THE MATERIAL ASPECTS OF SCIENCE AND TECHNOLOGY STUDIES: THE NARRATIVES AROUND SEED AS A 'THING' IN TAMILNADU

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DECLARATION

I declare that the dissertation entitled **"The Material Aspects of Science and Technology Studies: The Narratives Around Seed as a 'thing' in Tamilnadu"** submitted by me in partial fulfillment of the requirements for the award of the degree of Master of Philosophy from Jawaharlal Nehru University is my own work. The dissertation has not been submitted for any other degree of this University or any other University.

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CERTIFICATE

We recommend that the dissertation be placed before the examiners for evaluation.

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Dedicated to My *thangachi*

Dr Karthiga Kesavan

For believing in me from the days I took her for joyrides...

Contents

Introduction

I

Thinking about Seed

The thesis attempts to study seed as a thing placed in the ontological politics and Object-Oriented theorisation. Seeds are comprehended as active subjects of politics and social life viewed through the biographical contribution of G. Nammalvar, a permaculturalist from the state of Tamilnadu. The case study is situated within the debates of postcolonial Science and Technological Studies, and it will be claimed how things are redefining the social, political and the human-object relationship, which has become particularly evident when comprehended through the recent attention to the question of ontology.

Seeds are the primary input for agriculture. Seeds are objects of scientific inquiry and technological intervention and objects of contention in the biotechnological politics. They are an embodiment of regeneration and life and thus, an object of concern for the biodiversity conservationists. Seed is also an entity denoting the self-reliance and food sovereignty of the nation-states. Along with all these understandings, seeds, within the ontological hierarchy of subject-object and nature-culture dichotomies, are just seeds at the disposal of humans. The recent nonhuman turn is more concerned with the disposition of consigning objects and nonhumans to the zone of passivity (Bennett 2015, 224). The relegation of nonhumans and objects to the sphere of passivity and the regulation of it cannot be the ontological mimicking of the world as it flows in space and time but is a mental construct echoing the Cartesian divide. Such a mental construct is not the real momentum of the world itself but "one ontological vision" in which humans sit on the royal throne gazing at the passive material world as the dominating 'beings' (Pickering 2009, 1).

> The nonhuman turn, then, can be understood as a continuation of earlier attempts to depict a world populated not by active subjects and passive objects but by lively and essentially interactive materials, by bodies human and nonhuman. Some of the impetus to reinhabit the tradition also comes from the voluminous mountains of "things" that today surround those of us living in corporate-capitalist, neoliberal, shopping-as-religion cultures. (Bennett 2015, 224)

This thesis tries to express seeds as an enacting subject and as a catalyst of thing-politics and efforts to conceptualise the human-seed relationship presumed in the alternative politics of Dr G. Nammalvar. The idea of thing-politics is drawn from the neologism "*Dingpolitic*" of Latour (Latour 2005b, 14). The term centres the objects in social and political theorisation and

politics. For Latour, in contemporary times, people and other actants are assembled around the objects of concern, increasingly in the arena of politics like the politics around Genetically Modified Organisms or melting glaciers. The politics is claimed realist, and they look out at the material world and understand the geographies of object assemblies (Ibid., 14-15). The definition of Latour is expansive and gets closer to a parliament of things. However, in the thesis, the term thing-politics or politics of things are used in a very particular sense to understand the social and political networks, dispositions, and assemblies created around a thing. The thing can be anything from a seed to a water body. Moreover, the idea of alternative politics is comprehended through the prism of postcolonial Science and Technological Studies (STS) where the question of alternative sciences is studied symmetrically. The seed imagination within permaculture design and the alternative politics around such a system can be comprehended within the scope of postcolonial STS. The study is significant as these alternative practices like permaculture not only results out of the dissension with the industrial agriculture but also potentially reconstructs the science and society relations in the society. The seeds are thought as an actant in the social and political life within the sensibilities and possibilities provided by the ontological turning in STS. In the study, seeds are understood as objects for expository purposes through Latour's conceptualisation of quasi-objects (1993), Bennett's thing-power (2010), and Bryant's machines (2014).

To stress the fundamental disposition of the thesis, the question of Haraway is posited about the seeds, which she associated with her dog. In the words of Haraway,

> where do we find ourselves? When my dog and I touch, where and when are we? Which worldings and which sorts of temporalities and materialities erupt into this touch, and to what and whom is a response required? (Haraway 2006, 145)

Where do we find ourselves? When the seeds and I touch, where and when are we? Which worldlings and which sorts of temporalities and materialities erupt into this touch, and to what and whom is a response requires? These specific interrogations are consociated within the seed politics of Nammalvar. The seeds, human-seed relationship, and the reorganisation of human-object relationship in the public disposition through Nammalvar's sociological imagination become the crux of the research objective framed within the discourse of postcolonial STS. Through these narratives, the seeds will be established as actants and catalysts of thing-politics rather than just as representational objects or products of social construction.

The next section will give a brief overview of the literature on seeds and will bring out the differences in interpreting seeds within the ontological turn as active constructors of politics and as objects questioning the modern order of things.

Sociology of Seeds: A Brief Overview of Narratives on Seeds

Seeds are plural in its varieties, and some of the seeds are vital for the human survival, and other are not the concern of the humans. Mainly, seeds are considered as the first link in the food chain and are transmitters of life's future evolution. Seeds in the agriculture are generally classified as heirloom seeds (traditional or organic), hybrid seeds (first generation (F1) seeds achieved by the crossing of distant relatives of same species), and Genetically Modified seeds (desired genes from different species are introduced into the genome of the seeds) (Mone 2016, 2). Seeds are not only related to survival and agriculture but have been related to aesthetics, economics, medicine, science, politics, cultural, ethical, ritual, ecological, and technological aspects of life. Seed as an entity is and has been a significant object of concern in the social and political life of the humans.

Also, the seed is one of the essential objects of contestation seen through the prism of Science and Technology Studies (STS) in India. Seeds are the focus of a range of scholars from the fields like rural sociology, environmental studies, social movements and STS mainly from the beginning of the green revolution period to the post-green revolution and today, in the era of biotechnology. Within the corpus of STS, seeds can be studied as a part of S&T contentions, Intellectual Property Rights (IPRs), democracy and S&T, alternative sciences, and also, within the spectrum of social movements.

Seeds are simultaneously varied things; they are biological entities; constituents of ecological systems; actors of human practices and scientific endeavours (Lacey 2003, 91-92). In a closer look at its biological aspects, then seeds are both a tangible and an intangible object within the paradigm of Plant Genetic Resources (PGR). Plant Genetic Resources refers to the "total range of plant germplasm [the hereditary material of every cell] available in the global in the global gene pool" (Kloppenburg and Kleinman 1987, 9). As a tangible entity, a seed is an embodiment[1] of the germplasm. Similarly, the genetic material (DNA) that contains the code

[1] Seed is a generic term used to denote the propagative part of the plant, which is for the purpose of convenience. Sexual seeds are the true seeds that are produced due to the ovule fertilisation. The asexually propagating seeds (through cutting, grafting and tissue culture) stores their germplasm in the vegetative parts of the plants itself that includes the tubers, roots etc (Roa-Rodriguez and van Dooren 2008,194 and Kloppenburg and Kleinman 1987,9)

or the information of the traits inherited is the intangible aspect of the seed (Roa-Rodriguez and van Dooren 2008, 179). This dual approach towards the seed is not a modern post-DNA-discovery understanding, but even within the traditional agricultural practices, seeds were both a tangible renewable entity and were also saved and bred as a source of hereditary traits in the transmission of next generation of crops (Ibid., 178-179).

Seeds like most of the other material entities and nonhumans around us have been travelling in the historical time and space, and they are objects constituted and impacted by the larger structural forces. Seeds and plants of medical, botanical, and agricultural importance were traded and were also critical geopolitical entities from the colonial times (Chandra 2016, 1-3) (Chakrabarti 2013, 20-22). The question of utility, trade, medicinal value, vested interest of imperial power, and the notions of philanthropy, and contributions to the international scientific community are the legitimising factors. Along with these factors, the internal administrative imperatives that included plant protection, storage, disease prevention in the plants, famine protection led to the overall imperial interest in seeds and its scientific investigations (Arnold 2000, 23-37).

In the post-Mendelian period, Science and technology directed the monopolisation of plant germplasm on the fields through scientific breeding techniques, which consecutively became proprietary relations when the seeds were commodified. From the point of History of Science, the experiments with the genetic resource of plants started after the Mendelian model of hereditary transmission that led to the "making of natural history," where the technology of gene transferring was "outdoing evolution." (Kloppenburg 2004, 1-4) For scholars like Kloppenburg, "seed wars" are consequential of the successful wedlock between the Science of plant improvement and capitalism not to mention the transnational politics in the control of plant genetic resources (Kloppenburg and Kleinman 1987, 14-25).

In the context of India, in the mid-1960s, through New Agricultural Strategy, hybrid dwarf wheat was introduced deriving genes from a Japanese wheat variety. The introduction of High Yielding Varieties (HYV) is seen as a significant move in removing absolute poverty and creating food self-sufficiency in the country (The green revolution) due to the increased production output of the hybrid seeds along with the fertilisers and irrigation facilities. The green revolution, however, is not without its problems in producing uneven wealth and making farmers' resource dependent within the neo-liberal frame (Mallick et al. 2011). Such paradigms of innovations reconstruct the social arrangements around the core objects, here the seeds. Hybrid seeds were imported, international research agencies were involved in the innovation, and research laboratories were installed in many regions of the country in the phase of the green

revolution, and the seeds became a public good mediated by the welfarist state from being a common heritage under the custody of the farmers. Through subsequent patenting and Intellectual Property Rights, the first world and the corporates took over the control of plant genetic resources of the third world (Shiva 1991, 61-66). The political economy of the seeds in the green revolution phase is manipulated through the political ideologies, leadership, scientists, and the policy decisions (Visvanathan 2003). Shiva also deconstructs the myths of high yielding and addresses the development of new pests affecting the less stable and vulnerable monoculture fields (Shiva 1991, 81).

Seeds are just one aspect of the agricultural revolutions but of course, a significant unit to comprehend the direction of the flow of the technologies and its elaborate production of subsequent social realities. The phenotypical intervention in the seeds after the Mendelian Science resulted in the techniques of the green revolution and the genotypical intervention at the molecular level of the seeds after the discovery of DNA helix model by Crick and Watson influenced the gene revolution or the biotechnological revolution (Mallick et al. 2011). The two technological paradigms are the results of two different innovation systems that have to be comprehended within the structures of modernisation and globalisation (Parayil 2003, 986). In the case of the green revolution, the seed technologies were developed and transferred through the national collaborations with the aid of international agencies and the state-sponsored research institutions in the public domain. In the case of the gene revolution, the knowledge pool of biotechnology rests with the vast corporate investments in the field, and the transfer of technologies is through the private corporates in the field of biotechnology due to the liberalisation of intellectual property rights under the TRIPS (Trade-Related Aspects of Intellectual Property Rights) agreement (Ibid., 980-981). Therefore, the technology led to the redefinition of the imagination of seeds from the public domain to that of the proprietary realm. The system of Science works in nexus with the economic and political regimes of the time. Mooney's pathbreaking work captured such an account of the transformation of seeds from being a public to a private resource, *Seeds of the Earth: A Private or Public Resource?* (1983) in the context of the United States of America. Mooney traces the geography of plant genetic resources from the maps of Vavilov centres and shows how the development in Science and capitalism has rendered the gene-rich third world countries monocropping fields due to the green revolution (Mooney 1979, 1-22).

With the advent of biotechnology, seeds are entities of patenting regimes and legal battles (Kinchy 2012, 3-5). Due to enormous corporate intervention in the biotechnology, Jasanoff observes, seeds as objects of the first-world corporate empires that colonises the third-

world through the biotechnological innovations functioning like the colonial empires (2006, 285-292). In the article "A Biotechnology Story," Visvanathan and Parmar (2002) crucially mark all the central sites, figures, events and arguments relevant to biotechnology debates in India. Somewhere else, Visvanathan observes M.S. Swaminathan's[2] remark on biotechnology in agriculture as the catalyst for sustainable green revolution. He is understood as a figure who successfully tamed the dualism of land and lab, sustainability and development, and innovation and justice (Visvanathan 2003). Here, in Swaminathan's politics, the seed is imagined as an entity that can be altered not as an innovation of technology or profit but towards the higher purposes of sustainability, justice, humanity, and sufficiency. However, Suman Sahai, a Genetics scientist and the founder of the Delhi-based Non-Profit Organisation, Gene Campaign, takes a very conscious step about the incorporation of all biotechnological innovations. Specifically, when it comes to the introduction of Genetically Modified Organisms (GMOs), regulation is significant perceiving the issues of transparency, food safety aspects, farmers' rights, public participation, corporate monopolisation, policy competency, environmental impacts, and corporate monopolisation (Krishnakumar 2004).

Seeds are also embodiments of rights, security, sufficiency, and sovereignty. Chandra complicates the notions of rights, entitlement claims, and imaginations of citizenship of the peripheral communities in the developing biotechnological innovations and legal configurations (2016, xviii-xxx). Also, seeds after the biotechnology revolution became the personification of identity, ideology, rights, and representation within the discourses of patenting, food sovereignty and popular politics.

Susan Visvanathan (2015) discusses the seed and its political economy through the question of region and identity. The government of Kerala along with The European Union founded the Kerala Horticultural Development Programme (KHDP) in the early decades of the 1990s since the Kerala farmers were mostly dependent on the seeds and vegetables from Tamilnadu due to specific climatic conditions. The setup came about as a result of Mullaperiyar water dispute with Tamilnadu and also due to the apprehension about high fertiliser usage in the fields and the subsequent rise in the cancer rates in Kerala. The Kerala farmers wanted to de-link their import of seeds from the neighbouring state. In 2001, a new seed processing plant was established in the state in which the university scientists were

[2] Though praised as the father of green revolution in India, M.S. Swaminathan is a controversial figure amongst the activists and academics of sustainable and alternative agriculture practices for allegedly acting in favour of corporate and other international agencies (Alvares 1986). R.H. Richharia, senior rice scientist during the time of Indira Gandhi is lauded for his commendable insights over the indigenous HYVs and plan for sustainable rice cultivation in India. (Dogra 2017)

employed to produce enhanced seeds, which were then distributed to the farmers. Here, the question of identity, region, and the seeds are interlinked and how science and technological policies and international collaborations play their role is significant to observe. Also, the capability of one object (Mullaperiyar water) is interlinked with the political economy, and capability of the other object (seeds) and the idea of social is produced within such human-nonhuman relations.

Other literatures on seeds include ethnographies of seed saving (Phillips 2016); social life of seeds in terms of dispersal practices (Ellen and Platten 2011); seeds as biosocial commons (Patnaik 2016); and studies on comprehending the PGR access through the conservation organisations (Patnaik et al. 2017). Moreover, Pushpa Bhargava continuously worked on the policy concerns of the biotechnology and also, wrote on the need to control the seed business in India (2003); Niranjan Rao emphasises the importance of public sector investment in plant breeding (2004); and the role of civil societies in defending the seed sovereignty is accounted by Herring (2005). This is a very brief account of the vast literature available on seeds.

The literature mentioned above mainly narrate seeds as a pre-given category. The turn to ontology[3] complicates such fixities and is philosophically committed to the deconstruction of dichotomies like nature-culture and subject-object. Besides, it comprehends seeds as actors enacted and also as constituting of social and political rather than connoting seeds as products of the social and political forces. In most of the works cited, seeds are social constructs and objects of intervention, changes, manipulations, ideology, resources, and instruments of control. Though seed entities are placed in the social and political narratives, they are not attended with the sensibilities of the ontological turn: as an equal actant in the assemblies of reality production, and as an object in entanglement and in becoming rather than as a fixed entity. Demeulenaere's study comprehends the social movement called "Peasant seed" in France against the seed regulations as ontological struggles. Besides, the seeds reimagined in the distinctive scientist-activist epistemes are identified as different "biological ontologies." Seeds are understood as objects producing a distinctive worldview against the existing regimes. In her words, "the ontological dimension in this seed struggle, drawing on both meanings of the term as biological ontologies and worldviews are connected" (Demeulenaere 2014, 46).

[3] The introduction of the turn to ontology is explicated in the section on the ontological turning in the STS in this chapter itself and the second chapter will provide a detailed overview of epistemological and ontological undertones of STS.

Muller, in her article on seed struggles, bring in the argument of seeds as companions and tries to provide an ontic human-seed relation outside the conceptual categories (2014, 5-8). In these narratives, seeds are the highlights of the politics- the thing-politics, where the humans are assembled around the object-seeds. The question of ontology is invoked to understand the reality as composed through various actants and not as a fixed entity. In such a view of reality, the materialities, capabilities, and role of the human, nonhumans, and objects become evident. Therefore, the turn to ontology is inevitably related to the emphasis of the nonhumans and objects not only within STS but also within the anthropological literature. Thus, seeds are not the products of social construction but are the constituents constructing the social.

One cannot forego the political significance of the ontological turn and the object-centric worldviews. It is not only underscoring the objects in the social and political life but also proposes certain kind of reality, which often questions the dichotomies of subject-object and nature-culture, which are the underpinnings of modern scheme of things and therefore, here, seeds are the constituents of the nonmodern world (Latour 1993, 56, 78). Seeds as objects questioning the modern order of things are called counterhegemonic objects (Pickering 2009, 9).

Seeds as Counterhegemonic Objects

Seeds in the modernist order of things are observed as passive and are dealt as an object to be controlled and regulated. Kloppenburg remarks on how the forces of capitalism, science, and technology organised in their schema of things, approach seeds just as a potential object of commodification, scientific inquiry, and control (Kloppenburg 2004, 8-11). This approach to the seed-thing is a modern worldview unlike the polysemic construction of things, an ontological attitude of many nonmodern and non-western worldviews. Visvanathan states that plants, seeds, and other related species are observed as polysemic entities in the Indian context- as objects of ritual, reverence, magic, utility, livelihood, and memory (1997), which cannot be corkscrewed top-down by the institutions of capitalism, science, and technology. Understanding seed in such a polysemic nature is not anti-science or against the rationalist tendencies, but the seeds become "counterhegemonic" objects that question the centring and dualist objectivity of the world. Seeds as products of polysemic worldview connote,

> explicitly and self-consciously decentered practices and their products that an ontology of becoming becomes the natural ontological attitude, exposing dualist detachment for

> what it is: just one tactic of being in the world that we have at our disposal. (Pickering 2009, 9)

Such counterhegemonic traditions, their practices, objects, and institutions that are left to the margins have to be taken into account for understanding the liveliness, relationality, and thing-power of the materials around. These accounts will deconstruct our tendency of passive traversing in the world with a fixed order of things to a zone of relationality, flow, and becoming in entanglement. Seeds can be understood as relational, and as lively-becomings along the humans in spaces, interactions, assembles, events, and processes of counter-worldviews. Muller brings the example of the peasant struggles in France and Latvia against the seed production and regulations established during the period of agricultural modernisation as spaces of counternarratives, in which human-seed relations are articulated and reasserted through their sensorial relationality with the seeds (2014, 8-11). Seeds in such contestations are subjects mobilising the actants in the assemblies owing to their material agency as regenerative entities.

Three propositions are made up to this point, which will be taken for discussion in the following chapters. 1. STS and the ontological turn within it will emphasise the social, political, and material role of the objects. However, to understand the relevance of the turn in the postcolonial context, one has to be comprehending how the concepts of modernity, indigenous knowledge, alternative sciences, social movements, community rights, and developmental questions are framed within the discourses of postcolonial STS. In particular, how the discourses of alternative sciences and its practices are placed within postcolonial STS. The chapter one will deal with these propositions. 2. Seeds are understood through the descriptive term object. Object-centric theories will be rehearsed in chapter two to comprehend the seeds as thing-power, quasi-objects, machines, and black boxes. 3. The politics of Nammalvar is claimed as a thing-politic using the sensibilities of ontological turn and object-centric theories. Seeds construed within his seed politics will be explained as enacting subjects and catalysts that not only led to the realisation of seed-power and reimagination of human-seed relationship but is an originator of thing-politic to emerge in Tamilnadu seen through the biography and politics of Nammalvar.

II

Thesis Outline

Seeds are construed as coevolving and manifested as active agents of biological, social, and political life and are conceptualised as objects in this work. They are objects, in particular, because the Latourian and Object-Oriented Ontology[4] (OOO) frames provide the necessary conceptualisation to socio-politically understand entities around us without ontological hierarchization by the category of objects. These theorisations neither reduce objects to its elements nor construe them immediately in relations but attempt to perceive them as individual entities. Humans are also objects, and the distinction will be based on their differential performances and agencies in particular collectives (Bryant 2011, 19-21). Latour's Sociology of associations assumes objects as actants in the networks of other actants without subject-object hierarchization in theorising the social (Latour 2005a, 10). Bryant comprehends objects as machines that have to be explained with its performance as active contributing objects with differing capabilities and agencies (Bryant 2014, 6-7). Finally, for Bennett, objects are things since a thing is outside the purview of conceptualisation and control of humans, unlike the objects. Bennett's is a political project that aims to bring forth an attitude in the humans and a public mood where the mundane objects will be seen materially vibrant, manipulative, and agential in the biological, social, and political platforms (2010, vii, xvii). All these projects will dissolve the ontological hierarchisation of subject-object and nature-culture dichotomy, and in fact, centres the objects for the social and political analysis by dissolving anthropocentric narratives.

In the context of India, within the STS discourses, seeds are mainly read through two broad frameworks: firstly, within the green revolution and biotechnological politics (Mallick et al. 2011, Parayil 2003, Visvanathan 2003, Jasanoff 2006, Chandra 2016) and secondly, as constructed in the 'alternative' approaches to the agriculture, which are grouped as alternative sciences in the postcolonial STS discourses (Masanta 2008, Paul 2018, Shiva 1991, and Visvanathan 1997). These two frames are mostly juxtaposed as incompatible in their trajectories and worldviews as their notion of the outside world, interaction with market forces and the state, approach to development, and their idea of time-space are distinctive. The phase

[4] Object-Oriented Ontology is an umbrella term coined by Levi Bryant that includes a range of philosophies and social theories, which mainly came about in the late 1990s. Graham Harman is one of the founding figures of OOO. Though it is not an entirely new attempt, fundamentally, OOO theorises reality in terms of objects be it humans, nonhumans, fictions, natural or cultural entity (Harman 2018, 3-10, 279).

of the green revolution has to be understood within the paradigm of modernisation approach whereas the alternative approaches question the unilinearity of modernity and talk about the multiple modernities. Rajan brings out the general view on the alternative sciences approach as Luddite and polemical and finally, observes this literature as works on social movements and notes that these works as relatable to STS repertoire as covering the dissenting imaginations of democracy (2005, 13-14). Such observations cannot stand the test of significance of the postcolonial imaginations in STS. Science and Technology Studies (STS) can, in fact, become a powerful tool to attend and comprehend such alternative claims of practices and objects. The idea of symmetry towards understanding the various technoscientific or alternative practices is the fundamental credo of STS and in specific, the rationale of the postcolonial STS (Lin and Law 2015, 117). Also, the alternative practices are always a part of the STS accounts in India due to India's unique experiences with modernity and colonialism (Visvanathan 2011, 300-305). The question of modernity, colonialism, alternative worldviews, democracy, the political economy of Science and the developmental projects are the integral components defining the postcolonial temporality, and the grasping of these layers is the primary objective of postcolonial STS.

> It is important not to lose sight of the uneven distribution of technosocial networks around the world or of the alternative concerns, practices, or what we might think of as different "modes of knowing" in non-Western places. To say that we have never been modern is, in short, to talk about a "we" whose knowledge is particular, specific, and located. (Lin and Law 2015, 117)

The alternative concerns and practices are not only 'modes of knowing' but are modalities of constituting different worlds. These practices create different kinds of objects in the world which are opposed to the dichotomous worldview of the western metaphysics and are nothing but ontological in essence (Escobar 2010, 2016, Muller 2014, and Demeulenaere 2014). Woolgar and Lezuan try to assume the constitution or the ontology of the bin bag through the organisation of the textual content (2013, 327). In the same way, the seeds are constituted in duality: as biologically different entities (Demeulenaere 2014) within the designs of permaculture and as "counterhegemonic" objects socio-politically in the politics of Nammalvar (Pickering 2009, 9). These contra objects are against the modern order of things of the capitalistic, patenting, and scientific regimes where seeds are passive, regulated and institutionalised. The relational view of the things especially with the seeds in the case of Nammalvar can be seen as reflective of the material design and the normative undercurrent of Permaculture.

Permaculture is an alternative agroecology design and a movement (Brawner 2015, 430-432) that extends itself as a counterculture and talks about alternative archaeology, lifestyle changes, proposes counter food culture and is also a community-centric economic model (Crosby et al. 2014, par. 6-10). It developed as a sustainable alternative system for the western agricultural methods during the post energy and environmental crisis warning given by *The Club of Rome* in their stimulating book *The Limits to Growth* released in 1972. Permaculture drew on various scientific disciplines like Ecology, Landscape Geography, ethnobotany, folkloric, and indigenous knowledge systems (Mollison and Holmgren 1978, 2-5). The design was originated by Bill Mollison and David Holmgren in the mid-1970s in Australia. The design is agroecological, polycropping, and perennial in characteristics. Perceiving permaculture as an alternative agricultural method, or environmental science or as environmental cum political movement is just a surface-level comprehension. The design inherently expresses a 'natureculture' or a hybrid, which is a monist approach through its conceptualisation of "cultivated ecology" (ibid., 4) against the detached nature-culture outlook attributed in the industrial agriculture where nature is objectified and evinced as inactive (Aistara, 2013, 116). Permaculture deconstructs the divide between the theory and practice, and between rationality and sensibility through its basic explorative patterns of coming into contact with the world (Rothe 2014, 1). Therefore, the thesis does not assume permaculture as a movement or a method but details it as a design capable of reconstructing the material relational worldview.

The design axiomatically decentres the human ingenuity in the constitution of the world by illuminating the capabilities of the things outside: the soil, water bodies, plants species, and forests in constructing the realities. Mollison recommends to "Observe what happens in nature and then imitate it, adapt strategies that have already evolved accidentally" (1981, 6). Though the remark like "accidentally" puts into question a systemic flow of the natural system, it renders huge credibility for the act of imitation that is implicit in the natural systems (Rothe 2014, 2). The soil, plants, rivers, and the cattle species are understood as materially active agents that can furnish the human observer the knowledge, practical lessons, and give an explorative space in time for the constitution of the ontology. The design summates a shared agency, material relationality, and vibrancy of the things in which the humans, nonhumans, and the technological objects are understood for their capability and functionality in the material world. The major material and normative effect of the design is the delineation of dualistic ontological worldview as one of the many approaches of being in the world and also,

permaculture as a "self-consciously decentred" design connotes the material relationality between the things - an ontology attitude of becoming and coevolving with the things around (Pickering 2009, 9) (Forde 2017, 126-127). The Material agencies of the humans, nonhumans, and the objects get outstandingly accounted in the relational design, in which the everyday life is interconnected with the macro-level geopolitical and socio-economic structures. Moreover, such practices are taken up by the communities who are perceived as alternatives and associated not only with ecological but with various other alternative movements, and not to mention the networking, leadership, and training aspects involved (Forde 2017, 123-124, 128-129).

Lastly, two things have to be said: the thesis is not commenting on the 'scientificity' or the productive performances of permaculture. The system is not unproblematic, but the concern is to take into consideration the material and normative design of permaculture (Ibid., 119) so that the politics of things taking place in the state of Tamilnadu can be traced through a micro-level understanding from the genealogy of Nammalvar.

The polycropping system conspicuously establishes the idea of material relations, companion living, becoming, flow, and vitality of not just the plants, and cattle but about the material and the objects in general, considering its decentred and social movement-based outlook. In fact, in the case of Nammalvar, he spearheaded the protests against methane exaction; continuously argued for the conservation of water bodies; questioned the political economy of poultries, and organised people against fast food as he was also a part of the slow food movement. Moving back to seeds as an object in the design of permaculture, what can they be in such a configuration if not propelling its thing-power, relationality, hybridity, and companionship with the practitioner. However, the claim is that Nammalvar, the leader of the organic farming movement in Tamilnadu popularised such material relationality and a modality of companionship[5] not just with the seeds but with many other objects, which is called as the politics of things-a term drawn from Latour 's *dingpolitik* (2005, 14).

Being a storyteller, he narrated onto-stories[6] that explicated the thing capabilities and his popularisation of seed ball techniques created an alternative sociological imagination of the seeds (Bennett 2010, 1-4). These two methods are understood as techniques of representation

[5] The cover pages images of Nammalvar's books expresses him as the companion of nonhumans. For images see appendix 1.

[6] Onto-stories are stories that express the thing-power and material capacity of the things. The concept will de detailed in the chapter two in the section on Jane Bennett (2010, 4).

of the material power. Seeds are the subject of his politics, which not just expressed the seed-power by propagating saving of traditional varieties, and seed autonomy but it is argued that the seed as a subject became the initiator of the thing or object-politics in Tamilnadu understood by contextualising Nammalvar. The thing-power of the seed is detailed as being constituted within the design of permaculture. Permaculture is a skeleton frame, but the focus is laid on the assemblages around the two subjects of thing-politics: Seeds and Nammalvar. By comprehending the seed constitution of Nammalvar, I try to analyse the personal discourses of Nammalvar to show how his engagements can be captured as the beginning of thing-politics in Tamilnadu since many contemporary contestations in the state are about the question of science, technology, industry, development, and environment. Also, through the propagation of material, sensorial, and relational associations between seeds and the humans, a unique human-seed relationship is proposed, which reached out to a broader public due to his sustained efforts. The question of human-seed relationship is comprehended through discussing the general human-object relationship conceptualised by Theodor Adorno and Bennett.

Nammalvar is a charismatic leader with a flair for the Tamil language, a spellbinding storyteller, voracious writer, a networker, traveller, and an organiser. Committed towards organic agriculture, Nammalvar influenced many youngsters, villagers, urban middle class and women groups. He conducted workshops to educate farmers, activists, and enthusiasts about the organic farming methods and experimented with the techniques; networked with various Non-Governmental Organisations, universities, and self-help groups; travelled widely and held numerous meetings not only in Tamilnadu and other Indian states but also in other countries like Indonesia, United Kingdom, Philippines, Sweden, and Malaysia among others. His charisma has to be interpreted based on several aspects beginning from his saintly outlook to his exceptional wisdom, socialising capabilities, and his down-to-earth personality, which influenced the people to follow his ideas and politics (Weber 1978, 215). Though Nammalvar was the central figure of the movement[7], he built a strong community-centric leaderships and motivators, and thus, he was more democratic than a centralising figure (Khadse et al. 2018, 208-209).

The thing-politics of Nammalvar is delineated as his commitment to the things around us in general and specifically related to the aspects of agriculture, ecology, and body. Some of

[7] For information on other organic movements in India refer Alvares (2014). For sociological accounts on Karnataka Rajya Raitha Sangha, see (Khadse et al. 2018), refer also Plenty for All by Dabholkar (1998) and Mansata's (2015) The Vision for Natural Farming.

the individual things addressed by Nammalvar can be listed as follows- seeds, Bt. Brinjal, shrimps, palm trees, millet crops, neem, methane, microorganisms, earthworms, weeds, trees, soil, water bodies, forests, indigenous hens and cattle, and tractors among many others. He decentred the focus of the politics in the state from an anthropocentric standpoint to a thing-centric politics. He organised people, conducted meetings, and was part of many agricultural and environmental activist groups and gathered momentum for talking about the material politics. The question of sovereignty of the people was addressed in parallel within the sovereignty of the things.

Research Objectives

1. To narrate the context, genesis, epistemological, and ontological presumptions of STS in the West and India to capture its diverging and intersecting commitments for long-term academic engagement with the question of objects and nonhuman in the Indian context.

2. To exposit the turn to ontology as a significant step forward in understanding the nonhumans, objects, and materials concerning the STS and in what ways it can contribute to the postcolonial STS' endeavours to address the raising material and nonhuman contentions.

3. To establish seed as a thing-power and a subject with a differential agency in the social and political theorisation through rehearsing Latour's sociology of association (2005a), Bennett's thing-power (2010) and Bryant's idea of machines (2014).

4. To expound the propositions mentioned above, the politics of Nammalvar is taken to fore, and his seed imagination and seeds-politics are detailed through techniques of representing seeds. Moreover, it will be argued that the seed-politics initiated by Nammalvar as the originator for the many other politics of things to spur in Tamilnadu in the recent times if seen through the biographical accounts of Nammalvar.

The study started as a puzzle and continued to be exploratory. However, the thesis attempts to present some interpretative claims on the objectives. Therefore, instead of a straightforward hypothesis, broadly, I ask "How can we theoretically expound Nammalvar's seed politics through the possibilities created in turning to ontology and object-oriented theorisation if not as a politics of things?"

The fundamental commitment of the study is to establish seeds as enacting subjects and a catalyst of thing-politics through the figure of Nammalvar. However, academically and

theoretically, the commitment is placed within the broader discourse of postcolonial STS. The ontological turn and the object-centric politics are brought up to conceptualise seeds as objects of materiality, relationality, and thing-power. The critical terms of the research include seeds, STS, postcolonial STS, ontology, objects, thing and thing-power, thing-politics or politics of things, and Nammalvar. The discourses, concepts, things, events, processes, personalities, and theories are brought together to establish the research objectives.

Chapterization

Introduction

The introduction establishes the fundamental disposition of the study, which is aimed at understanding the seeds as a subject of the social and political. The seeds are explained not just as the products of the social construction but as agents of enacting the social. The thesis draws on the commitment of STS in the ontological turn and sets out the context for engaging with the politics of Nammalvar and the seeds. Thus, the rationale of studying seeds as actants through the case study of Nammalvar will be detailed. Also, the chapter discusses two major themes of the research in detail in its later section: the ontological turn in STS, and the ontological politics and the seed question.

Chapter One: The Context, Genesis, and Practice of STS in the West and India

Chapter One is aimed at placing the current study in the literature of postcolonial STS. The process is not straightforward considering the complicated genealogy of STS in the west and India. Therefore, the arguments of the chapter traverse in such complexity without directly situating the study as a discourse within postcolonial alternative sciences. The dispositions of STS in west and India are traced, and various categories that define the postcolonial STS are explained. The chapter is closed by discussing the changing focus of STS from knowledge to material aspects of science and technology.

Chapter Two: Theorising the Objects and Establishing Seed as an Object.

Chapter Two brings out the philosophical and theoretical presumptions of the research. The chapter is conceptual and discusses the theorisations of Bruno Latour, and other Object-Oriented Ontologists like Levi Bryant and Jane Bennett. The chapter explains the categories like ontology, quasi-objects, objects, machines and things to establish the basic undertones and the politics of these theories. Finally, the chapter delineates seed as an object, thing, and

machine simultaneously for understanding the entity in material terms through a review of the literature.

Chapter Three: The Politics of Dr G. Nammalvar, Sociological Imagination of Seeds, and the thing-politics in Tamilnadu.

Chapter Three is the crux of the thesis where the case study of Nammalvar is placed within the sensibilities and potentials of the ontological turn in STS. The chapter attempts to interpret the politics of Nammalvar as a politics of things, in which seeds are addressed as the subject and initiator of thing-politics in Tamilnadu. The design of permaculture is established as the underpinning for the relational materiality viewpoint of Nammalvar and the source for his thing-politics. The chapter also discusses the reimagination of human-seed relation within his politics after conceptualising the object politics. Finally, the seed-story and seed ball techniques are explained as his two techniques of representation employed to popularise the seed-power.

Conclusion

The concluding chapter rehearses how the constitution of the object like that of the seed defines and redefines the assemblies around it. Also, the chapter discusses the need for sociologically grasping the objects of concern when it comes to the issues of science, technology, and ecology as they are constituting the social and political life. Finally, the case study of Nammalvar is said to emphasise the emerging categories of nonhumans, objects, and region to the forefront in the discourses of postcolonial STS.

Methodology

The study employs discursive categories and concepts to establish the claims in the research objective. The thesis is a presentation of an interpretative research account that relied mainly on the secondary qualitative data. Various kinds of secondary data used include books, academic articles, unpublished theses, newspaper articles and magazines, pamphlets, video documents, podcasts, visuals, contents from blogs and other social media platforms. For accounts on Nammalvar and his politics, several of his Tamil publications, speeches, and video documentation were studied along with the vast reportages on him and his contributions in Tamilnadu.

The resources for the study were mainly collected from the libraries like Dr B. R. Ambedkar Library, Jawaharlal Nehru University, New Delhi, Centre for Science and Environment Library, New Delhi, Centre for the Study of Developing Societies, New Delhi, and The Nehru Memorial Museum and Library, New Delhi.

Limitations

I could not gain the ground knowledge about the organisations, networks, and the gravity of the works of Nammalvar considering the time and scope of the M Phil research. Also, an ethnographic detailing of the seed narratives would have illuminated more on the human-seed relationship established. This limitation reflects in the chapterisation where chapter one and two are expository trying to establish the context of STS, the question of ontology and the object theorisation. Therefore, the chapters are explanatory and not analytical in the argumentations. However, chapter three is entirely built on the broader theoretical propositions, which are interpreted by the case study of Nammalvar.

III

The section will situate the current preoccupation with the seeds under the ontological turn in STS. However, Chapter Two will take a few steps backwards to contextualise STS and its discourses in the west and India to rehearse their presumptions with the notions of epistemology and ontology so that one can discern the relevance of this ontological and object-centric politics in the Indian scenario.

The ontological turn in the Science and Technological Studies

The idea of epistemology and ontology are articulated in a particularistic sense in the tradition of STS that cannot account for the multiple interpretations of the terms. Narrowly, epistemology is "the study of knowledge and justified belief. As the study of knowledge, epistemology is concerned with the following questions: What are the necessary and sufficient conditions of knowledge? What are its sources? What is its structure, and what are its limits?" (Steup 2018, par. 1). The theoretical base of STS for comprehending the scientific knowledge begins from Sociology of Scientific Knowledge (SSK). The approach primarily questions the foundationalism and essentialism of scientific knowledge but does not deny the scientific realism. The 'strong programme' extended the Wittgenstein project to create a legitimate space for sociology to interpret and explain scientific knowledge. Therefore, it is in this sense that

SSK is "anti-epistemology" and not a programme of anti-scientism (Shapin 1995, 297). In STS, the question of epistemology is advanced particularly in this sense of the description.

The techno-scientific attentiveness initiated by laboratory studies is often interpreted as a tilt to ontology from the previous focus on the epistemology of scientific knowledge. Like epistemology, the ontology is understood in STS from a particular vantage point. In general, the definition of ontology is "the study of what there is" (Hofweber 2018). Ian Hacking (2002) in his work on developing the Foucauldian "Historical Ontology" grasps it as the study of how "we" are "constituted as" along the three axes of "knowledge, power and ethics." Here, "we" extends apart from people to include things, ideas, and so on. STS slides to a "constitutive" comprehension of ontology than to the philosophical question of being or not being. The notion behind historical ontology is that the present being is constituted in a historical process through which we are created as objects of knowledge, subjects of power and agents of ethics. Even if not along the tradition of Foucault, STS is always inclined to study the constitution of things, i.e., right from Kuhnian work on the structure of scientific revolution in the macro level to the laboratory studies in the micro level. Such a constitutive understanding has always been sceptical of 'the natural.' For example, in the laboratory studies, the fundamental idea is to map the fundamental factors in the production of a scientific fact. Also, constructivists move beyond the human-nonhuman distinction. The other significant reference point of ontology in STS is empirical ontology stressed by Law and Lien among many others. The definition of empirical ontology marks a move in the source of knowledge from ideas and representation to performance, materiality, and enactment of things. Therefore, it is a shift from empirical epistemology (social shaping of Science & Technology) to an empirical ontology (reality itself is in the choreography of relations) (Law and Lien 2012, 363-368).

Law says that it is not that earlier in STS there were no studies of "choreography" of relations, and it just emerged. There is always a coexistence of the empirical epistemological and empirical ontological approaches in the studies of S&T (Ibid., 366, 367). However, Woolgar and Lezaun say if one wants to talk about the ontological project in STS, then it is more of renewal or reemphasising the old commitments rather than to boast it as something new. For him, such an emphasis on the ontology comes from the recent overall turn in the philosophy and social theory marked as a shift to the Materialisms, Post-Humanism, Nonhuman turn, and Speculative Realism amongst others (2013). Nevertheless, STS from the period of laboratory ethnographies attempted to demystify the mind-body, science-technology, human-nonhuman, and nature-society as merely cognitive dichotomies incapacitated to capture

the real complexity. Latour, Knorr Cetina, Pickering, Callon, and Law are significant early figures in the field to emphasise the entanglement of the human and material leading to the sociology of association, symmetry, enactment, practice and empirical ontology.

Sismondo remarks this 'ontological turn' as a "roundabout" of the earlier constructivist metaphor of STS, which is a matter of emphasis for a different purpose. The fundamental difference lies in the purpose; the social constructivist project aims at analysing the social process that will result in "durable realities" (Woolgar and Lezaun 2015, 2). However, in the ontological project, the aim is to study the immediate enactment of the practices here and now to bring about the complexity in the understanding of reality, which is even in a stable moment is precarious and "slippery" (Law and Lien 2013, 365). Woolgar calls attention to the phrase, "It could be otherwise" that highlights the alterities in approaching and explicating the practices and the reality (Woolgar and Lezaun 2013,322).

Finally, the two significant outcomes of the ontological turn would be 1. The turn has raised the bar to grasp the determination of reality (Woolgar and Lezuan 2015, 7) and 2. The turn highlights the object s, nonhumans and the materials that are mundane as performances enacted in practices (Woolgar and Lezuan 2013, 323).

Ontological politics and the seeds

Law describes ontological politics as,

> if realities are enacted, then reality is not in principle fixed or singular, and truth is no longer the only ground for accepting or rejecting a representation. The implication is that there are various possible reasons, including the political, for enacting one kind of reality rather than another, and that these grounds can in some measure be debated. This is ontological politics. (Law 2004, 162)

The thesis attempts to study the construction of seed reality in multiple terms- a polysemic view of seeds through the figure of Dr G. Nammalvar; an agricultural scientist turned permaculturalist. The "one kind of reality rather than the other" (Ibid.) produced through the seeds in the practices and politics of Nammalvar is addressed. Here, the seed reality is enacted. Therefore, the reality of the seed is not singular. The seed enacted in the politics of Nammalvar is nothing but an object crafted in the assemblage called permaculture (Rothe 2014, 8-9). However, I wish to address the question of how the object of seed became the initial spur for the politics of things to emerge in the state of Tamilnadu. Escobar, in his studies on Latin American social struggles, employs the term "*ontological struggles*" to explain such struggles

that destabilise the nature-culture dichotomy to demonstrate relational ontologies where the human-nonhuman and subject-object ontological hierarchizations are put into interrogation (2010, 39). Therefore, my fundamental propositions are kept under these two broader perspectives: ontological politics and ontological struggles.

The seed- the object of inquiry, is enacted in different sites, i.e., the seed is done differently in various sites. It is not the question of whether there is something like that of a seed as we see and identify them, which is the question of philosophical ontology. Here, the seed is studied from the foundation of social ontology which in a way accepts the socially identified seed, leaving aside the question, if the seed is present outside the construction of society. The sites are contextual and situated locally and thus, the seed-object is located and has to be understood as an in-hereness only in relation within that specific context (Law 2004, 42-45). Here, the ontological politics is that there is no being or becoming outside the process of enactment and beyond the idea of distributed agencies. Moreover, the ontological politics is firm about the symmetrical validity of realities rather than being a tool of relativism or singular worldview (Ibid., 151-152).

The thesis argues that the seed is interpreted in its relationality in the politics of Nammalvar who through his writings, speeches, and organisations enacted a particular kind of seed reality which propagated an associative and a companion-like (Muller 2014) human-seed relationship. This alternative human-seed relationship is proposed just as an initiation for many major thing politics to come in the state of Tamilnadu, which is nothing short of the "*ontological struggles*" of Escobar (2010).

Overall, by bringing the question of ontology and objects, the thesis philosophically rejects the scheme of one nature presented 'out there' as it is defined in the epistemological commitment of natural sciences and social sciences. This rejection is valued politically through the commitment towards plural realities as a viewpoint, where the politics is to overcome the subject-object dichotomy or nature-culture divisions propagated in the humanistic paradigms of the social sciences. Therefore, here, the seed is the subject of the proposal and not an asymmetrical object understood just in relation to the subject.

The next chapter will be on the context, genesis, and practices of STS in the West and India, which will be used to explain the underlying preoccupations of the two discourses moulding their engagements with the question of knowledge and reality. The understanding of the epistemological commitments and ontological views are fundamental to imagine the

question of objects and nonhumans within that specific socio-historical context. Therefore, to place the politics of things of Nammalvar within the corpus of alternative sciences and the simultaneous object imagination, an overview of debates in the Indian STS is necessary.

Chapter One

The Context, Genesis, and Practice of STS in the West and India.

I

Background and Dispositions of STS: Western and Indian Accounts

As a post-cold war discipline, STS inherited a cautious attitude towards the role of science in society. It has neither an anti-science stance nor a propagandist position. The alarm bell hit the conscience of both the natural and social scientists after the dreadful consequences of the Manhattan Project. However, in the decolonised countries, the experiences with Science come implied with their colonial encounters. The preoccupations and the origins of STS are socio-historically situated and related to the encounter with modernity. Therefore, comprehension of the genesis, institutionalisation and the ideologies of STS cannot be disentangled from the aspects of modernity, colonialism, nation, democracy, and developmental paradigms.

Theoretically, the field is distinctive from the other social studies of science (History, Philosophy and Sociology of science are called social studies of science) that are mostly the products of enlightenment mission and rationale. Epistemologically, the objective of the discipline is to understand and produce knowledge through the lens of science and technology in creating social realities rather than through the presumptions of the categories like that of social, historical, and political. In fact, STS travels in between the standard schism of 'two cultures': the divide between humanities and the natural sciences. It is not only trying to travel in the midway but also attempts to deconstruct the very divide between social and natural, calling it a Kantian hangover of the Copernican revolution (Latour 1999, 6). This revolution has led to the creation of a mind independent of the outside reality and furthered the binary of natural and social realism to comprehend the reality. Latour calls this dichotomisation as a modernist settlement and adds,

> For Science studies [STS is addressed as Science Studies], there is no sense in talking independently of epistemology, ontology, psychology, and politics – not to mention theology. In short: "out there," "nature"; "in there," the mind; "down there," the social; "up there," God. We do not claim that these spheres are cut off from one another, but rather that they all pertain to the same settlement, a settlement that can be replaced by several alternative ones. (Ibid., 14)

Latour suggests that abridging the gap of 'two cultures' can only be a pedagogy or a propagandist idea without questioning the purification of the very categories, social and natural. Therefore, the fundamental categories like that of natural, social and political are understood in practice simultaneously by STS. By questioning the categories, one is expected to march forward to build a new politics called cosmopolitics[8] in these times of ecological distress and climate change.

This distinctiveness reflects in the epistemological and ontological dispositions of STS. The notion of epistemology is understood in relative terms, and it is concerned mainly with the naturalisation of the scientific knowledge. The privilege of scientific realism is questioned in socio-philosophical terms from a relativist position. Science is not a mimicry of nature but a socially constituted episteme, argues STS. However, the field is ontologically realist in presumption (Woolgar 1988, 53-65), and Bloor puts the point succinctly,

> It would be, at most, an idealism about the semantic dimension of current forms of realism, but not an attack on its ontological dimension. It would also be strictly limited in its scope. For notice: a banknote is ultimately a banknote because we collectively deem it to be so. For all that, it is a real thing with weight and substance and location. None of this materiality is denied by what has been said about its social status as a banknote. (Bloor 1991(1976), 175)

Bloor's Sociology of Scientific Knowledge (SSK) (the foundational approach for STS) initiated a symmetrical view of knowledge. However, STS became radicalised after the laboratories studies' theorisation of the material ways of doing Science. It construed reality in its making and entanglements instead through frozen categories like the social or natural. Therefore, various elements of culture and practice of scientists including their tools, literary descriptions, and nonhuman organisms are comprehended in the knowledge production process. The coming of the material brought to stage the ontological assumptions of the field (Pickering 1992, 7-8). Science as an epistemological activity was deflated, and the practising of Science in physical and material circumstances was highlighted. Therefore, the early phase of STS in the west is a combination of philosophical and empirical interventions in comprehending science in society. These commitments led to its particular epistemological and ontological tenets.

[8] 'Cosmopolitics: An ancient word from the Stoics to express an affiliation to no city in particular but to humanity in general. The concept acquired a deeper meaning through its use by Isabelle Stengers to mean the new politics that is no longer framed inside the modernist settlement* of nature* and society*. There are now different politics and different cosmos' (Latour 1999, 305)

Though the major metaphysical achievement of STS in the west[9] is the articulation of a counter Copernican revolution, the practice of STS in India is oriented towards other objectives. In India, STS has a recent development consequent of the disenchantment with the science-state nexus during the emergency period. However, the science-society relations inside and outside the academia has to be contextualised along the initial decolonised spirit. The emotion of decolonisation is mixed and did not have a straightforward approval or rejection of science. Science was seen as western and colonial. However, the socialists and the 'progressive' nationalists took forward the Nehruvian agenda of befriending science to live the future. Therefore, the early social studies of science were policy and planning related and had a propagandist agenda. It was only during the emergency; the nexus of state and science was commented as disciplining and vivisectional (Visvanathan 1997, 6-7). From then, 'science for social change' is no more a neutral-utopian ideology. This critical appraisal towards science is not an initiation of academia but arose due to the grassroots people's movement. The questions of colonialism, modernity, nation and its developmental ideologies structured the initial critical STS in India (Ibid., 1-13). In many ways, the questioning of Science began as a cognitive activity from the engagement of SSK in the case of the west, but in India, the science and technology propagated in the name of development and progress can be marked as the source of questioning and deflating science. This particular distinction between western and Indian STS on the basis of engagements with knowledge systems is not rigid considering a range of epistemological engagements of scholars working on indigenous knowledge systems (Sujatha 2015 and Naraindas 2014). Moreover, scholars like J.P.S Uberoi had studied the alternative sciences within the western world as a way of rejecting Science that is based on the division between mind and body (Uberoi 2002).

Many scholars separate the motifs like science in democracy, social movements, alternative sciences, and indigenous knowledge systems as externals of doing proper science studies or consider them as "dissenting imaginations" of Science (Rajan 2005, 14). Such zoning of alternative and indigenous studies within STS will lead to a monolithic standpoint over S&T reproducing the old dichotomies and asymmetries. However, as Prasad's title of his article denotes, it is essential to move beyond the dichotomy of alternative and empirical science by understanding the circulations, interactions, and practices in-betweens (Prasad 2006, 219). The relegation of alternative sciences and imaginations of dissent as social movements will produce

[9] The categories west and non-west are used as expository tools understanding the inherent problematics.

flawed and incomplete reflections of the postcolonial society thwarting creativity, claims to rights, and representation.

Therefore, one has to be attentive to the concepts of modernity, indigenous knowledge, community, and democracy to perceive the so-called alternative theorisation and practices of STS in India. In his work on *Indian Modernity,* Avijit Pathak says that the experience of colonial modernity has given a sense of trauma and anxiety. The question of self-identity as a nation dominated the spirit of politics in the post-independence period. Modernity as a mediation of rationality and Science was not rejected, but the 'alien' nature of it was thought of as destructive of the Indian culture after the struggles of decolonialisation. Pathak explicates the complexity of Indian modernity as follows,

> contemporary India too (especially after the crisis of the Nehruvian agenda of nation-building) there is a critique of modernity…Yet, what should not be forgotten is that things are complex in India. True, the critique of modernity is meaningful. But, then, this does not mean the glorification of 'traditionalism'. Because tradition, if not redefined and reformulated, may prove to be oppressive. Moreover, modernity may still have something positive (Pathak 2015, 37).

Therefore, the question of modernity in the Indian context cannot be contained within ideas of modernity or tradition but has to be complicated and comprehended through hybrid categories. As postcolonial STS is a field of both academic scholars and activists, the take on modernity is crucial and hence, parallelly, "modern is both mobilised and critiqued, for the promises of modernity" (Pandian 2002, 1739). The questions of Science, alternative sciences, indigenous knowledge, the political economy of science and social movements should not be separated for a creative and engaging politics that legitimises the idea of public and democracy.

Therefore, the sociological studies on science grapple with the complexities of particular historical context and the scholars of indigenous knowledge and alternative sciences operate simultaneously within postcolonial STS. However, scholars like Naraindas complicate such simple divisions between indigenous knowledge and Science by reading specific practices of knowledge systems. His reading accounts the contemporary Ayurvedic drugs as resultants of epistemic mangling of biomedical, Ayurveda and polyherbal formulary of the west, which is called the creolisation process (Naraindas 2014, 105-136).

All that said, there is an evident distinction between the scholars who work on indigenous knowledge and alternative sciences in their approaches to the question of epistemology. Both of these scholars take (leaving aside specific proper 'Science' Studies and policy studies scholars) a non-dualist position over the question of epistemology. However, their approach to the question varies. For example, the scholars working on indigenous

medicine will bring the epistemological principles of the Indian traditions to justify the non-dualist position. Sujatha, in her article, 'Is food natural or cultural? Food, body and the mind in Indian medical traditions,' explores the idea of food in Siddha knowledge system and attempts to differentiate the relations between nature and culture within Siddha knowledge traditions from the western medical systems. She states,

> Food …is an ideal entry point to examine how systems of medicine theorize the relation between body and mind because food is related to hacking both of them. While any system of medicine may accept the importance of food, the problem lies in how exactly it postulates the relation between food, body and mind. The manner of the relation would offer insights into where the line between the medical and the social, or nature and culture, is drawn by different cultures. (Sujatha 2015, 113)

Likewise, the alternative science scholars foreground their argument from a socio-political standpoint insisting epistemic relativism and the right to co-existence of various knowledge systems, the standpoint epistemology, which are not only perspectives but are intellectual and political pursuits (Harding 2011, 19-22). Visvanathan calls it "cognitive justice" and explains it as, "the right of different forms of knowledge to co-exist… this plurality needs to go beyond tolerance or liberalism to an active recognition of the need for diversity" (Visvanathan 2009, par. 21). Moreover, thus, this camp of STS accommodates the alternative sciences and practices, new social movements, the questions of science in democracy, and indigenous knowledge systems. It is here the current study is situated within the practices of STS in India.

When it comes to STS in India, the notion of ontology is about the constitution of 'self' and 'other' structured by the discourses of the west and the non-west. It is about the worldviews imagined through different epistemological commitments (Prasad 2016, 195). The dichotomy of the west and non-west is an explicit concern in both STS and the studies of indigenous knowledge systems. However, the sites of analysis and ideologies of intervention are different between these two approaches. For example, the question of the history of science is always related to the history of nature. Science, in fact, is comprehended as a description of nature itself. However, for the scholars of indigenous knowledge, each culture can have their way of perceiving nature and its ontology (Kanjirakkat, McOuat, and Sarukkai 2015, 1-11).

Nevertheless, when it comes to alternative scholars in India, their concern is about the consequences of universalist, monocultural, and homogenising tendencies of Science. They observe scientific and developmental discourses as anti-people and are fundamentally interested in the alternative epistemologies emphasising the pluralistic ontologies that value the principle of diversity and dignified co-existence. For Prasad, alternative sciences "look for *epistemological alternatives* to modern science in order to search for non-Eurocentric, non-

violent, and non-vivisectionist *ontological possibilities*" (2006, 220). Broadly, the alternative sciences in the Indian context are understood as social constructivist that questions Science based on the power and authority vested in the institution of Science. By delegitimising all other knowledge systems, Science claims to be value-free. The alternative sciences scholars like Ashis Nandy, Vandana Shiva, Alvares, and Shiv Visvanathan critique such objective disposition of Science through articulating the question of identity, gender, developmental violence, and cognitive justice (Pattnaik 2014).

The chapter will attempt to comparatively study the contextualised genesis, institutionalisation and professionalisation of STS in the west and India. In that process, the essential motifs of History of Science, Philosophy of Science and Sociology of Science (the social studies of science) as dealt in these places and their influence on the subject matter of STS will also be comprehended. The chapter also brings out the commitment and the definition of STS in general. Moreover, within the STS scholarship, the question of postcolonial was detailed only in the third handbook of the discipline. The handbook is a significant moment because of two things: firstly, the maiden effort was made to define the field of STS and secondly, the inclusion of a chapter on postcolonial STS gave a global character to the field of STS for furthering the articulations and contestations from diverging standpoints over the dynamics of S&T (Hackett et al. 2008, 1-8). It is within this postcolonial scholarship that the current research is placed. The closing section of the chapter is aimed at giving an overview of the epistemological and ontological presumptions in the practices of STS in the west: from Sociology of Scientific Knowledge (SSK) to the recent ontological turn, which will set the tone for the next chapter to dwell on object theories.

II

Distinguishing STS from other Social Studies of Science

In the west, the History of Science and Philosophy of Science, unlike most of the other social and cultural studies of science had an emergency before the World War II. When it comes to the history of Philosophy of Science in the Anglo-American domain, one can say that the early works were on the study of logic and language. The academic interest grew as the result of the movements for analytical philosophy and logical positivism (Traweek 1993, 4-5). The arguments proposed were on the internal logic of Science. The engagements of Philosophy of Science are the beginning for the social sciences trying to perceive the dynamics in the production of the scientific facts. It included the debates of positivists versus falsificationists

and the question of underdetermination amongst many others as explained by Sismondo in his work on the introduction to Science and Technology Studies (2004, 2-6). These studies attended mostly to the "logical relations between successful scientific ideas". There was a general assumption that Science is the singular and pristine way of knowing and there cannot be any questioning of the epistemological position of Science (Traweek 1993, 4).

Such objectivist assumptions of Science not only dominated the Philosophy of Science but also the Sociology of Science until the late 1970s. One can relate to this functionalist perspective of Science in Sociology as a reflection of Merton's ethos of Science. It rendered the internal structure of Science as unquestionable and fathomed Science as the beacon light of knowledge and the only objective knowledge of nature. However, many studies countering the ethos of Science began to come in the 1980s (Sismondo 2004, 27-30).

In the U.S., most of the scholars of Sociology of Science had an uncritical view of Science until the late 1970s. The social studies of sciences remained Mertonian and focused on the bibliographic citational analysis to a large extent. The functionalist presumptions of Science lasted longer in the Sociology of Science even though symbolic interactionism and Marxist perspectives stood as critiques of the functionalist standpoint (Star 1988, 197-198). The change in the path is mostly cited coming from the practices of Sociology of Science in Europe, which took an anti-positivist stand and was sceptical of the disinterestedness as an ethos of Science and investigated the 'social' in the scientific content, institutions, and practices. Most of the personalities associated with this model were from Edinburgh's 'Strong Programme'. This programme is called as Sociology of Scientific Knowledge (SSK) that diverged in its focus form Sociology of Knowledge (SOK) (Ibid., 198). SSK was not only influential in the genesis but also moulded the foundational propositions of STS.

History, Philosophy, and Sociology of Science developed separately addressing their scope of knowledge relevant to the matters of chronology and causation (History), the internal logic and analytics (Philosophy) and the social and contextual (Sociology) in the studying of Science. In the same way, conceptually, Sismondo differentiates STS from Sociology, Philosophy, and History of Science through STS's substantial recognition of the metaphor of constructivism. He goes on to state a one-line definition, "STS looks to how things it studies are constructed" (Sismondo 2008, 13). Being wary, he says that this cannot motivate us to have a linear imagination on the scope and contributions of STS as the contexts and interpretations of the studies on constructivism has led to divergences in the theoretical and methodological approaches.

Jasanoff (2012) in her brief genealogy of STS, discusses STS' ancestry from the Kuhnian contribution. Thomas Kuhn's work on *The Structure of Scientific Revolutions* (2012), a book (first published in 1962) by a physicist himself brought down the idea of scientific practice to a kind of activity performed by scientific community within the realm of normal Science. Such normality can change with a crisis acknowledged by the community leading to a "paradigm shift", Kuhn proposed. This historicizing of the scientific revolution began a new epoch of validity and normativity in the comprehension of the scientific community as a part of the broader social institution. Nevertheless, Kuhn considered himself an internalist historian of Science and did not reject the objective foundations of Science. Here, one has to note that Kuhn later disassociated himself and his works from any sociological interpretations and for him, his work is limited to the space of internal history of ideas/science and cannot be associated with any relativising arguments over the questions of the epistemology of Science (Shapin 1995, 294). Most of the scholars of STS agree to the interdisciplinary beginning of STS from Kuhn's work.

Social Studies of Science and STS: An overview of the Indian Experience

In the post-independence India, the Sociology of Science was confined to the planning and policy studies like most of the other Social Sciences (Chatterjee 2003, 482-497). Even today, most of the studies are confined to the discourse of S&T as a tool for social change. Technocrats, policy analysists, and bibliometric scholars contribute equally to this version of the Sociology of S&T along with sociologists. In his foreword to the book, *Sociology of Science and Technology in India* (2014), Haribabu remarks,

> Contributions to this volume attempt to address the following aspects: Science and society interface by exploring the instrumental role of Science and technology in the development and social change; understanding the internal dynamics of many scientific communities in different spaces; Science and civil society dynamics. (Haribabu 2014, XVII)

Predominantly, these questions focus on the issues directed towards policy making, social engineering and social change. These studies account for the economist tendencies of the post-independent state echoing the preoccupation of almost all social sciences. Such an emphasis is not the distinguishing element of the Sociology of S&T as practised in India. All the nation states today are committed to S&T development and these sociological analyses come as a reflection of the statist agendas.

Binay Kumar Pattnaik classifies the significant themes of Sociology of S&T in India, which includes, 1. Studies in the structural-functional perspective, 2. The concept of scientific

community, 3.Studies in social constructive perspective, 4.Studies in Marxian perspective, 5. Studies in science and technology movements in India, 6.Alternative Science movements, 7. Women in Indian Science, 8. Cognitive elements in scientific knowledge production, and 9. Institutional and cultural moorings of knowledge production in Science (2014, XIX-XXXII). The themes on the social movements and alternative sciences form the core base of the postcolonial STS[10]. The works of Vandana Shiva and C.V. Seshadri that questioned the epistemology and ontology of Science could be brought under this approach (Visvanathan 2011, 304). Also, sociologically, some scholarship questioned the instrumentality of Science in maintaining the status quo and philosophically, the inherent tendencies of Science that separate the truth from reality was seen as a problematic disposition (Uberoi 2002, X-XI). Many scholars turned their attention towards the alternatives for Science drawing on the traditional and other alternative knowledge systems citing the environmental distress and the epistemic violence caused by the technoscientific practices of the state. For the neo-Gandhian scholars, Science is not problematic because it is west, but they consider Science as inherently violent that jeopardises the coexistence of pluralistic knowledge systems in a democracy (Visvanathan 2011, 306). J.P.S. Uberoi went on to explore the other scientific traditions within the west like the hermeneutic tradition, which is based on a non-dualistic approach to the world (Prasad 2006, 219-221). These postcolonial scholars are not anti-scientific, but their politics propose for dialogue, reconciliation, and cohabitation of various epistemological standpoints appreciating diversity rather than blindly falling for the banners such as Science, progress, and development. They strongly oppose the tendencies of museumisation of people and their knowledge through the developmental initiatives that stage nothing short of a mockery of democracy (Visvanathan 2011, 306). These alternative positions on the agendas of modernity have to be seen as a productive space for the challenging of totalitarian forces, be it Science or other traditional epistemes. The politics of Nammalvar though not expounded as a social movement can be located within such an alternative frame of the postcolonial STS.

The bibliometric analysis of the historiography of History of Science in India published in 1998. It noted that almost half the number of papers written was situated in the ancient and early medieval periods and "it appears that *the historian of Science in India, as elsewhere, bogged down in nationalist historiography, was lured by an idea of 'golden age' of Science*

[10] This standardising of the postcolonial STS through the motifs of alternative and movement-based perspectives are critiqued as giving a narrow scope against the larger potentials of STS (Abraham 2006). Without doubt due to many reasons Sociology as a field shares a strong relationship with STS and the beginning and the major corpus of Sociology of Science in India revolves around the critiques of techno-scientific developmental models and social movements (Visvanathan 2011, 301-305). Thus, the postcolonial STS reflects such a position.

and culture in India" (Italicised in the original) (Raina 1988, 409). The other inquisitiveness of the Historians of Science in India was- why did Sciences develop in the west and not in India. In India, critical studies of scientism developed within the rubric of romanticism and populism in the late 1970s and early 1980s. When the centralised developmental agendas of the state began to collapse, and there was also a simultaneous eclipsing of Bernalism amongst the natural scientists and social theorists (Raina 1997, 13). Consequently, the question of power in the colonial knowledge production became the central theme in the History of Science. Historian Deepak Kumar explains how the knowledge over the colonised geographies, natures and bodies led the imperial state manufacture and legitimised its authority over the ruled (Kumar 1980, 107-109). Kavita Philip in her book, *Civilising Natures* attempts to give a cultural materialist reading to understand the intersection of colonial science and the colonial power structures. According to her, it is impossible to imagine one without the other (Philip 2004, 8-10).

In the post-independence period, the scholars of Philosophy of Science and Indian History were committed expounding the notion of 'Indianness', as a response to the distortive orientalist imagination. The historical and philosophical debates contended whether to attribute Indian Philosophy to the spiritual or material realm. Scholars varied amongst their attributions towards the core of Indian Philosophy. However, most of the debates in the public discourses consigned Indian Philosophy to the spiritual domain and the western to a material domain, which in turn stabilised the dichotomy of west and non-west. Raina states that "While recognising that any dialogue between Western and Eastern will take place in a Western language, Western philosophical categories take precedence in the dialogue and define the terrain" (Raina 2012, 197). These preoccupations can be seen reflecting in the debates of self-other, centre-periphery, west-east, nature-culture, body-mind, and theory-practice amongst other dichotomies forming the recurring motifs in Indian Social Sciences. Such philosophical undercurrents defined and continue to define the research commitments of the scholars working in the fields of Philosophy, History and Sociology of Science in India. The subject matter of Philosophy of Science and History of Science in India like most of the other former colonies are concerned with the search of the 'self' after the colonial encounter. However, scholars like Philip try to suggest that in the framework of critiquing the western-colonial-scientific rationality, the proponents of alternative sciences in India tend to move towards the claims of an isolated 'east' in the pre-colonial times as if it had a static tradition undergirded with an innocent view towards the nature as against the instrumental rationality of the 'west'. According to her, these arguments are contributing to a revival and essentialist standpoints. For her, Science cannot be considered as inherently a violent knowledge system and also, not that indigenous systems were all non-

instrumental in their worldview. She claims such binaries undermines the ever interacting and co-produced networks of 'global' and 'local' concerning the process of knowledge production (Philip 2004, 8-10). Moreover, the subject of postcolonial STS and alternative sciences are complicated through the debates of inter-sectionality by the feminist and Dalit studies scholars (Omvedt 1990, Nanda 1996, Omvedt 2011, and Chadha and Achuthan 2017).

In the Indian context, the distinctions amongst Sociology, History, and Political Studies of Science are blurred under the postcolonial commitment of STS. The scholarships on the critique of colonialism and colonial Science became a legitimate historical project after the emergence of postcolonial studies. This is a very recent phenomenon of post-1980s since such a postcolonial consolidation began after Said's *Orientalism* and Fanon's work on the violence of colonial medicine (Harding 2011, 3). The notion of 'historicism' articulated by the scholars of Indian subaltern studies paved a legitimate theoretical space (Chakrabarty 2000, 7-10). The critical historiography of Science contests the idea of 'historicism' of the colonial state that was furthered through its scientific knowledge and institutions. In the same way, the post-Kuhnian STS in India resulted out of people's contention over the 'historicism' of the nation-state implied in its developmental projects in India.

STS, as practised in the west has a specific lineage from the SSK's 'strong programme,' which separates it from the Sociology, Philosophy, and History of Science. However, STS as a field has diverse approaches within it ranging from Social Constructivism, Ethnomethodology, Feminist Science Studies, Actor-Network Theory, Discourse Analysis to mention a few. When it comes to STS in India, the colligation of themes under STS only happened in the late 1970s. STS did not develop as a field of analysis distinguishing itself from History or Sociology of Science having its specific worldview like in the west but is consolidated due to the postcolonial critiques of colonialism and through sociological demystification of modernity in the Indian context. Raina in many ways observes a productive space in separating the History and Philosophy of Science from the commitments of STS on the one hand. In his words,

> Some of them prefer "history and philosophy of science" (HPS) since it conceptually distances itself from cultural and contextual interpretations of science – leaning strongly towards the view that science is a rational enterprise, employing concrete case studies to humanize the sciences. On the other hand, the current fascination with "science, technology, society" (STS) in addition to its fashionable standing like "cultural studies", concerns itself with exploring how science and technology work and their impact on society, but is undecided about the goals of STS as a cognitive movement. (Raina et al. 2009, 37)

On the other hand, for scholars like Visvanathan, the commitments of Sociology of Science and Science Studies/STS/postcolonial STS (Visvanathan 2011, Visvanathan 2002) are indistinguishable. It is more appropriate to say that Sociology of Science is closely associated with the commitments of the postcolonial STS than any other social studies of science in the Indian context perhaps this also the case of STS' global image. However, Sujatha and Sengupta (2013) in a survey and review article elaborate on the discourses of Science, knowledge, gender, body, Philosophy and Sociology of Science without circumscribing to any disciplinary boundaries under the title *Knowledge, Science, and Society*. All these viewpoints blur the identity of STS practices in India. However, the characteristic motifs of STS in India have to be traced from the engagements of people's movement and civil societies in defining and redefining the social contract of science in a democracy. Mainly, the research inquires how postcolonial STS can account for a certain kind of reality produced in the alternative practices by humans, nonhumans, and ecological actors; engage with the 'alternative' ontological struggles; account the processes of interaction, contention, liberation, and subversion from the regions of the country.

The literature on the colonial knowledge-power nexus, studies on modernity, alternative sciences, new social movements, indigenous knowledge studies, Feminist Science Studies, and political economy of transnational technoscience and its transactions can be enwrapped within what is called STS/postcolonial STS in India. These scholarships' engagements have demystified the rigid categories of west/non-west, mind/body, nature/culture, and colony/metropole creating intersecting spaces and hybrid categories. All such critical enterprises combine to form the postcolonial STS scholarship. Anderson (2002) remarks that the postcolonial implicates the attributes of colonial critique, postcolonial theory and historical anthropology of modernity. And postcolonial STS is a movement away from the older styles of Science Studies that confined itself to the concerns of nation-state and was not equipped with the categories to describe the processes of co-production of region-global, economies, technologies, identities, and cultural creations and therefore,

> postcolonial perspective suggests fresh ways to study the changing political economies of capitalism and Science, the mutual reorganization of the global and the local, the increasing transnational traffic of people, practices, technologies, and contemporary contests over 'intellectual property'. (Anderson 2002, 643)

Postcolonial STS posited alternative or multiple modernities as its fundamental undercurrent moving away from modernisation theory. Significantly, the local and the networks became buzzwords to understand the process and stabilisation of science and technology concerning

the region after the coming of the Actor-Network Theory (ANT). “Science and technology are necessarily local practices, yet they can travel,” observes Anderson (Ibid. 649). The local history and the regional politics are perceived simultaneously along with their global transactions in postcolonial STS.

The institutionalisation of STS- Locations and Practices

In the west, institutionally, Sociology of Science and History of Science spawned at many locations in North America and Europe as early as the 1950s. Science and Technology Studies came about in the late 1960s in U.K. and the U.S. respectively. Simultaneous establishments of journals like Society for Social Studies of Science (4S) that came in 1975, European Association of Studies of Science and Technology was founded in 1981(EASST) and Social Studies of Science (SSS) in 1971 can be called the areas of inter-disciplinary engagements towards doing Social Studies of Sciences and Science Policy Studies. Such an institutional and academic emergence marked one side of the spectrum (Martin et al. 2011, 1191-1192). On the other side, Visvanathan (2011) and Bijker (2017) trace the origins of the inter-disciplinary associations outside the academic spaces in the context of third world countries (with a focus on India) and the Netherlands respectively. In the context of the third world (particularly in India), if not in a full-fledged sense, the discipline of STS emerged due to the failures in the transfer of technology models, developmental projects (in the building of dams and in enforcing of forest policies) and techno-scientific disasters (like the Bhopal gas tragedy). Such an experience simultaneously led to a range of social movements against the state-science nexus as early in the 1980s and intensified as issue-based struggles during the post-liberalisation era in India. For Bijker, societal issues such as that of nuclear energy, genetic modification and the nuclear arms race in the 1970s can be marked as the initial phase of STS literature, which took an ‘academic detour’ later in the 1980s resulting in the number of masters, doctoral programs, journals, handbooks and professional chairs (Bijker 2017, 316). Ubiquitously, the field of STS has to be defined ambidextrously which studies science and technology as a process and product on the one side and comprehends S&T as a social project and as an activist interest on the other side. Such a two-sidedness becomes apparent in the process of institutionalisation of STS in American campuses as the result of compulsive Science accountability demand raised by the anti-war, civil rights, feminist and environmental campaigns outside the academia. However, in Europe and especially in England, the politics of reformation in the science education and the financial budgeting of science, technical

education and governance led to the emergence of what is called ‘Science of Science’ or ‘Science policy’ (Edge 1995, 7-10).

The debates in England both in the universities and in the public spheres were on the essential guiding principles in the education of scientists. The tension between the classic literature of the humanities and the evolving institutions of science education was mostly a moral subject and were also discussed in the financial cum policy realms. The debates, on the one hand, were around the reformation needed in science education through liberalisation and inclusion of more science and on the other hand, they were about the balancing of an objective dose of science education with the socially responsible subjective imagination, the humanisation of science. This reflects the tone of "The Two Cultures" debate that reiterated a hostility in the co-existence of Humanities and Sciences. The Rede lecture of C.P. Snow in 1959 created tremors in the literary circles; he vehemently critiqued humanities for throttling the growth of science and suggested that it is too late for the conservatives to catch the train of industrial and scientific revolution. The abstract understanding of humanisation of science as if Science sprung from nowhere on the one side and the created antagonism between the two cultures, on the other side gave the space for the initial growth of critical STS institutionalisation in the technical academia. However, later, the relativist criticisms from the Sociology of Scientific Knowledge (SSK) other than the early humanistic strand periled the coexistence within the science education and other technical institutes. This eventually led to the downfall of the pedagogical humanisation of the science project in Europe (Ibid., 8-11).

One should also observe that science education, Science policy and the Sociology of Science were neither sceptical/critical nor empirically associated with the Science. Instead, they all appreciated the objective and positivistic way of knowing preached in the domain of Science and studied mostly the impact of science and technology in society. It was SSK that inherited a relativistic and reflexive epistemological standpoint on Science. It established an empirical analysis by adhering to micro level ethnographic studies in the scientific laboratories. It described the manufacturing of scientific knowledge as social as any human activity and upheld the “social” in both the processes and products of Science. The major breeding ground for the field of STS is nothing but the preliminary Social Studies on Science that happened in the Science Studies Unit, Edinburgh (Ibid.,7). Andrew Pickering in his essay provides cartography of the practices of SSK in Europe and the US. The “Strong Programme” at Edinburgh school and the empirical studies at the Bath University were centrifugal locations that diverged from the already existing literature of social studies on Sciences (Pickering 1992, 1).

In India, the cartography of institutional practices of social studies of science and technology is relatively simple. The science-society relation in the Indian context can be divided into three phases: 1. The golden period of scientism, 2. The period of disenchantment with science, and 3. The neo-liberal science phase. The institutionalisation of courses on science in society was based on the science and society relations. It was in the late 1960s, as per the recommendations of Kothari Commission, History of Science course was introduced to the natural science students in the Delhi University to familiarise them with the issues of underdevelopment and the role of science to bring a social change. (Raina et al. 2009, 12-14) Later, a Centre for Science Education was inaugurated in Delhi University. Indira Gandhi Open University, in the late 1980s, launched a compulsory undergraduate course on 'The Foundation Course in Science and Technology'. The first master level programme on social studies of science was launched at the Centre for Studies in Science Policy (CSSP), Jawaharlal Nehru University. The Department of Sociology at the University of Hyderabad started offering courses on the Sociology and Philosophy of Science. The University also has a Centre for Knowledge, Creativity and Innovation. All of these centres offer M Phil-PhD programmes. Later, by the mid of the 1980s, many technical micro universities adopted courses on 'Science-society', particularly, in many IITs' Humanities and Social Sciences departments were established with the aim of humanising the technical cores of education. However, Visvanathan in his essay on Sociology of Science in India expresses his profound disappointment with the performances of these centres in contributing to the critical studies of Science and Technology. He expounds that "these spaces guaranteed neither domesticity nor reasonable academic reproduction. Sociology failed in what was its strength, the detailed power, and integrity of its ethnographic studies" (Visvanathan 2011, 308).

When it comes to the identity of STS, Raina et al. (2009) say that the social studies of science and technology and not STS that developed within the academia more than three decades ago. The waning of developmental agendas and the collapse of technocratic policies led to the genesis of the interdisciplinary issue-oriented- activism-based studies outside the academic realms though these crises were discussed in the scope of History, Philosophy and Sociology of Science. Raina is a social epistemologist committed to the bridging of science and society together as Steve Fuller would call it, the process of linking the scientists and people. The social epistemologists indeed have bafflement towards the commitments of STS and its concerns over the society (Fuller 2007, 152-156). However, within Indian academia scholars like Shiv Visvanathan consider STS as the potential discourse for addressing the issues of democracy, knowledge, and governance (Visvanathan 2006, 164-169).

The disappearance of some critical journals like *International Federation of Developmental Alternatives* (IFDA), *Dossier*, and *The Lokayan Bulletin* led to the "banalisation" of the academic rigour of social studies of science (Visvanathan 2011, 308). The dissenting voices are continuously coming from the fields, movements, and civil society interventions. Today, one can see many NGOs in India acting as institutions of science-society relations producing a whole range of research papers and field analysis reports relevant to STS from the ground.

Understanding the Grid of Practice- Geography and Ideology

Rosing (1977), one of the editors of the first handbook of the field, identifies two kinds of regionalisation within STS, i.e. the socio-political regionalisation (geographical-ideological regionalisation) and the cognitive or intellectual regionalisation (research content-methodological classification). Under the socio-political regionalisation, one can see the reflections of the cold war polarisation in the international relations shadowing in the Study of Science, Technology, and Society (SSTS), which is the bourgeoisie and socialist schism. They were called the western and the eastern approaches towards the science and technology. Both the blocks had the same trust in Science, and they also had many similarities in their views on science and technology as the tools of progress and power. Such sameness was explicit in the areas of Philosophy of Science, Ethics, Sociology, History, Planning, Economics, Military, and Popularisation of Science amongst others. Nonetheless, the difference was manifest in the unilinear, statist, and technocratic orientation of the East in their approach to S&T. Also, the validation was drawn from a Marxian-Leninist theory of Science in its practical planning and management. Therefore, there was a higher political legitimisation for the research of STS in the East (Rosing 1977, 12-19).

The STS in India has a different undertone unlike the divide between the first world and the second world countries. Most of the decolonised third world countries' STS scholarship bear a postcolonial undertone to it. The focus of the alternative sciences, peoples' movement, the political economy of technoscience enterprise and the cognitive elements in the knowledge production (Intellectual Property) dominate the postcolonial STS challenging the emerging neo-imperial S&T forces. Today, unlike when Rosing wrote the article in 1977, if we have to think in academic terms of certain ideological organisation, then Indian STS along with other decolonised third worlds' approaches can be placed fittingly in the postcolonial framework, where the politico-moral significance is to 'provincialize' techno-scientific transactions and alternative imaginations in the neo-liberal world (Anderson and Adams 2008, 185).

Nevertheless, the intellectual regionalisation is relevant to both to 'west', 'east', and now to the 'postcolonial' counterparts in their practices of social studies on science and technology. The two-intellectual congregation are the Social Studies of Science (SSS), and the Science-Policy Studies (SPS). Firstly, the Social Studies of Science compliments and moves beyond the research questions of the mother disciples like Sociology, History and Philosophy to understand the complexity of the reality produced through the dynamics of science and technology. Secondly, Policy Studies are confined to statist agendas and nationalist in orientation, which focuses more on the issues of governance, control and the direction of the movement of science and technology (Rosing 1977, 16-18). The exercise of relative contextualisation of STS practices in the west and India ends here. The next two sections will describe the general commitment of STS and will simultaneously define the scope of the field.

Defining STS and Postcolonial STS

Up until here, the narrative has thrown some light on the origins, distinctions of STS from other independent approaches to the social studies of science, institutionalisation process of STS, regionalisation in STS, and on SSK as the theoretical bedrock of STS. The scope and defining feature of STS are discussed in brief in these concluding paragraphs. In the introductory remarks of the second handbook of STS (not counting the quantitative and statistical handbook of Studies on Science and technology) edited by Jasanoff (1995), the editors clearly establish the shift from "Science, Technology and Society" studies to "Science and Technology Studies" to uphold the continuing relationship with historical methods and philosophical inquiries. The term 'society' is dropped as it relegates its boundary closest to the Sociology of Science than to others is the rationale behind validating STS amongst many other options in naming the field. More than that, the editors did not provide a definitive statement of STS. Nevertheless, they went on to comment that the field has gained its currency in many parts of the world with particular enthusiasm and impulsiveness about its direction (Jasanoff 1995, XI). In the third edition of the handbook, the editors began by saying,

> If the 1970s was an era of disciplinary juxtaposition and integration and the 1990s a time for mapping a half-seen world of shifting continents and emerging countries, then in our time the field of Science and technology studies (STS) may be characterized by its engagement with various public and decision makers, its influence on intellectual directions in cognate fields, its ambivalence about conceptual categories and dichotomies, and its attention to places, practices, and things. (Hackett 2008, 1)

Thus, only by the mid-2000s, STS passed its "still emerging" (Jasanoff 1995, XI) phase to a standardised form, where it is now more definitive, reflexive, dialogical and autonomous. Gathering the moment, the editors pronounced that,

> STS has become an interdisciplinary field that is creating an integrative understanding of the origins, dynamics, and consequences of Science and technology. The field is not a narrowly academic endeavour: STS scholars engage activists, scientists, doctors, decision makers, engineers, and other stakeholders on matters of equity, policy, politics, social change, national development, and economic transformation." (Hackett 2008, 1)

In the fourth edition of the handbook, a more refined and concrete definition of STS was given,

> Science and technology studies—STS, for short—is an interdisciplinary field that investigates the institutions, practices, meanings, and outcomes of Science and technology and their multiple entanglements with the worlds people inhabit their lives, and their values. As a dynamic and innovative intellectual field, STS explores the transformative power of Science and technology to arrange and rearrange contemporary societies. (Felt 2016, 1)

These definitions provide an overall prospect of STS. However, the scope is widened, and possibilities of nuanced comprehensions are explored through the approach of postcolonial STS. The third edition of the handbook included a paper on the introductory statement of postcolonial STS. The postcolonial commitment of the scholarship now becomes an important source of identity for STS as a globally relevant field of study. To put it in the words of Anderson,

> 'postcolonial' thus refers both to new configurations of technoscience and to the critical modes of analysis that identify them. We hope that a closer engagement of Science studies with postcolonial studies will allow us to question technoscience differently, find more heterogeneous sources, and reveal more fully the patterns of local transactions that give rise to global, or universalist, claims. (Anderson 2002, 643)

However, Itty Abraham (2006) gives a critical reading of Anderson's proposal and comments that if the primary objective of postcolonial technoscience is to understand the alternative knowledge sources and the local spaces of those knowledge claims, then it is not precisely attending to the question of Science per se but encompasses just the ideological politics. Abraham claims that postcolonial science operates only at a national scale and to understand the doing of science and technology in developing countries, one has to follow the postcolonial scientists and their spaces of transnational collaboration for more productive engagement within the rubric of STS. In his words,

> "postcolonial techno-science" as a way of doing science studies may not be commensurable with "postcolonial techno-science" as a way of thinking about alternative and local knowledge. One way of seeing this clearly is to focus on the spaces within which "science" is represented and acts. In what follows, I juxtapose contests over western scientific knowledge within

> contexts of colonial and postcolonial nationalism against accounts of postcolonial scientists "doing" science in relation to their geophysical location, in order to demonstrate that they operate on entirely different spatial scales. Studying the practice of science is a far more productive approach to take if we are to come to grips with modern science in the developing world: to open this nascent field up to questions of ontology is to engage in a completely different, and manifestly political, project, which, by definition, can have only a political resolution. (Abraham 2006, 211)

One has to agree with the preoccupation of postcolonial STS with the idea of Nation but then it is not only transnational spaces, but the regional spaces of the nation are also sidelined in the mainstream postcolonial engagements. However, the juxtaposing of the alternative studies against the transnational technoscience practices is problematic. One cannot deny the fruitful exercise of studying the postcolonial scientists but not at the cost of relegating the alternatives just to the domain of ideology and identity politics. The need for comprehending the questions of the region, alternatives, indigenous knowledge, communities, social movements, ethics, and grass root organisations have not eclipsed. Therefore, there is a necessity to reconfigure the order of things within postcolonial STS that would link up the issues of ecology, Anthropocene, alternatives, critiques of modernity, colonial history and political economy of science and technology in the neo-liberal system as a way forward than compartmentalising the field itself. Thus, it is within these commitments, the politics of G. Nammalvar is situated to engage with the alternative imaginations, practices, and objects within the postcolonial context.

I conclude by drawing attention to the ambitious proposal of Law and Lin, who have given an even broader view of the processes of correspondence and collaboration within STS that talks about the dialoguing of postcolonialities. In the words of Law and Lin,

> STS might do well to explore a third post-colonial version of the principle of symmetry, where the discipline would explore the politics and analytics of treating non-Western and STS terms of analysis symmetrically. This means that it would stop automatically privileging the latter. Instead, with this postcolonial version of symmetry, the traffic would be lively, two-way, and contested. Or, even better, because there is no single postcoloniality, there would be multiple centres, a variety of postcolonial symmetries, and a series of different STSs. (Law and Lin 2017, 4)

III

A brief account of the discourses of STS from Knowledge to Material turn

The interdisciplinary field of STS is unique in its metaphysical, theoretical, and methodological orientations. Therefore, it is more than essential to discuss the historical construction of knowledge in STS. Though the field of STS has gained significantly from Sociology, History and Philosophy of Science, one cannot deny the essential foundation

provided by Sociology of Scientific Knowledge (SSK). The tracing of the foundation of STS from Sociology of Scientific Knowledge is not to say that Sociology of Science and History of Science were not committed to the social dimensions of Science. However, their insistence slipped into the internal-external debates of social studies of science. These studies were either committed to studying the external social factors that impacted the scientific knowledge production or to write an internal history of the objective progress of the scientific knowledge. Here is where the significance of SSK becomes evident. For Bloor (1991(1976)) and other significant proponents, the culture and practice of scientific knowledge production are as social as any other institution that can be sociologically analysed.

The basic premises of SSK is Wittgenstein's propositions that moved away from the Mannheimian Sociology of Knowledge (SOK). SOK is of the conviction that the existential aspects of socio-historic conditions do not determine the immanent theory and internal logic of the pure or the exact sciences, and therefore, the method of social sciences cannot attend to the content of natural sciences. This distancing, Bloor outlined as a downfall in the Sociology of Knowledge as proposed by Mannheim. In Bloor's point of view, Mannheim's Sociology of Knowledge can only explicate on the Sociology of Error in its study of scientific knowledge. It means, for Bloor, from the words of Mannheim, 2x2=4 can be interpreted only from the logic of arithmetic and not otherwise. Bloor finds this misleading in the scholarship of Mannheim. It is here, Wittgenstein provides the beginning for a Sociology of Scientific Knowledge. Here, 2x2=4 is not incorrect for Wittgenstein from the arithmetic's standpoint. However, he raises the question of context cum interpretation and takes a sceptical view on the claims of realism and universality of the claim of 2x2=4 (Lynch 1994, 49-51). In the opening paragraph of the book, *Knowledge and Social Imagery*, Bloor clearly states that the current attitude of the Sociology of Science and Sociology of Knowledge is to assign the domain of Science to the philosopher as if a Sociologist has nothing to comment on the content of scientific knowledge. He pronounces four basic tenets of the Sociology of Scientific Knowledge that stands as the definition of "Strong Programme" to overcome the limitations in the social study of scientific knowledge,

1. The possibility of a causal explanation for the formation of a system of knowledge that consists of factors other than social.
2. The knowledge should be studied impartially without concerning its truth or false value, rational or irrational beliefs.
3. Symmetrical causes will be applied to examine the truth or falsity of the beliefs.

4. The patterns of explanation in the Sociology of scientific knowledge is reflexive (Bloor 1991(1976), 7).

The scholarship of SSK is a turning point in the sociological analysis of Science. The symmetrical view and causal factors in studying all kinds of belief systems became the core undertone of STS. This framework is foundational for STS and can be called as a phase of "Science as knowledge" (Pickering 1992, 3, 5-12). Even the subject of mathematics is considered conducive to a social interpretation with a commitment to epistemic relativism and not to judgemental relativism. Epistemic relativism is anti-realist that perceives knowledge as a product of a time and culture rather than a mimic of nature. Therefore, it is against scientific realism. Whereas, judgmental relativism validates all knowledge as equal and comparable, which is not a take of SSK as it will lead to fascist adherences (Cetina 1983, 1-17). However, this explanation is rather simple, which came about in the early days. Scholars of STS are not anti-Science, but in the same way, they are sensitive to the plurality of knowledge systems and towards the need for a co-existence in a morally responsible way. Susan Star brilliantly explicates this argument,

> the question on a meta level becomes: how can we make a revolution that will be ontologically and epistemologically pluralist yet morally responsible? Can we be both pluralist and constructivist, hold strong values and leave room for sovereign constructions of viewpoints? … I would claim that there is stronger evidence for Nazi-ism arising from ignorance of the conditions of production of knowledge than from exploring the relative configurations of these conditions in different times and places." (Star 1988, 202)

The next turn in the studying of Science is a turn to the material, where the concern of technology became highlighted. Science Studies came to be known as Science and Technology Studies. For the scholars like Cetina, Latour, Woolgar, Callon, and Pickering among others, Science is not all about the epistemology and logic. Science is also about doing. It is like saying that Science does not always happen in mind, but also happens in the material spaces, which are the laboratories. Latour and Callon called the position of SSK proponents as "deontological" which emphasised just the social (social realism) like how the natural scientists stressed the physical (natural realism). They accused SSK adherents saying that "they cannot entertain even for a moment another ontological status for society and for things" (Callon and

Latour 1992, 347). This for Pickering is the next turn called "Science as practice" (1992, 7-8, 14-15).

Latour (2005a), Callon (1984) and other Actor-Network Theorists (ANT) introduced new metaphors in understanding the reality. It is not any more human actors but actants that included humans-things-nonhumans parallelly and insisted on translations instead of interaction. They created a sense of in-between and hybridity in the real world rather than the natural and social realism. This deconstruction of subject/object, human/nonhuman, nature/culture along with the overall non-human, and a material shift in the philosophical and sociological theorisation has led to a material-semiotic politics with post-structuralist sensibilities, as John Law would call it. In the current phase of STS, the preoccupation is,

> For instead of asking why things happen it asks how they occur. How they arrange themselves. How the materials of the world (social, technical, documentary, natural, human, animal) get themselves done in particular locations for a moment in all their heterogeneity. And how they go on shifting and relating themselves in the processes that enact realities, knowledges and all the rest. (Law 2008, 10)

The work of Latour (1993) insists on the translations of the categories like social, natural, and political and suggests not to fall in the trap of assuming those categories as pure informants for understanding the real world. Further, there is a decline in the social constructivist tendencies in STS though not everyone gave up on its potential. Actor-Network Theorists and material-semiotic theorists in STS have moved and dissolved the foundationalism in the 'social' and 'construction' to talk about 'process', 'networks', and 'flow', and 'enactment'. In this phase of STS, realities and their representations are enacted and are performative simultaneously. Again, it is post-structural that is attentive to the nonhuman, and material modes of reality. To just put this, the interest of this realm is more than epistemology, which is towards an ontological politics. If there is a reality, it is constituted in practices and STS is now interested in studying how it gets constituted in practices. Here, the politics is in search of realities enacted in its particularities outside the dominant epistemic spaces. Therefore, the core presumption of STS is that practices bring about representation (epistemology) on the one side and realities (ontology) on the other side (Law 2008, 12-16).

Conclusion

The chapter discussed the fundamental dispositions of mainstream STS and postcolonial STS from the Indian context. It is argued that the postcolonial STS' engagements are shaped by particular socio-historical context rather than straightforwardly dealing with the

questions of S&T alone by highlighting the categories of modernity, nationalism, civilisation, indigenous knowledge, democracy, community rights, social movements, and alternative sciences. The chapter gave a distinction between social studies of science and STS, but in the context of India, such a distinction is blurred through the postcolonial exercise. In this scenario, the current study is placed within discourses of alternative sciences under the banner of postcolonial STS. The chapter ended with the changing priorities of STS from knowledge to material questions of science and technology. The emphasis on the material aspects inevitably led to the attention over the idea of ontology, objects, and nonhumans. The next chapter will continue to focus on ontology question by elaborating on the politics of Latour. Also, it will expound on the theorisation of objects and finally, establish seeds as objects through the conceptualisation of Latour (2005), Bryant (2011), and Bennett (2009).

Chapter Two.

Theorising the Objects and Establishing Seed as an Object.

> the less they speak of objects. As if a damning curse had been cast unto things, they remain asleep like the servants of some enchanted castle. Yet, as soon as they are freed from the spell, they start shuddering, stretching, and muttering. They begin to swarm in all directions, shaking the other human actors, waking them out of their dogmatic sleep.
>
> -Bruno Latour (2005a, 73-74).

I

Latour, the coming of Ontology and the objects in STS

The turn towards the question of ontology and the question of nonhumans in STS are not only significant within the discipline but is a step forward in the imagination of the world as composed of beings and coevolving(s) rather than one to be known and controlled. Initially, it began as a shift from the focus of epistemology influenced by the tradition of Sociology of Scientific Knowledge (SSK) to the interrogation of Science as doing in the laboratory space. The understanding of Science as doing brought in the aspect of things and nonhumans. This shift is referred to as "Science-as-Knowledge to Science-as-Practice" (Pickering 1992, vii). The focus of epistemology and ontology co-exists in STS practices and are important in their ways. Nevertheless, the material side has received more relevance today since the social investigations have to accommodate and account the physical and ecological conditions of climate change and other vulnerabilities caused by capitalistic and biotechnological developments[11]. Moreover, within the domain of "empirical epistemology" in STS, the study is about the knowledge as shaped in theory and practice. Here, the reality of the objects is assumed as pre-given[12]. However, according to "empirical ontology", the reality of the object is not pre-given. The objects are enacted in particular relations relevant to a specific practice

[11] The Actor-Network Theory (ANT) contributed mainly to the study of practices and networks of translations that includes the humans and nonhumans in the same plane to understand the stabilisation of assemblies relevant to S&T production and impact. Many critiques ANT as apolitical, managerialist and masculinist in character. The significance here is the ground created by ANT within STS practices to approach the specific methods of reality production, questioning of the hierarchical relation of human-nonhuman actors, demystification of nature-culture, and observing reality as multiple. In fact, this has diversified the terrain for STS from its earlier preoccupation with epistemology to materialist attention (Law 2009, 141-150).

[12] Here, the reality is not only pre-given but also dualistic: the natural/physical and the social reality. Nevertheless, within 'empirical ontology', the reality is not pre-given and also does not revolve around the rigid limits of natural and social. Realities get constituted in the practices simultaneously.

(Law and Lien 2013, 364-366). This turn within STS is a needed diversification from attending only to the production and impact of science and technology into laying out a platform that encompasses the issues of objects, and nonhumans. Also, the issue of ecology is quartered immediately since the locus of discussions became more material (that includes objects and nonhumans) and practice-oriented in STS. This is not an isolated tendency but comes under the general movement within philosophy and social theory is beginning to attend and talk more about the nonhuman and the material world. The development of Actor-Network Theories, assemblage theories, new materialisms, Feminist materialisms, and speculative realism among others captures the turn to nonhumans and objects. The turn is marked as the epicentre of the future arts, humanities and social sciences (Grusin 2015, vii-ix).

The coming of ontology and objects are interrelated. The collapsing of distinct zones of nature and culture as maintained in the modernist settlement in almost all spheres of life has led us to rethink of the reality constitution more seriously, strikingly in the face of Anthropocene, material resource crisis, and climate change. Nonhumans, objects, and other organic and inorganic entities are manifestly present and involved in the reality constitution. In many senses, the turn to the nonhumans is a reflective turn in the age where we are caught in the mess of objects everywhere. The inseparability of human lives from the gadgets, the negative impact of many objects on the environment, and the increasing consumeristic tendencies have shifted the attention to pursuing the place of the objects in the social and political life[13].

In fact, the focus of the objects subverts the hierarchical relationship of subject-object. The object is more inclusive and is extended to include humans, nonhumans, material and symbolic entities in the same non-hierarchical plane by the Object-Oriented Ontologists[14] (OOO) and other material and nonhuman theorists in their philosophy and theorisation. The

[13] The social analysis of objects in a certain sense is as old as the modern social theory itself. For instance, Marx's analysis of the commodity fetishism. Also, things as a part of social and collective life have always been the central focus of the anthropologists. However, today, the concern over the objects at least from the view of STS and ecology is particular, where the objects enable, disenable, influence, manipulate and control human actions and ecology. In an online article published on February 5, 2018, in the *INDEPENDENT,* Gabbatiss discusses the warning given by the scientists about the vast amount of microplastics ingested by the marine species. This just a single instance to indicate the urgent intervention of objects in social, political, biological and species life.

[14] Object-Oriented Ontology is an umbrella term coined by Levi Bryant that includes a range of philosophies and social theories, which mainly came about in the late 1990s. Graham Harman is one of the founding figures of OOO. Though it is not an entirely new attempt, fundamentally, OOO theorises reality in terms of objects be it humans, nonhumans, fictions, natural or cultural entity (Harman 2018, 3-10, 279).

project of the object is theoretically, philosophically, politically, ethically, and aesthetically situated in the necessity of the time we live. Bennett succinctly reasons out the attitude of nonhuman theorists,

> Theorists of the nonhuman want to see what would happen—to perception and judgment…to our very notions of self and the human…the nonhuman turn is to find new techniques, in speech and art and mood, to disclose the participation of nonhumans in "our" world…a grammar that was less organized around subjects and objects and more capable of avowing the presence of what Bruno Latour called "actants" (Bennett 2015, 224-225).

For scholars like Latour, STS (Philosophy of Science and Anthropology to be very specific) has provided the needed ground for demystifying the separation of nature-culture and subject-object dichotomy. The scholarship of Philosophy of Science and the practical attention to the laboratories demystified the mind/body dichotomy. Similarly, anthropologists from the very beginning through their ethnographies of 'others' (in parallel becoming the 'moderns' separating nature and culture) saw no validity in the nature-culture dichotomy (Latour 2014a, 301-304). These platforms together in the Latourian framework have led "the oldest settlement of one nature and many cultures which stabilised universality too fast and accepted plurality too lightly" to dissipate creating more space for talking about multiple ontologies or multiple natures (Ibid., 301). This multiplicity involves the ontology of humans, nonhumans, and objects. The separation between natural reality and social reality is dissolved as the boundary between nature and culture is slashed. Now, the reality cannot be compartmentalised but is a single plane where the objects, meanings, relations, symbols, innovations, truths, mathematical equations, religious hymns, polemics, democracy, and terror are manufactured simultaneously in practice.

The focus is laid on the objects after the deconstruction of the nature-culture dichotomy. There are various actors in the world playing their roles. These actors create multiple realities in their assemblages. Therefore, the reality is produced differently by these actors. For example, how Law's and Lien's (2013) study of salmon farming showed that the salmons are realities done only in their relational enactments in particular settings and not as a pre-given entity. The salmon in an evolutionary biology textbook is done differently from the 'daufisk' (dead fish) enacted by the workers at the salmon farm. The entity of salmon is different in each of these assemblies, and there are coordination efforts that happen to connect all these separate salmon entities produced, to be called that particular salmon (Woolgar and Lezaun 2013, 325). The salmon is not taken for granted and the emphasis is given on how salmon reality is produced in different practices. Therefore, this "ontological turn" in STS is what Woolgar calls

attention to "It could be otherwise". This phrase is often used by Woolgar to insist on the very spirit of the scholarship of STS, which is to be sharp in attending to the alterities in the descriptions of realities (Ibid., 322). Law and Lien explain that there are multiple realities. People, animals, and objects are multiple actants who are done differently in practices, composing their realities (Law and Lien 2013, 366).

The question of ontology is not very complicated in at least how the Science Studies scholars are delineating it. “To go from metaphysics to ontology is to raise again the question of what *real* world is *really* like”, Latour explains ontology[15] (Latour 2005a, 117, Italicised in the original). The quest for looking outside reflects that the reality is produced in plurality. For instance, the soil scientists who worked on the arrangement of the topsoil regarded it to be a composition of layers of inert matter (Pedology). Later, the topsoil came to be regarded as the ground of swarming microorganisms (Edaphology) by micro zoologists. There is a contestation between these two approaches within Soil Science. The topsoil can be two different things viewed through two different set of practices, and therefore, the reality is plural in practice. This argument does not mean that Science is a fiction and there is no reality at all to be attended by the scientists. However, it is to wait and observe reality, not as a unified hard matter of fact. Rather, it is to understand the very thing (object/ ‘nature') as not singular but in multiples. I use the term multiple-ocular(ity) in comprehending the thing (here the topsoil). These multiple visions of the things are precisely hinting at the distribution of agencies from humans to nonhumans to the other objects on the earth, making it a "*pluriverse”* (Ibid., 116, Italicized in the original). *“pluriverse”* indicates the agencies in reality and for Latour, it is not merely the multiple interpretations of the human actor about a thing but claims multiplicity as the property of things itself (Ibid.). Here, we can construe how the notion of ontology and objects are interlaced and are the resultants of the shifting focus from epistemology/representation to the way in which objects get enacted in the practices (Woolgar and Lezaun 2013, 323). The apprehension about the constitution of the outside makes one realise that multiple actors are

[15] Latour invests his time on ontology in his work *Reassembling the Social* (2005), where he explicates on what has to be the very essence of Sociology. He follows Gabriel Tarde; the predecessor of Durkheim who challenged the Durkheimian version of having an evolutionary and organismic view of society. He explained that Durkheim’s approach as a political project of social engineering. For Tarde, Sociology should be fluid and equip itself with innovative methods to understand science and technology that alters the social life like all other forces. However, social should be considered as a “special domain of reality” but should be based on “the principle of connections”. Social includes the stars, atoms, biological organisms, metaphysics, philosophy etc. like family, religion, law and others (Latour 2005, 13-14). This detour is taken to say that it is from this background that Latour is interested in comprehending realities in connections. Therefore, the notion of ontology is to look around to construe how the reality ‘really’ is and the processes, nodes and actors of its constitution.

enmeshed in the scene, and therefore, attention to the practices in which these actants involved is necessary. Overall, there is no single reality out there, and the reality is produced in the practices where multiple actors/ objects[7] are involved and are done differently.

For Latour, the reimagination of nature/culture dichotomy and the agency of the objects have become an inescapable mooring after "1989: The Year of Miracles". The year represented the collapse of socialism and revealed the tragic consequences of capitalism's mastery over nature leading to major ecological crises (Latour 1993, 8). The global ecological crises remain as a moot point in the politics of Latour. The position of STS in attending science, politics, and discourse in the same plane gets justified after such revelations. Further, Latour questions the relevance of the critical stances: epistemology, sociology and discourse analysis, which are separated through the categories of nature and social. He asks, "Can anyone imagine a study that would treat the ozone hole as simultaneously naturalised, sociologized and deconstructed?" (Ibid., 6). For Latour, the ozone hole is a quasi-object or a hybrid that overcomes the nature and culture distinction, since the reality of ozone is constituted through scientific, political and discoursal networks and translations. These processes of translations prove the incongruence of the nature-culture purification choreographed as "modern critical stance" (Ibid., 11).

Such realities, objects and events highlight the artificial purification of nature and culture and validate the importance of hybrid categories. The choreographed approach to reality, in turn, compartmentalises intellectuals into three distinctive camps called the epistemologists, sociologists and the deconstructionists based on above-mentioned modern stance. In that case, Latour reaffirms,

> The ozone hole is too social and too narrated to be truly natural; the strategy of industrial firms and heads of state is too full of chemical reactions to be reduced to power and interest; the discourse of the ecosphere is too real and too social to boil down to meaning effects. Is it our fault if the networks are simultaneously real, like nature, narrated, like discourse and collective, like society? (Ibid., 6)

Therefore, the resettlement of the critical concerns is quite a promising commitment towards a cooperative construction of the world of nonmodern. The emphasises on the need for the transparent dialoguing amongst these three disciplines concerning the approaches to nature, power, and discourse is contextualised through the experiences of the west. Nevertheless, it is appropriate for the 'western' and 'eastern' worlds. In the scenario of the west, it just becomes Science and politics in the process of constituting reality. Whereas, in India and other postcolonial societies, the dialoguing processes have to include the other epistemologies and

their approaches to nature as potential shapers of the nonmodern reality if one can say so. Besides, the anthropologies of colonial experience and modernity frames the interrogation with the Science. The question of colonialism, anthropological critiques of modernity, and the contestations and possibilities posited by the 'alternative' epistemologies complicate the science-politics-discourse reconciliations. The alternative epistemologies encompass mainly the commentaries on the critique of development; practices, transmutations and possibilities thought along the indigenous knowledge systems; interactions of Science in democracy; rights of marginalised communities and cognitive justice; ecological crisis; and the various functionalities of social movements. Therefore, this complex terrain requires an imaginative politics and significantly, a decentralised dialoguing. Though it may seem far-reaching, the nonmodern juncture should be emphasised in the postcolonial STS both by the scholars of 'doing' Science camp and also by those who perform alternative epistemologies envisioning alternative ontologies (Abraham 2006, 211). So that the juncture may propose reality in an active, constructive, and collaborative terms, where ontology gets highlighted, and objects are construed as products of assemblages rather than fixities.

To sum up, the reconciliation of nature/culture has brought about three significant moves in STS, which are as follows,

1. Bringing back the question of ontology to understand the composition of the real world without nature-culture division.
2. It has made the objects to take the lead. Objects are not any more just in the background but are active participants of reality constitution. Also, it makes someone to say that objects are significant players because of the critical place objects (especially the quasi-objects like biotech products, ozone hole, and others) have in our social and political life.
3. The demystification also informs us about the impossible reduction of reality either to the quotient of knowledge (Epistemology) or the power (Sociology) or the realm of discourse (Discourse Analysis). The demystification is pivotal to STS and ecological studies which necessarily needs to come out of the modernist myth to perform its primary subject matter.

The notion of ecology has come to occupy the central point for dialoguing and reconciliation in STS under the influence of Latourian metaphysis. However, it should be noted that the question of ecology has always been the concern of Gandhian and neo-Gandhian scholarship of STS in India[16]. Also, the alternative scholars have been critical about the

[16] For works deliberating on ecological concerns within STS in India, see Alvares (1992), Visvanathan (1997), and Shiva (1988). The politics of Latour largely draws from the philosophical and socio-historical accounts of the

separation of nature from the culture in the postcolonial contexts. The incorporation of the alternative epistemes' views of nature into Latourian approach is not resolved here. However, Latour's commitment to being nonmodern is essential to approach the concerns of Science, politics and discourse in the Indian scenario. One cannot see this as an exhaustive frame both for theory and practice since it can always be contested through the lens of alternative epistemologies and with their possibilities outside the homogenising scientific worldview in the Indian and other postcolonial contexts. However, it is presumed that without sliding into the zone of anti-science/relativism or scientization, the nonmodern moment can be seen/used as a leeway to imagine the possibilities of thinking through other epistemes and folk knowledge for composing the reality. Mainly, this reality composition will be able to create alternative social worlds, objects, and relations, which will be a real "Hybrid rather than homogenised structures are what emerge as the characteristics of these alternatives [epistemologies]" (Chadha 1998, 2967)[17]. These hybrids do not undermine the humanistic potentials of the Science (more productively sciences as Latour puts it in *Politics of Nature* (2004)). Also, these alternative epistemologies should ceaselessly engage in creating sustainable, democratic and community-oriented knowledge practices. It is proposed here as Chadha remarks, one has to build more engaging dialogues between the camps of critical Science Studies and the advocates of alternative epistemologies rather than naively accusing the advocates of alternative epistemologists as aiding the identity politics of Hindu fundamentalists like the critique of Nanda (Chadha 1998). This postcolonial predicament reproduces Chakrabarty exposition in his famous work, *Provincializing Europe* (2000). Chakrabarty insists on thinking outside the ontological singularity of human and the essentialisation of the secular historical time to grasp

west. I have certain apprehensions over applying all his views on nature, politics and ecology directly to the STS practices in India. The question of west-east, science - 'other' epistemological approaches to nature, class, caste question and gender politics are to be synthesised in the overall framework of Latour. The thesis welcomes Latour's attention to the object in the assemblages of relations. The critique mentioned above on Latour's Actor-Network Theory comes from Prasad (2016, 197). Prasad says ANT as an approach cannot dismantle or critique the west-east dichotomy in the discourses of STS. Also, Restivo attacks the incomprehensive approach of Latour over the functioning of democracy when he talks about the constitution of nonmoderns (2005, 111).

[17] Scholars like Meera Nanda vehemently oppose the arguments of the alternative scholars citing that scholarship as patriarchal, propagating epistemic relativism and aiding the right-wing Hindu fundamentalism (Chadha 1998). However, Chadha claims that such essentialisation of alternative modernities with the Hindu fundamentalism leads to nothing but a more uncritical acknowledgement of the Science-progress duo, which is disproved in the context of India and many other postcolonial countries. Also, she states that the epistemic relativism does not mean that there is no truth at all but "What epistemic relativism does is that it makes the space for truth a contested one, allowing truths to have only provisional and partial validity either in the form of standpoint epistemology or in the form of the strategically held 'elusive' or 'imagined' centres of the deconstructivists" (Ibid.,2968).

the postcolonial modernity in India (Ibid., 15-16). These delineations of the crossroads capture the spirit of postcolonial temporality.

The nonmodern turn, the sagacity of Anthropocene and the impasses of postcolonial reality have to be thought of as catalysts for the talks on alternative worldviews. The normative structure of history-writing resonates the kind of reimagination required at this point. Chakrabarty opines about writing a species history in the era of Anthropocene. However, he calls for a "postcolonial vigilance against 'universals' that hide particular interests" (2016, 107). It is suggested to see if the temporality of Anthropocene can open up some old gateways for imagining the other possibilities that will enable a productive fuse between several uncertainties in the evolutionary, modern, ecological, and postcolonial temporalities. Such a proposal restates the argument of Visvanathan, where he says,

> It is the problem of time that becomes fundamental to ecology. Ecology demands an unravelling of the various kinds of time in science and various kinds of time concealed in concepts like extinction, death, obsolescence, memory, particularly in terms of how science conceives nature and other cultures. (Visvanathan 1997, 56)

Therefore, it is a compelling moment for thinking along the alternative and coevolutionary approaches. Importantly, a material approach in studying the nonhumans and objects can enable the social scientists to grasp the outlooks of different knowledge systems in perceiving and producing objects realities. These knowledge systems must not be regarded as producing incommensurable realities in prior but have to be understood as enriching of each other in the co-production of multiple realities. Such an alternative imagination need not be an overarching knowledge system, but it can aim at either reconstituting the objects, nonhumans and ecologies of significance viewed through science, technology and ecological frame. For instance: objects like the plastics, GMOs, asbestos; nonhumans like bees, coral reefs, and blue whales; ecologies like terrace gardening, and community forests- are entities of concern and significance to STS and ecological studies.

The alternative object politics should highlight the entanglement of objects and other nonhuman entities as the subject matter of social and political conceptualisation along with the humans. The engagement will naturally be drifting away from the homogenising narrative of Science and capitalism. The convoluted mess in which we live in should be the starting point of the narratives and the politics. This beginning will reveal our entangled life with the other species, material objects and natural entities leading us to ponder more on the idea of ontology; over the question of what reality is and on how it gets constituted. Not only the question of

material and nonhuman objects but the ideologies, institutions, power-grids, discourses and resistances should equally resonate in the object politics. The idea of imagination is more powerful in these times on par with or sometimes more than the idea of critique. These imaginations provide possibilities of life and living in collaboration than immersing oneself into the susceptibilities of capitalism, science, and development, which through the historical process rendered the gap between the human and the 'outside' world.

In this section, the coming of ontology and the inclination to the question of the object in STS are discussed through the deconstruction of nature/culture divide influenced by the Latourian framework. This deconstruction has made it possible to simultaneously think of the notions of natures, politics, and discourses. The focus of ontology is the starting point of the object-oriented politics in the era of climate change and Anthropocene. Cannot this point be mobilised to invite the alternative views on nature to constitute a sustainable reality without falling into the trap of scientization or anti-science or any relativist position? This is an old question taken forward in a rejuvenated way by emphasising the objects.

II

The Project on Objects and its democratisation

The philosophers and sociologists concerned with the idea of ontology and objects like many of the postcolonial STS scholars in India who are against the violence perpetuated through Science and development are not anti-science and technology. Claude Alvares in an interview puts it very succinctly that he is not against the process of mining. Moreover, he adds that human history cannot be detangled from the mining technology. However, he goes on to explain that he is against the process of mining that produces an enormous amount of wealth for the big companies at the cost of intensive labour extracted from the workers and the authoritative displacement of marginal sections of the society like tribes, peasants, and migrants (Sahgal n.d.). Here, the political economy of the mining process is condemned, the politics of ecology is brought in and importantly, the reality constituted through the epistemes of science and technology is not undermined claiming them as inherently violent. Nor an enchantment of premodern times is invoked. This attitude deliberates the relation between the postcolonial human subject with the knowledge system inbuilt in the developmentalism in a democratic space.

In the same way, Levi Bryant strongly states that OOO (Object-Oriented Ontology) is not about entering into a pre-modern enchantment with nature and is not a project of recovering

objects from Science[18] (Levi Bryant, Larval Subjects, comment posted November 21, 2016). Instead, object-oriented philosophers strive for the right kind of Science that would address the material crisis that we are facing today. The approach of Alvares is sceptical towards the political economy of technoscientific applications as it is marginalising the vulnerable sections of the society. The authoritative control over subaltern social groups is the concern, and their inclusion in the reality constitution becomes a social justice phenomenon. The inclusion of objects is also a similar project, in which the objects and nonhumans will not be ignored and denounced as passive backgrounds for the active humans. Therefore, the project of OOO attempts to include them as participants in the ontological, social, political and ecological existence. In this way, the objects that are important for STS will be brought in more convincingly for mulling over the future course of action. It is not to say that objects and the humans are to be seen in the same plane without accounting their sentience and degree of suffering that they go through. However, the point here is to build a paradigm that will include the objects in the politics, where its thing-power is understood and given its proper due for ecological and material well-being at least out of an anthropocentric and selfish motivation. Such a project inclusive of the object will be more sensitive to both "people-materialities and thing-materialities" (Bennett 2010, X). Bryant calls the object-orientation as an ontological stance than a political stance since the initial objective is to disentangle the objects from the human gaze and conceptualisation philosophically. It is to say that objects cannot be reduced either to the constructivism of the humans nor to be understood only in relations. Though objects cannot be reflected upon entirely through the concept; there is still a lot for the Humanities and Social Sciences to explicate about the being of the object (Bryant 2011, 18). The philosophers of objects complain how the material and the objects are relegated to a passive zone in the explications of social and political life as if they did not exist in those realms (Levi Bryant, Larval Subjects, comment posted November 21, 2016). Therefore, emphasising the presence of objects outside the human thought having its independent life by a critique of the concept itself from an ontological vantage point is the beginning for an object-oriented politics.

According to Levi Bryant, in the overall philosophical tendency, one can observe two positions about the question of subject and object. One is the position of the epistemological realists, and the other is the anti-realists (social constructionists) with regards to their take on the subject-object relations. For epistemological realists, the reality is fully captured through a

[18] This particular reference is from the blog of Bryant called Larval Subjects. The blog space of Levi Bryant is very popular amongst the scholars working on objects and has got a substantial readership (Harman 2018).

priori categories of the mind. However, the anti-realists reject that position of completely capturing the reality through the concepts since all these categories are socio-historically contingent to a specific space and time.

> In short, epistemological realists argue that true representations represent a world that is in no way dependent on being represented by the subject or culture to exist as it does… Anti-realisms, by contrast, note that our relationship to the world still falls within the domain belonging to the subject, mind, and culture. (Bryant 2011, 15)

However, both of these positions address the object in association with the human subject. If one could imagine subject and object as two intersecting circles A and B. Then, the intersecting point AB is the point of representation, and the object (circle B) is accounted only within the accessible realm of the subject- the intersecting point AB. Circle B remaining outside the AB is blocked out and not taken into theorisation. The presence of the autonomous object is neglected in the social theorisation. It is here the project of democratising the objects is significant. The project dismantles the subject-object divide and informs three significant propositions- firstly, the democracy of objects imagines an object that exists for itself rather than standing as an opposing pole of the subject or as an object only in the realm of representation; secondly, proposes "onticology" (Ibid., 22), the ontological position in which all the existing entities are objects. "There is only one type of being: objects", says Bryant (Ibid., 20); and thirdly, these statements do not mean the exclusion of humans but humans exist as one among the other objects that populate the world inheriting their unique capacities and powers (Ibid., 20). The role of plastics, weather patterns, resources, technological objects, diseases, roads, bamboos and something like asbestos sheets will be taken into account in understanding the collective or the social. It is not a reversal of hierarchy, but this ontological demystification is an alternative way to understand social and political networks in a material sense. Overall, democratising the object is an attempt to unshackle the objects from the human gaze to make objects a "being for themselves" (Ibid., 19, 22-24).

Outside the dichotomy of epistemological realists and the anti-realists, Object-Oriented Ontologists announce themselves as realists and their politics is against the anti-realist continental philosophy. However, here, anti-realism does not mean the traditional idealist position of saying all that exists is some variation of mind, but anti-realism is an attitude against what Meillassoux calls 'correlationalism' (Ibid., 36). The idea of correlationalism is that we have access to only the correlated zone that exists between thinking and being and these two categories cannot be separated from each other. So, the idea of reality is untenable outside the thought of the being and language. This aspect of the continental philosophy is traced from

Kantian Copernican revolution. The mind is not controlled by the objects anymore, but the mind controls the object, declared the revolution. The thing-in-itself is abjured outside the access of human thought. This tendency cordoned off the reality outside the human access (Bryant et al. 2011, 3-4).

For Bryant, *The Democracy of Objects* aims at an ontological destabilisation of the subject-object distinction propagated in the mainstream philosophy and social theory that renders object almost passive and invisible in the conceptualisation of the social as if only the culturalist domain play the entire process of collectivisation of the social. In his approach, the definition of the social is positively destabilised, and the social is extended to the object-ual sphere. The inclusion of the object into the realm of theorisation is a step against the modernist schema. The term society is replaced by the term collective (like how Latour talks about the associations) to include the humans and nonhumans in a flat ontology. In this case, the nonhuman actants can play an active role in the mobilisation of the humans and widen the sphere of social for a rigorous social and political analysis in the time of multiplication of bionics, biotech objects, ecological crisis and climate change (Bryant 2011, 22-24). Flat ontology encourages us to move beyond nature/culture dichotomy, and it also treats both these artificial entities as real.

Moreover, ontology places the entities like that of natural, signs, human and nonhuman in the same ontological footing and analyses them in its entanglement rather than through rigid distinctions. Moreover, for Harman, flat ontology is an ontology that does not presume any differences in the ontologies of the objects and "*initially"* observes all objects in the same way (Harman 2018, 54, Italicised in the original)[19].

[19] For Harman, flat ontology can be a good beginning for OOO but cannot be a good ending for the philosophy. Because he says that philosophy cannot end by saying every object is same in their ontological position but should explain more on different kinds of objects. Harman (2018) and Bryant (2014) have talked about such distinctions in the kinds of objects, which is not detailed here. In the thesis, the aim is to grapple with the object question as a way of engaging with the S &T and ecologically significant objects, here, the seeds. Therefore, as of now only the foundational delineation of object as explicated by the OOO is captured.

III

Latour's quasi-objects and the *Dingpolitik*

As mentioned earlier, the foundational politics of Latour is the demystification of the modernist dichotomy of nature and culture, which is very important for the launch of his object-oriented politics. Therefore, an object cannot be relegated to either of these zones. Instead, objects are constituted in practice through other objects in relation without a nature-culture schema. In his sociology of association, objects are actants that through translation with other actants produce stability in the networks. Objects could mean anything here from a hammer to an endangered species to a Genetically Modified Organism or a social media hashtag. An object is just one among the other actants in the assembly, which is capable of enabling, controlling, destabilising and influencing the other actors and the network in general. However, his politics on the question of objects is more specific. It is his long association with the Science Studies that made him say that the microbes in the labs of Pasteur and scallops in the St. Brieuc Bay are compatible in adding meaning to the social itself. "it was the first time for me that the objects of science and technology had become, so to speak, social-compatible," describes Latour (Latour 2005a, 10).

In Latour's work, two terms are significant when it comes to the object question, the actant and the quasi-object. Actant is more an encompassing term that includes all actors from humans to nonhumans to objects. An actant can be both material (Human/nonhuman/hybrid objects) and semiotic entities (ideas/meanings/images). In general, objects are actants along with the other actants in a non-hierarchical plane. The Agency of the actants is the actions performed by the actants in relation to the other. These actions need not be a speech act or a rational act but a doing that has some effects, or it should be transforming the other actant in the trial of strength. Proving the trail of strength means that the individual actants should perform their actions to maintain the assembly be it material or semiotic (Ibid., 52-54). Latour gives agency to all these actants in the assemblage, and his Sociology is about tracing the networks of actants moving away from the Sociology of pre-aggregate social factors. According to him, in the traditional Sociology, the presence of the object was considered the background and its role was not included in the social theorisation because of the limitation in the word social itself. It is limited to the area of the language and rational reflections that in turn relegates social into the world of humans.

> it is hard to see how a hammer, a basket, a door closer, a cat, a rug, a mug, a list, or a tag could act. They might exist in the domain of 'material' 'causal' relations…then *any thing* that does modify a state of affairs by making a difference is an actor—or, if it has no figuration yet, an actant. Thus, the questions to ask about any agent are simply the following: Does it make a difference in the course of some other agent's action or not? Is there some trial that allows someone to detect this difference? (Latour 2005a, 71)

Actants do not have its essence outside the assembly. The Actor-Network Theorists come to an explanation only when there is an actant having its effect on another actant. Propagating an approach to the social, Latour is trying to build the connections and the relations rather than defining the objects itself. Therefore, the agency of the object is placed in the relations and effect on the other actants in the networks. The relations of the seeds/mosquitos in the network of actants becomes the core of tracing the social rather than describing the object itself. Nevertheless, hybrid and Genetically Modified seeds occupy a special status as these are quasi-objects, the one kind of object that interested him the most.

The notion of quasi-objects is unique in the Latourian framework since these are the explicit entities against the nature-culture distinction. Quasi-objects[20] are the hybrids that are found everywhere delegitimising the modernist settlement of nature and culture as distinctive zones of reality. It is a small subset of other objects acting as actants. For instance, hybrid rice, Fitbit watches, radar devices around the neck of an endangered bird are all quasi-objects (Harman 2009, 63). These quasi-objects are active participants in the construction of the reality. However, this does not mean reality is composed of hybrids everywhere. Harman states that though this concept of hybrid is useful, one should not look for hybrid quality in all objects since this could again lead to an emphasis of nature-culture in all objects. Instead, Harman says that we should talk of "*compounds*" (Italicised in the original) that may be of purely natural and purely cultural entities. He gives the example of carbon and oxygen molecules in CO2 as a purely natural entity and "Europe with its mixed Greco-Jewish cultural foundation" as a purely cultural entity (Harman 2018, 58).

Objects enable, control, influence, and authorise the human actions in the assembles. Latour accepts that the objects are just temporally attached to many assemblages. Latour talks about the construction of the speed bumps to control the speed of the vehicles near the schools. The material imposition through this object is an add-on to the symbolic domain of interactions

[20] Latour borrows the term quasi-object from Michel Serres. Michel Serres' explanation of the football as a role playing actant is very interesting. The role playing of the ball is rationalised through the shape, form, dimensions, heaviness of the ball that in turn dictates the movements of the players coming in contact with it (Levi Bryant, Larval Subjects, comment posted June 18, 2011).

like that of a 'Go Slow' signboard and a yellow light signal (Latour 2005a, 71-81). Not to mention the sites of performances like that of a building construction site, and a panopticon structure explicated by Foucault, where the material speaks equally like the humans or sometimes more powerfully. Nevertheless, the Latourian frame is far away from a critical approach to the networks in which these objects are actants, unlike the Foucauldian panopticon structure that throws a critical view on how the bodies are kept under constant surveillance passively through the very structure of the prison and the body is disciplined simultaneously. Such an immanent critique of networks is not the explicit concern of the politics of Latour.

Latour's dimension of defining an object-oriented politics can be rationalised at two levels: Firstly, to take the right kind of realist attention, which is not compartmentalised as social and natural. Therefore, to be a realist, one should neither be a social constructivist (a fairy position) nor to be a scientific realist (a fact position) but has to take a fair position (Latour 2004b, 237-243). The position values the cosmos as composed in assemblies of human and nonhuman actants. This is perhaps the ontology that Latour is emphasising in his sociology of associations. Secondly, for Latour, politics around the objects especially the hybrids and the representations of such hybrids in public become critical. Therefore, he calls for a creative exploration of understanding various modes of representations to represent the nonhumans and the objects. His politics is to devise various techniques of representing the things or the matters of concern (Latour and Sánchez-Criado 2007, 364-366). Today, the public controversies over the science, technological and ecological objects have made the Science and ecology as a matter of concern rather than a matter of fact (Latour 2011, 72). In such a condition, he tries to construct a public of reason in the matters of scientific and ecological controversies. So, there needs to be an assembly for representing the matters of concern. Latour complains how the deliberations of scientific and technological matters are reduced to arguments of indisputable facts, which are stipulated as unmediated agreements. These agreements are nothing but mere rhetoric in the name of Science (2005b, 18-21). There should be 21st-century agoras to discuss the politics of nature or the things. It is another way of bringing science into democracy. This new spirit of the parliament is to act as an "assembly of assemblies" (Latour 2005b, 31), doing politics on things. The representation in such a parliament is not an electoral representation, but the representation of a thing is presumed merely because of their participation in the networks or the assemblies. This broader range of participants are made visible to the representatives of the parliament and are not just muffled in the rhetoric of Science.

In this assembly, the sciences are made public through various technologies of representations. These technologies of representations are not unilinear like that of the Habermasian speech act and the public sphere, and indeed, Latour sees the "humans sitting at a table talking" as an insufficient way of imagining a liberal democratic politics (Latour and Sánchez-Criado 2007, 368). The idea of liberal democracy has to be more material-inclusive that should assemble and deliberate on the nonhumans. Therefore, he proposes other imaginative ways of designing the atmosphere of the assembly, presenting of the things and arguments, and creating participation through the comprehension of the things as inventive ways of designing the technologies of representation (Ibid., 365-371). This imagination can be termed as "Dingpolitik" (thing-politics), a realist position in doing politics (Latour 2005, 4). Here, the assembly or the parliament is commenced based on an object of concern and representatives include a more extensive range of human and nonhuman actants. This model of bringing things to the public experimented in the exhibition, *Making Things Public* (2005) that Latour curated along with his artist collaborator Peter Weibel in Germany. The exhibits included objects, texts, experiments, instruments, images, sculptures, and videos that were representative of the objects of concern. Through the medium of the exhibition, they worked on a communicative process for creating an informed public, which is called a thought-exhibition *(Gedankenausstellung)*. Regarding the process of public making through the mediation of exhibition, Latour says,

> We would like visitors and readers to move from one to the other by asking every time the three following questions: How do they manage to bring in the relevant parties? How do they manage to bring in the relevant issues? What change does it make in the way people make up their mind to be attached to things? (Latour 2005b, 24)

Overall, Latour is assembling, exhibiting, deliberating and composing the world through engaging with the matters of concern. For him, the question of power is in creating innovative technologies of representation not to mention his tendency against the question of critique (Latour and Sánchez-Criado 2007, 370, Latour 2004b). Power is comprehended through assembling rather than deconstructing. Also, the nature of politics is understood as operating through assembling and in the techniques of representation. Hence, his politics addresses these two central issues- assembling and representing.

Bennet's things and the onto-stories

Jane Bennett's political, ecological approach is even more vitalising for an imaginative politics. By political ecology, she means to bring a parallel link between the ecosystem and the

political system. For establishing such an objective, she investigates the inherent materialism vibrant in all things and simultaneously, brings these things to the realm of public and democracy. The highlighting of the inherent materiality of things is the project of vital materialism. The project of vital materiality is influenced by Deleuze and Guattari's 'material vitalism', according to which "vitality is immanent in matter-energy" (Bennett 2010, X). She emphasises how the understanding of vital materialism can bring forth many ecologically sustainable proposals. For Bennett, the separation of life and matter is both a philosophical and a political problem. Philosophically, the distinction made between matter and life has led us to neglect the "vitality of matter and the lively powers of material formations" (Ibid., vii). Such a difference is resolved by making visible the vitality in the organic, inorganic, and other objects. For example, trash on the roadside can be understood for its vitality when we comprehend it as a thing producing chemicals. The space generated in the process of estranging the distinction of life-matter is the beginning of the proposal of vital materialism. Politically, it is important to create a public that is sensible and responsible to the nonhumans and objects considering the vitality quotient in them (Ibid., VII). In her words,

> By "vitality" I mean the capacity of things - edibles, commodities, storms, metals - not only to impede or block the will and designs of humans but also to act as quasi agents or forces with trajectories, propensities, or tendencies of their own. My aspiration is to articulate a vibrant materiality that runs alongside and inside humans to see how analyses of political events might change if we gave the force of things more due. How, for example, would patterns of consumption change if we faced not litter, rubbish, trash, or "the recycling." but an accumulating pile of lively and potentially dangerous matter? (Ibid., VIII)

Comprehending the inherent vitality of the objects is essential. Vitality here is not a mystic power of things, but it is the material capability of the things. Bennett calls this thing-power. The thing-power is a gesture of aliveness and independence that things exhibit outside the human experience. Thing-power is the weird ability of the things to move away from the status of the objects to become independent and alive, outside the human perception. For her, the usage of the word thing gives more agency in terms of connoting the presence of liveliness in the entity than term the object that is rendered passive and comprehensible through the term concept by the subject. This thing-power gives us an alternative way to observe and enter into the nonhuman world (Ibid., XVI-XVII). Bennet's first instance of the thing-power is seeing the heap of garbage on the roadside and attending to them as more than the semiotics of objects. To see them as live, engaging, reacting and transforming is the process of giving the things its due. Bennet's encounter with the litter on the roadside makes her think of the irrational American consumeristic culture which accumulates volumes of commodities. This is a result

of the camouflage of the vitality of things. The narratives of the plastic on the roadside, glove in the bin or a torn cloth on the fence are all called "onto-story". These stories tell us the overlap of the humans and the "thinghood" (Ibid., 4). Bennett clarifies that these ontological stories are not to say that there is no difference between a human and a thing. However, the point is to decentre the humans from 'the ontological center or hierarchical apex' (Ibid., 4-5, 11)

A grasp over the thing-power is significant not only for a philosophical demystification but also for political action. Since, it would be a hindrance in doing politics with the figure of an inanimate object when we are talking about a materially and ecologically sustainable mode of production, distribution, and consumption (Ibid., IX). The idea of affect is central in the politics and ethics of vital materialism. It is essential to set out the "right mood or landscape of affect" for the right kind of politics to flourish (Ibid., xii). Affect is not a human relational quality, but there is a possibility to comprehend such a connection from varied elements and moments generated by the nonhuman actors. Also, it is the notion of affect that is defining the agency of the things from Bennett's viewpoint. Here, affect is impersonal and intrinsic to the forms of things. Affect denotes the ability of the body to act and respond. This act does not have to be an intentional/linguistic or performance oriented one that makes humans more relevant to the notion of affect (Ibid., XII). The agency of the thing can be anything that is capable of producing harm or an aiding effect on another human or any other body. A response of awareness seeing the heap of plastics or a repulsive feeling after seeing a dead rat or pleasure at the shimmering of the glass reflecting the sunlight is how the humans are affected (Ibid., 4-5).

For Bennett, things are not objects that are merely living a life in the thought of the humans. The materiality of the things has to be acknowledged outside the human narcissistic tendencies. For which, she goes on to impose anthropomorphic qualities to the things as an act of subversion (Harman 2018, 240-243). Bennett says that some of the critics are uncomfortable with giving an equal ontological status of humans and nonhumans in assemblies and finds that such an equal footing will lead to no moral grounds reserved for privileging a man over germs (in case of a hostile virus) or a man over another man (in case of exploitation of the woman, poor and likewise). So, the judgements regarding the privileging of some actant over the other in specific contexts become a problem. Bennett reasons out that vital materialism acknowledges the successes that came about in the distinction of the subject-object regarding the obliteration of human suffering. Perhaps, it is quick to express its doubts about the

sustainable effects and backlashes of such a distinction in the future and lays out an affective aesthetic style of ethics and politics. The unethical instrumentalisation of nature has proved it costly for the long-term interests of humans. The overall intention is to improve the status of materiality in which we are enmeshed and composed. For which, more than a moral claim for the matter, a physiological and bodily relation of all matters is invoked. This is perhaps humanistic and motivated out of self-interest. However, the result should be able to distribute the value to a broad range of bodies (Bennett 2010, 11-13). The Political ecology will conceive humanity as a means to an end and not an end in itself. By this sensitivity, it is maintained that the equal ontological footing will not straight away direct to the undermining of the human actant at the same time will not be insensitive to the other range of actants and therefore, contributes to a broader notion of self-interest. Bennett writes,

> The ethical aim becomes to distribute value more generously, to bodies as such. Such a newfound attentiveness to matter and its powers will not solve the problem of human exploitation or oppression. but it can inspire a greater sense of the extent to which all bodies are kin in the sense of inextricably enmeshed in a dense network of relations. And in a knotted world of vibrant matter, to harm one section of the web may very well be to harm oneself. Such an enlightened or expanded notion of self-interest is good for humans. (Ibid., 3)

Bennett is invoking an analogy between the political system with the ecological system. The actors are understood as participants in the assembly as Latour insists and further, Dewey's conception of the public is welcomed because of its conceptualisation of the political actor. For Dewey, the public is temporary and formed as issue-based collectives. In such a public, the actor is not assembling based on a rational choice but because of the shared perception of harm. The human and nonhumans actors are belonging to the same political ecosystem where the conjoined action is accomplished through their affective coming together. For Dewey, the bodies in public should be able to affect and be affected by the other bodies and they are brought together with a problem that acts as a signal. When something is harming them and distracting their usual capacity and power to act, then these harmed bodies come closer to each other. They engage together and act in specific ways to restore their powers. These acts are political and by which they resolve the harm, compensate the damage and frame protections against any future harm (Ibid., 100-107). The assembly of ontologically many actants is acknowledged in the political decisions, but this does not mean that each of the problem solved will be able to distribute agency or justice to all the participants of that ecosystem. The political ecosystem cannot be egalitarian in most of the scenarios. The survival and the stakes of humans can be having the upper hand all the time in the outcomes. Bennett states,

> Since I have challenged the uniqueness of humanity in several ways, why not conclude that we and they are equally entitled? Because I have not eliminated all differences between us but examined instead the affinities across these differences, affinities that enable the very assemblages explored…I seek to extend awareness of our interinvolvernents and interdependencies. The political goal of a vital materialism is not the perfect equality of actants, but a polity with more channels of communication between members. (Ibid., 104)

Overcoming the need for speech act in the political and public participation, she advances along the concept of 'demos' explicated by Rancière. The concept denotes the human force that is not recognised and given a voice in public. For him, democracy is established only when there is some action from these 'demos' that exposes the arbitrary nature of the dominants in public. Politics happens only when these marginalised actors become disruptive to the socio-political order of the society. Their inclusion in public occurs as a spontaneous action that makes them claim "the equality of speaking beings" (Ibid., 105). Rancière himself did not extend his 'demos' to include the nonhumans and relegated it to the circle of human speech. However, Bennett finds possibility in extending Rancière's theory of democracy to the vital materiality. Firstly, the 'demos' is not a fixed entity but a travelling force capable of disruption. Secondly, the politics here is not the action but the "*effect*" that the act creates among the dominants to realise the presence of the marginalised other (Ibid., 106) (Italicised in the original). A dead rat, a plastic bag, few wooden logs and like many other nonhumans, these can perform an act of disruption and create an effect on the other bodies especially the human bodies. The acknowledgement of force and effect as actions of politics will loosen the criteria of participation in politics between humans and nonhumans. This movement away from the politics limited to the zone of language use will leave us more attentive to perceive other actants that travel with us in so many assemblages. It will also lead to ask more complicated questions to understand reality, which includes, "Does mercury help enact autism...Can a hurricane bring down a president?" (Ibid., 107). It is without any doubt that the theories of democracy have to be extended and equipped with more sensibilities to comprehend, evaluate, politicise, control and predict the more intricate life humans live with other nonhumans today.

Bryant's Machines and the mechanology

For Bryant, traditionally social theorisation has comprehended power only by meanings and symbols and the processes through which it is transmitted via social relations. The role of real materials in constituting the social relations was never a part of the mainstream social analysis. Therefore, he questions how a social theorist can understand the ecological crisis and

climate change by moving away from the monopoly of the term culture. How are we to produce a significant knowledge needed at this point if we are only considering things as vehicles of social relations? Here, one has to understand that social relations are also formed through the things. Imagine, the changing ocean currents and ever decreasing bees in rearranging the social relations and meanings of social and political life in the world. Bryant brings the example of the simulation game *SimCity*, where the player has to build the design of the city from laying roads, planting trees to the launching of industrial estates. (Bryant 2014, 4-5). Bryant says the way in which the game brings the interconnections of the materiality and in turn, the manufacturing of social relations are eyeopeners. The question of control is a very slippery zone here, and it is through the translation of one object over the other to use the Callon's term (1984), there is a creation of stabilisation, and the processes occur materially. He explains that for instance, the wrong planting of the trees will lead to unabsorbed pollutants that in turn changes the composition of the other material components that includes the human actors. Hence, they become sick. It is not always the question of culture and meanings, but the material significantly changes the course of social actions and relations. The power and authority are consolidated around the material realities. Here, the speed bump example of Latour is relatable, where the speed bumps are objects of control and stabilisation of the traffic (2005a, 71-77). They are active as the riders, vehicles and the changing signal lights. By giving importance to the material aspects of the composition, Bryant is not rejecting the value of the critical social and political theories. However, for him, the realm of discursive is exaggerated side-lining the physical aspects of social, political and ethical life (Bryant 2014, 1-10).

Nevertheless, the author is also not suggesting a social and political theorist to be an expert in Physics, Chemistry or Biology to comprehend the material. However, the social scientists, firstly have to understand that world consists of units and elements ranging "at a variety of different levels of scale, and that are themselves composed of other entities" (Ibid., 6). Moreover, the focus should also be on how these units mediate other objects in creating realities without the separation of social and natural. This mediation of one unit and the other unit should be able to narrate a story where the social, political and ethical life can be comprehended through a material dimension rather than a unilinear discursive explanation of social life. An out of context example would be, how did the coming of the street water taps in a caste-ridden society alter the social relations between the various caste groups? Here, I use the technique of "Latour Litanies" of Ian Bogost to bring out the various material dimension of the investigation mentioned above rather than subsuming all the material components under the question of caste, which is the prototype of mainstream analysis (Ian Bogost, Bogost blog,

comment posted December 16, 2009). "Latour Litanies" is specifically used for the "annulment of prototypes that come to stand for the being and nature of all objects" (Levi Bryant, Larval Subjects, comment posted April 26, 2010). Therefore, the some of the material objects of the study can include the street, the tap, water, municipal office, placement of the tap, consumers, caste identities, the process of fetching the water, and temporality.

> Rather, by "matter," all I mean is "stuff" and "things." The world, I contend, is composed entirely of "stuff" and "stuff" comes in a variety of different forms. Even ideas and concepts have their materiality. (Bryant 2014, 6)

As per the statement, ideas have their material existence. For Bryant, the idea of caste also has its materiality from its being in thought as a concept in the brain, then embodying that idea to the body and to the other materials like that of tap and water. Both the semiotic/expressive things (incorporeal) and physical/material things (corporeal) are brought into his metaphor of machines/things (Ibid., 26). The enclosing of semiotics and material are seen in the essence of Actor-Network-theory itself. The point to note in these material-semiotic approaches is the effort catered for centring the things and in emphasising its role in the social, political and ecological theorisation. In this respect, we have to move closer to the world of things and come up with the language that can articulate the "thinghood" (Bennett 2010, 4). In such an effort, Bryant observes the objects as machines to completely remove the human gaze attached to the term objects. "I call these entities 'machines' to emphasise the manner in which entities dynamically *operate* on inputs producing outputs" (Ibid., 6). Machines are medium for another machine to perform. In that sense, a human can become a medium for nonhuman to act as the case of a steam engine, where the continuous performance of human lets the nonhuman ship to act. Alternatively, a nonhuman can be a medium for another nonhuman. A light bulb can be a medium for the lizard to catch its night prey (Ibid., 22-37). Machines are not understood based on their property, but within the frame of Machine-Oriented Ontology (MOO) (Ibid., 15), machines are what they do. Machines are comprehended based on the production process that involves the input and output in relation to the other machines (Ibid., 39). Bryant calls this field of analysis as "mechanology" that is aimed at studying the essential features of varied machines that include "living machines, incorporeal machines, artistic machines, political machines, etc" (Ibid., 17).

Before finishing this section on specific discussions about the object-oriented theorisation, let me return to Graham Harman. Harman gives more autonomy to objects than Latour, Bennett, and Bryant. Latour's sociological and Bennett's politico-ethical approaches and their inclusivity of objects is related to a social and political objective. Not to forget

Bryant's relational ontology where the machine is understood for its action and effect on the other machine (Harman 2018, 228). In the case of Latour, the sociology of associations need to take full hold of the objects around us. In the case of the Bennett, in making a politico-ethical discourse of broader self (humans and all other actants) and of broader interest (interests of humans and all other actants), she builds vital materialism that is encompassing both the humans and other objects. In both these cases, the objects are dealt in relational aspect to the other objects that are mostly a human. This turns out evident because of their commitment to the notions of inclusive social and inclusive political. This is no different from Bryant's MOO. However, philosopher Graham tackles object in a more autonomous sense that exists as a thing-in-itself rather than being held up in other relations. For him, OOO tries to deal with the broadest sense possible of the term things, which exists with specific grade of independence without any relations (Harman 2018, 41).

> an object is anything that cannot be entirely reduced either to the components of which it is made or to the effects that it has on other things. (Ibid., 43)

Harman states that there has been an aversion to studying the 'mid-sized physical objects' in the philosophy due to the tradition of objects falling either to the 'undermining' or 'overmining' tendencies of philosophising. The pre-Socratic philosophies were preoccupied with the constituting components of the objects, the 'undermining' approach. In 'overmining' approach, the object is not perceived as a real thing outside the relationship with the other objects or events or away from its qualities (Harman 2011, 172). The object of OOO becomes even more complex when Harman extents the very concept of the object to the events, collectives, or any institution. A pulsar, mayflies, 100-metre dash, rule of a queen, East India company, or exchange of winks can be included in the range of objects in Harman's terms. Therefore, again 'an object' is anything that '*is more than its pieces* and *less than its effects*' (Harman 2018, 53). Harman's broader objective of object theory is not detailed here. It is understandable that Harman's object-orientation is critical of the ANT approach of Latour, Bennett's things and Bryant's machines, where the object is not a substance in-itself but treated only in its relation (Ibid., 153).

However, the concern of my thesis is to establish a comprehension of objects as influencing the other nonhuman and material counterparts in relation, particularly the humans in assemblages. Harman's object is aiming something wider and can eventually disorient the focus that is very particular in this attempt. Firstly, the effort here is to discuss the ontological

and object-oriented social investigation. Secondly, to highlight the political and ethical part in bringing the object as equal counterparts for a materially engaging STS.

Latour's Dingpolitik, Bennett's Onto-story, and Bryant's Onto-cartography- Attempting a comprehension

Latour's actants and Bennett's things give us an opening to take objects as the sole subject matter of focus and investigation in social research, particularly with regards to the science, technology and ecology related objects. Latour poses the importance of actants in terms of comprehending the social itself. For him, social is incomplete if it ends with the human and with their social relations. Social encompasses the natural and the material. Therefore, the object becomes integral in his framework. In his book, *Reassembling the Social* (2005a), the notion of object is a social entity, which has to be methodologically incorporated in undertaking sociology of associations. However, the question of the object is dealt more politically in his work, *Politics of Nature* (2004a). Here, his notion of the object is related to nature and therefore, to the realm of sciences. This position is problematic in relation to the construction of nature and objects outside the sphere of science. For instance, the construction of nature in the sphere of religion, morality, or by the so-called 'alternative' epistemologies of Science. This issue in specific distances the scholarship of Latour from the Indian scenario and in others words, makes us question the inclusivity of his nonmodern politics. Bennett's focus on the object is situated philosophically, but her emphasis is politico-ethically relevant to the making of a public that is sensible in its approach to the objects. Latour's approach calls for a parliament of things, where representatives of humans and nonhumans shall commence a discussion about the composing of the world. In many ways, Bennett's mode of politics is not a formal invitation but towards a creation of a public mood that will sense a responsibility towards the issue of nonhumans and objects unlike a formal deliberative approach of Latour (Bennett 2010, xii).

Machines of Bryant is, even more, a concrete version of an ontology cum object project compared to Latour's actants and Bennet's thing-power. It is because, Latour's objects are actants in the ANT model, which is a methodology to comprehend the real social following the footsteps of Gabriel Trade (Latour 2005a), whom he calls the founder of French Sociology (Latour 2004b, 245). Here, one cannot underestimate the lead given by Latour to be inclusive of the objects and nonhumans and in considering them as active players of reality composition. The question of power and social suffering becomes less attended within Latour's paradigm.

Bennett's vital materialism is an aesthetic, scientific, material and a political claim to understand the things around us. She calls for attentiveness to the aliveness of things, a thing-power. Again, her "onto-story" is a unique ontological expression of the things. However, the social and political hindrances for the humans in coming closer to the vitality of the things are not explicated (Bennett 2010, 4). However, Bryant's "Onto-cartography" is more productive, which is,

> map of relations between machines that analyzes how these assemblages organize the movement, development, and becoming other machines in a world… *Onto-Cartography* is that social relations or ecologies take the form they take due to the gravity – my term for "power"– physical and discursive machines exercise on elements that inhabit assemblages, worlds, or ecologies. (Bryant 2014, 7)

The mapping is a move forward from his earlier strictly ontological project called "onticology" attempted in the book *The Democracy of Objects* (2011), which just demystified the relegation of objects as a passive entity in the philosophical and social theorisations (Bryant 2011, 20). The objective of Onto-cartography is to bring about a "meta-politics and meta-ethics" through the narrative of machines. He calls it "meta" because the primary aim is still to establish the ontology of the things through which the question of politics and ethics will be turned into the plot (Bryant 2014, 8). In an interview with Harman (in a Question and Answer session with the author arranged by Edinburgh University Press), Bryant claims that his cartography is the mapping of the machines. Both the semiotic and corporeal machines like how Marx mapped capitalism's structure and how Foucault mapped the assembling of a knowledge system in a particular period to understand the power grid. He uses the metaphor gravity instead of power to keep it out of the anthropocentric limitations. The understanding of the gravity grid is aimed to develop the tactics to come out of the oppressive assemblages (Bryant n.d. (in the interview with Harman) and Bryant 2014, 7).

The politics of Latour, Bennett, Bryant and Harman are seen complementing each other. Latour's diplomatic mediation is valid and certainly cannot be seen as an inclusive way of doing politics. Whereas, Bennett's creation of public mood by sensitising the public with the issues of S&T and ecology through onto-stories seems more imaginative. However, both Bennett and Latour take a pragmatic approach is constituting their public in the sense of Dewey, as an issue based floating public. However, the idea of critique and the creation of public is more inclusive in the onto-stories of Bennett than in the thought-experiment of Latour. The important reservation one has with the politics of Latour is its very diplomatic and top-down approach in delineating his parliament of things and in building a politics through the mediation of exhibition. Also, his take on the 'alternative' epistemologies to sciences in

composing the nonmodern world is not discussed leaving Latour an ambiguous figure within postcolonial STS. Though he questions the exoticism of Occidentalism (Latour 2011, 77-78), his idea of composing the world or assembling the actants from a postcolonial standpoint is yet to be done. As mentioned, the quotient of critiquing the socio-historical process of assemblies in the description of objects is missing in the theorisation of Latour and Bennett. Anna Tsing's (2015) mushroom in her narrative becomes a critique of capitalism and violent projects of science and technology, in which the object is highlighted along with a critique of the assembles. Bennett had mentioned about postponing these larger questions of social structure over detailing the lively things (Bennett 2010, 17). Here, in particular, Bryant's mapping of the objects is necessary as it accounts for the junctures of oppressive socio-historical processes.

The major takeaway from these politics is to cultivate a realist tendency in approaching the question of the social through which the mundane objects and nonhumans can become actants evincing their thing-power that enables a process of mapping the relations with them. This mapping of the social and the political relations is a way forward to resolve the questions significant to both Science and Technology Studies and ecological studies. The next section will attempt to illustrate seeds through the categories of object politics by studying the sociological literature on seeds.

IV

Understanding the object seed- Seed as a Machine

Theorizing the Contemporary, a forum of the journal *Cultural Anthropology*, published a lexicon list titled "Lexicon for an Anthropocene Yet Unseen" in 2016. Anthropologists Cymene Howe and Anand Pandian (2016) gave a brief introduction for the title. The attempt is to flag off and engage with the changing idea of 'life' and 'living' socially in the era of Anthropocene through vocabularies and meanings that the discipline of anthropology can illuminate and delineate further. Apocalypse, Carbon, Cosmos, Death, Distribution, Ecopolitics, Nature, Power, Seed, Species, Timely, Zoonosis are some of the enlisted lexicons. This backdrop is especially important for my narrative to grasp the significance of selecting an 'object' for the study like that of seeds. The intention is not about giving a voice to the seed or perceive the reality from the seed's position but is to emphasise the coevolution of human and other forms of life in the entanglement of social morphologies. It is to suggest that the attitude

of “becoming” of a human with the seed as non-hierarchical beings can be construed as a beginning for the departure in the era of Anthropocene (Kirksey and Helmreich 2010, 548).

Seed is an object not just in relation to the subject but is seen as an entity (object without any hierarchy) outside the conceptualisation of the human thought. This becomes clear in the explanation of the seed as a machine (Bryant 2014) and as a thing-power (Bennett 2010). The rationale for selecting seed as an entity of focus can be explained at three levels: 1. It is interesting to see how seed and its diversity is imagined as an essential part of the era not only for survival but understood as an entity of ethics and power in the lexicon of Anthropocene. 2. In the context of India, the seed is the most publicly and then academically debated object when it comes to the STS. 3. In the coming chapter, the seed becomes the subject and agent of the assembly in mobilising a politics of things in the state of Tamilnadu as comprehended from the politics of G. Nammalvar. Therefore, I am comprehending the entity of seed as an object and as a thing-power that can act as an individual actant having its capacity to influence the other actants. This section will provide specific episodic narratives that will try and give what Bennet calls giving “the force of things more due” (Bennett 2010, viii).

Fundamentally, seed can be seen as a black box (Harman 2009, 33) in a Latourian sense, which as a substance remained quiet in the public discourse as its input and output were considered known and natural maybe until the episode of the green revolution in the Indian context. Post-green revolution the materiality of the object became a concern and seed was black boxed to see its internal composition. The dissection is quite literal regarding how seed became an object in the scientific laboratories, where they were altered, decoded, and designed by the other actants in the assembly like the fertiliser, weeds, soil, and climate on the one hand. On the other hand, the seed is black boxed to see its external relations in terms of how the international relations, ideology, national building, ethics, and power structures reconciled the entity of seed. Seed is no longer something natural but is an actant assembled in layers. Shiva provides the institutional structure of seed travel in terms of seeds became an object of inquiry regulation and administration from the period of green revolution. The notions of “certified seeds” conveys how the seed was converted to an object of regulation, control, quality, and efficiency (Shiva 1991, 65). The seed as something to be known is not the preoccupation of the scientists alone but today seeds are monitored by national and international institutions that control the composition and travel of these seeds (Chandra 2016). Also, the assemblages within which seed is located became a site of engagement for civil society organisations. Seed as an

object is highly scrutinised along with all its co-actants like the fertiliser (Herring 2005, 213-217).

Navdanya is one such civil society organisation spearheaded by Vandana Shiva monitors the seeds and further, attempts to change the assembling of the seed against the methodologies and objectives of green revolution and GMOs. Assembling of seed is to be understood at two levels: 1. The organisation questions the technology of green revolution and genetic engineering (GM). 2. They are also sceptical about the power loop through which the seed travels and the control of germplasm and patenting by the multinational corporates. Also, through their organisation, they promote alternative assembles where the seeds travel with specific alternative rationale. Seeds are not calculated on their properties of germplasm; not seen as a property to be controlled, and seeds are not something that needs to be renewed through institutions and centralised agencies. Here, the seeds are gifts that can be exchanged and shared with a sense of ethical responsibility (Paul 2018, 424-426). Paul states,

> security—"seed-sovereignty" and "biopolitics"—are often staged carefully through a discourse of expectations and ethics of life that is impossible to politicize and yet is somehow already political. These terms function on the basis of the paradigms of friendship, care, knowing, and a reawakening of the human–nature relationship in social theory and thinking. (Ibid., 424-425)

In his essay, "Footnotes to Vavilov", which is on the significance of gene diversity, Visvanathan claims for the polysemic understanding of things as the source of resistance, i.e. the multidimensional understanding of the things as the basis for the resistance against the monoculture and the improved gene diversity. He explains that plants and seeds cannot be perceived in its scientific and economic terms alone and plants and seeds are entities that traverse the zones of magic, religion, science, work and medicine in the non-western societies (1997, 64-66). Visvanathan is comprehending seed as a "machine" to use the term of Bryant (2014, 37-38) when he says that plant and seeds cannot be imagined as purely as a singular entity or as an isolated being. Seeds have to be imagined in relation with the ecosystem, and by the effects, it has on the other organisms like the soil, water, land, humans, and animals as the machine understood through its input and output. Vandana Shiva talks about the inconsiderate hybrid seeds that were imagined as isolated entities. She articulates how the water-thirsty seeds with its heavy fertiliser requirements degraded the soil, and the monocultural fields became vulnerable to the pests (1991, 121). Therefore, for a sociological study of any object, it has to be understood in terms of its input and output.

The seed of Navdanya is polysemic in its performance as a machine where the machine is not isolated but imagined as ecologically sustainable with the other things around it. The

input and the output of the seed machine reflect the quality of its performance which is again not purely economic. The performance is valued in ethical, religious and ecological terms. This seed as the machine is not only ecologically sustainable for other nonhuman machines but invokes a sense of community, sharing and responsibility as a gift. Studying the organisation of Navdanya, Paul visualises the seed as a community being within the limits of the organisation that falls outside the logic of capitalism and corporatisation (Paul 2018). These introducing paragraphs flag off seed as a black box that is construed and scrutinised as an entity of importance in the era of Anthropocene, GMOs and biopolitics. However, these overarching structures of capital, Science, and governmentality cannot observe all the assemblies of seed and different kind of black box that the seed can be; one such instance is the case study of Navdanya.

Seed as a quasi-object and its thing-power

This section will understand the entity of seed within the philosophical and theoretical apparatus of the object-oriented propositions. Seed is already comprehended as a machine, as a "stuff" that is perceived not for its properties but for what it does on the other "stuff" (Bryant 2014, 6). Seed can be a purely natural entity, or it can be a quasi-object/ hybrid. Seed cannot always be understood as a hybrid without nature and culture distinction. In other words, the seed is not an entity that is produced in the practices without nature or culture distinction. The seed that is untouched by the human gaze or of an unknown plant species can still be understood as a natural object. Though one finds it difficult to imagine such an object in the era of Anthropocene, nonetheless, Harman distinguishes between natural and hybrid objects. Harman comprehends CO_2 as a purely natural entity (Harman 2018, 58). However, seeds inside the paradigm of agriculture and forestry are construed as quasi-objects. It is so because these seeds have been known, interacted, categorised, travelled, designed, shared, imagined, celebrated, ritualised and reproduced within the so-called natural and cultural domains of human life. This becomes clear when Visvanathan explains how Anderson conceives the plants as artefacts like any other man-made artefacts available. He describes how the maize as a crop thrived because of the intervention of the human who continued planting the grass with a pathological character in the female inflorescence that has no equivalent among the grasses. Therefore, their being is dependent and cannot be seen as a purely natural entity (1997, 62). Likewise, when it comes to the Science of forestry, the idea of care and plantation inherently presumes the things as something designed and managed. Therefore, those things are quasi-objects. Hybrid and genetically modified seeds are without apprehension quasi-objects. When we understand the

complexity of the network of these hybrid and genetically modified seeds, then the seed has to be comprehended in the complexity of Science, Sociology and Discourse Analysis. The seed will not make any sense like the ozone example of Latour if these critical epistemes are done separately dividing the natural and social realities (Latour 1993, 5-6).

The understanding of seed as a machine, an actant and as a quasi-object gives a specific, concrete underpinning to the further social analysis of the entity seen within the ontological politics and object theorisation.

1. The significance of the ontological politics is its emphasises of the comprehension of reality through studying the practices and the relations of practice in a particular assembly. Seed is not the same in all the assembles but is done differently that differs from one assembly to the other like the salmon of Law and Lien (2013, 366). The comprehension of the green revolution seeds in the discoursal assembly of politicians, scientists and the bureaucrats are done within the logic of nation-building, food grain sufficiency, and international research on the high yielding seeds. The same green revolution seed is done differently in practice in the assembly of soil, fertilisers, tractors and water supplying facilities where the seed is done according to the materiality of the soil, land, micro-macro climate of the cultivation field, fertiliser content, ecology, farmers knowledge, credit system, electricity and water supply.

2. The understanding of human, nonhuman, and object as actants in assembles is the sociology of association where the human and the nonhuman actors are given agency and are treated active and capable of manipulation in these assemblies. A compressive study of social can be done only by involving the nonhumans and objects rather than imposing the pre-aggregate social categories like class, gender, and caste following the path of Gabriel Trade (Latour 2005a).

3. The understanding of objects as actants, machines, and quasi-objects not gives a clarity over the physiological character of the object but about its performance as an actant in the network. This approach is more sensitive to recognise, understand, and analyse both the objects of science and technology and other ecological objects. These are three primary outcomes of perceiving entities as machines, actants and quasi-objects.

Visvanathan (1997) narrates the importance of gene diversity, which first came to light through the efforts of the Russian scientist Vavilov. This essay grapples with the anxiousness about the genetic erosion of various plant species in the world. The apprehension about the loss of gene diversity can very well be an “onto-story” that can tell us more about the thing-

power of the seeds (Bennett 2010, 4). Pat Mooney in his work talks about the various researches, commissions and policy changes that were made to cope after the blight that struck the US corn crop in the 1970s. Mooney quotes what a USDA (United States Department of Agriculture) official said about the blight, 'we were sitting around fat, dump and happy…the hybrids were doing well and all of a sudden the disease hit. We did not believe it could happen, but it did' (Mooney 1979, 11). Seed is not a weirdly vital thing like a dead rat or a spool of thread as discussed by Bennett. However, the moment of surprise that the seeds gave after affected by the blight is undoubtedly a display of the thing-power of seeds. This "onto-story" of the seed is conveying the moral that seed as a thing is a vital player in the world assembly (Bennet 2010, 3-4). In the words of Bennett,

> I will try, impossibly, to name the moment of independence (from subjectivity) possessed by things, a moment that must be there, since things do in fact affect other bodies, enhancing or weakening their power. I will shift from the language of epistemology to that of ontology, from a focus on an elusive recalcitrance hovering between immanence and transcendence (the absolute) to an active, earthy, not-quite-human capaciousness (vibrant matter). I will try to give voice to a vitality intrinsic to materiality, in the process absolving matter from its long history of attachment to automatism or mechanism. (Ibid., 3)

Overall, it is argued that the focus of human, nonhuman, natural, and symbolic entities as objects can give a more concrete perspective both over the materiality and political-economy of objects. The proposal is to be inclusive of all the objects in social and political theorisation. Thus, this section has given a brief description of seed as an object, an actant, and as a machine having its thing-power.

Chapter Three

The Politics of G. Nammalvar, Sociological Imagination of Seeds, and the thing-politics in Tamilnadu

Thing[21] and the thing-politics are the two significant terms used to study the discourse of seeds and the human-seed relation in the chapter. The terms thing, object, and machine are extensively discussed in the previous chapter. They merely mean any actants from human to nonhumans to symbols (Mobiles, hashtags, supreme court, pilot, or a water body) and these actants are assumed as real with differing material agencies and can influence other actant's actions (Datta 2015, 102,111). The term thing-politics conceptualised by Latour implies the idea of social where relations are constructed in association with the things. Social is not a mysterious force that binds people together, but social in reality is produced by the associations with the things. Especially, Latour is interested in the objects of science and technology or the hybrids that assemble the relations of actants (Latour 2005a, 10). This politics that brings the objects to the centre as entities capable of mobilising, assembling and representing other actants in the networks is called the politics of things or the thing-politics (Turnbell 2010, 101-103). Seed, an actant; an associate in the human-seed relation; and an agent of politics in the narratives of Dr G. Nammalvar will be expounded as an originator of thing-politic in Tamilnadu seen through the prism of Nammalvar and his discourses.

The chapter continues to engage with the question of the object and extends to understand the human-object relationship without ontological hierarchisation. The subject-object relationship as discussed by Theodor Adorno and Jane Bennett is brought in to read the human-seed relationship enacted in the writings and politics of Nammalvar, outside the western schema of subject-object dichotomy. Moreover, it is proposed that being a permaculturalist and doing an alternative politics for more than three decades, Nammalvar has led to nothing short of a thing-politics in the state of Tamilnadu. His seed imagination assumed seeds outside the linear narratives of science and capitalism, creating a different relation not only with seeds but

[21] The terms thing and object are used interchangeably in the thesis. However, Bennet remarks things as a more post-human terminology that decentres humans from the ontological centre than the term object (2004, 351-152). Likewise, Bryant uses the term machine to indicate the idea of performance rather than representation of the object (2014, 15). Also, Latour uses the term dingpolitik (thing-politic), a realist politic of representing the matters of concern and claims this politic as leading to an object-centric democracy (2005b, 23-24). These approaches are comprehended as specific interventions of the scholars within the general rubric of object-centric politics called Object Oriented Ontology (Harman 2018). Therefore, the terms like objects, things, and machines are employed interchangeably.

in general with other objects of concern like that of soil, water, sand, trees, food, shrimps, indigenous hens, millets, and fertilisers. The noteworthy contributions of Nammalvar are manifest and cannot be foregone in any reading and comprehending of the nascent techno-scientific contentions and resistances in Tamilnadu. He has been an instrumental figure in mobilising various stakeholders against a range of unsustainable techno-scientific projects, experiments, and other industrial ventures in Tamilnadu from the 1980s. His engagement with a range of stakeholders like the farmers, local communities, villagers, women collectives, students, young Information Technology professionals, civil societies, and international networks gave rise to spaces of interaction, subjects for discussions, and alliances for collective action, which accentuated on the thing-power (capability of the things) of various materials of contention. The chapter argues that being a permaculturalist, Nammalvar continuously talked about the importance of co-existence of the materialities and stressed on the ecology and interconnectivity of things around us. Beginning his politics against the science and technology of green revolution; he acknowledged seeds as the fundamental object of concern and as a determinant of sovereignty not only for the farmers but of the region at large. Mainly, for Nammalvar, the sovereignty and sustainability of seeds cannot be detangled from the political and ecological sustainability of the humans. The idea of object-centric politics is a continuation of the democratisation of objects discussed by Bryant (2011): objects as associates in the social and political narratives.

Nammalvar established an alternative human-seed relationship through two techniques of representing the seeds as associates of politics; they include storytelling about the seeds and the popularisation of seed ball technique as a collective activity. These two techniques are construed as methods of representing the seeds, its thing-power and as an attempt of building alternative human-seed relation. As a fascinating storyteller, Nammalvar in actuality has built a consciousness of things that began with the critical object like the seeds. His extensive fieldwork, social activism, commitment with various farmers' associations, networking with environmental groups and other civil societies not only propagated his vision of self-reliance, sustainability and the materiality of the things but also created many individual leaders and networks of organisations. It is proposed that his emphasis on the things and in specific, the entity of seeds opened a new window of politics of things in Tamilnadu. The concerns over the science, technology, materiality, human, nonhuman, and objects have begun to take centre stage of politics in the state.

The overall narrative is situated within the commitments of postcolonial STS to cite the politics of the region, materiality, nonhuman, and objects as integral aspects of the "relational ontologies". The conception of "relational ontologies" delineates the assumptions of being and living that falls outside the western worldview (Escobar 2010, 39 and Escobar 2016, 16-18). The human-seed relationship constituted in the politics of Nammalvar has to be understood in such a paradigm that understands entities in interrelations without the hierarchisation of reality. In such relational worlds, the question of region/territory, life and the commons are conceived in the same plane, and their alternative mobilisations are nothing but "*ontological struggles*" (Escobar 2016, 20). Postcolonial STS as practised in India has been talking about the alternative ontologies envisioned through the epistemologies other than Science (Abraham 2006). However, the aspects of region, politics, nonhuman, objects and 'alternative' human-object relations were not the major focus of discussion within the discourses of postcolonial STS. To understand the emerging tendencies of the region's attitude, public consciousness, resistances, contentions with regards to the science and technology initiatives, and further the policy-making of the state, it is more than essential to look into the micro-level nodes, assemblies, interactions, imaginaries, alternative assumptions concerning the worldviews, nonhumans and objects, personalities and their politics in entanglement.

Therefore, the chapter explicates on a case study that focuses on the notions of ontology, objects and subject-object relations. It moves away from the preoccupations of the STS in India that is concerned with the question of epistemology rather than ontology, objects, materialities, and nonhumans that are significant to comprehend the issues of science and technology, and which have become manifest actants in the politics today. Nammalvar's imagination of seeds and his alternative politics is understood as the initiation of object-oriented politics that has brought out the objects as a vital vantage point of politics. The issues over the things, in general, have become more than a case of scientific controversy that needs the engagement of the sociologists to build the discourses by not just being committed to the social, epistemological, and humans but to the objects, ontological and nonhuman actants of the real world. Seed, in the first chapter, was construed as a constituent object building the social that questioned the hierarchical relationship of the subject-object and was called a "counterhegemonic" object (Pickering 2009, 9) (Muller 2014). Now, the seed politics taken up Nammalvar in Tamilnadu will be taken as a case study to comprehend how the objects have begun to reshape not only the politic but also the general human-object relations within the purview of postcolonial STS.

I

The politics of things in Tamilnadu and the commitment of Dr G. Nammalvar

In the recent times, the state of Tamilnadu witnessed a range of politics of things where the scientific rhetoric in the name of "matters of facts" have become "matters of concern" (Latour 2011, 72) and the issues were taken up as livelihood concerns threatening the local communities' and Tamilnadu's ecology at large. The politics of things include: the copper smelter in the case of Sterlite protests (Jayaraman 2018), the extraction of Coal-Bed Methane (CBM) in the Cauvery delta in the case of Kathiramangalam resistance (*The Hindu* 2013), the Hydrocarbon exploration in the case of Neduvasal protests (Jayaraman 2017) and about the Enayam port construction activities in the Coastal Economic Zone (CEZ) (*The New Indian Express* 2017) to mention a few of such instances. These continuous resistances that occurred all-over Tamilnadu were spurred by the vigilant protests that began in Kathiramangalam against the Methane extraction project in the year 2010.

Neduvasal is a village in the district of Pudukkottai, a delta region with abundant groundwater and fertile soil. Within a few days of announcing the Hydrocarbon exploration in the village, the villagers began to protest against the project being aware of the impact caused by the other oil production processes in the nearby delta districts. In discussing the Neduvasal protests that started in the March of 2017, Jayaraman, a noted environmental activist in Tamilnadu describes the astounding groundwork of the natural farmer Dr G. Nammalvar in the delta region creating awareness about the need to protect the soil, land, water, and agriculture in the region. He mentions,

> villagers are aware about the general consequences of hydrocarbon extraction thanks to a successful and popular campaign against a controversial coal-bed methane (CBM) project in Thanjavur between 2010 and 2016. Led by the late G. Nammalwar, a popular organic farming proponent, the campaign included a massive awareness drive to educate villagers about CBM as well as about how hydrocarbons are extracted from Earth, the effects of such operations on the environment and on people's livelihoods. (Jayaraman 2017, par. 6)

Popularly called *Ayya*, Nammalvar is a natural farmer, a permaculturalist, an agricultural scientist, and a social activist who spearheaded the organic farming movement in Tamilnadu. He spoke everything about things; these things were objects of science, technology, ecology, body, and agriculture. He realised the significance of these objects that have to be discussed amongst the village communities and in the society at large. He persistently had long conversations with the public and explained the history and politics behind these things: seeds, millets, Hydrocarbons, Cauvery, soil, groundwater, methane, genetically modified seeds,

cattle, forests, weeds, fertilisers, microorganisms, brinjal, shrimps, eggs, mountains, neem and many more. In fact, he talked about the relationship between the humans and the things around them. To comprehend the imagination and politics of Nammalvar, it is essential to get an overview of the human-object relation in general. The previous chapter revolved around the question of objects and various approaches of the object-oriented politics. It is presumed that objects significant to the STS and ecology can be detailed sociologically by the comprehension of these object-oriented approaches, where objects are understood in their enactments rather than by their representational status. As an extension of that objective, chapter two ended with an exposition of seeds as an object- an object that has been and still is the preoccupation of STS in India mainly due to the impact of the so-called "green revolution" and the recent developments in biotechnology. Here, in analysing the human-object relationship, the focus will be laid on the constitution of human-seed relationship as construed from the politics of Nammalvar by analysing things especially the seeds in his narratives. By taking cues from various sociological understandings of human-seed relationship, an attempt is made to outline the imagination of seeds by Nammalvar that sharply reflects in one of his book titled *Ini Vithaigalae Perayutham* (2017) (Seeds: The Future Arsenal).

Here, the aim is not to essentialise the organic seeds and farmers' knowledge by dichotomising it with the green revolution seeds and the scientists. Such a dichotomy between Science and the indigenous knowledge is not any more a valid perspective since for some time now literature from Science Studies have deconstructed the unilinear culture of Science and other anthropological studies have shown the compatibilities in the techniques of academic and non-academic actors (Demeulenaere 2014, 46). Also, the overall sociological imagination of Nammalvar cannot be limited to the construction of alternative seeds outside the so-called scientific green and gene revolution seeds alone. Firstly, for Nammalvar, the seed had been the fundamental unit of his politics since he strongly felt that food crops have to be produced with total sovereignty locally in a sustainable manner. Nevertheless, his politics cannot be seen as restricted to the idea of agriculture, and ecology like the other organic movements flourished in other regions of India.

Nammalvar emphasised the identity of Tamil and the region of Tamilnadu to claim the sovereignty of things: land, water, cattle, air, soil and seeds are within the identity of Tamil (Nammalvar 2014, 132-138). He was called a Tamil revivalist (*Times of India* 2017), and certain sections of Marxist and Dravidian rationalists opposed his views of anti-vaccination and allopathy medical system. Also, many rationalists claimed that the politics of Hindutva is

infringing into Tamilnadu through the routes of alternative farming systems (Kumaresan 2017). However, this is only one side of the story, many Tamil nationalist groups and civil societies concerned with the question of ecology and science lauded the commitments of Nammalvar towards a region-centric politics (Jeshi 2014 and S. Karthick 2013). Many of the organic farmers are alleged as right-wing supporters. However, Nammalvar placed his politics of things and region at the forefront and was not focused on distinguishing the right or the left-wing positions (Khadse et al. 2018, 198). Also, in the overall study, one is neither interested in engaging with the questions of 'scientificity' in the farming practices of Nammalvar nor deliberating on the allegation of right-wing association that concerns many similar alternative movements in the Indian context. Instead, the real politics of Nammalvar exists in his popularisation and champagning of the thing-politics, which decentred the humans by rendering them in the enmesh of the things where things are explicated as real and performative. Thus, the attempt is not to eulogise the figure of Nammalvar. The aim is to sociologically understand the personality, his politics, imagination, and contributions.

The imagination of Nammalvar has to be seen through a broader prism and hence, it can be said that in general, his seed politics echoes his commitment to "relational ontologies", a region-centric approach that "eschew the divisions between nature and culture, individual and community, us and them that are central to the modern ontology (that of liberal modernity)" (Escobar 2010, 39). Again, ontology here is not concerned with any metaphysical questions but tries to attend to a socio-historical constitution of the assemblies. The "relational ontology" reflects the shared alternative assumptions regarding the objects, events, relations and practices in the constitution of the world itself outside the homogenising western narratives. Plantations and GMOs are examples of one kind of designs and objects constituted within the modern ontology that separates the nature and culture. However, the "relational politics" demystifies the nature-culture, developed-undeveloped and coloniser-colonised divide by establishing an associative subject making not only with the humans but also with the nonhumans (Ibid., 56). The permaculture farm and the organic seeds as objects produced in the permaculture design in the yards of Nammalvar are seen as entities of a distinctive set of shared assumptions of the world that exists outside the modernist worldview (Aistara 2013, 116).

The ontology constituted within such an alternative imagination has its implications in the political, cultural, ecological and spatial fields, which are understood in the enactment and not as pre-given categories (Escobar 2010, 41). Moreover, thus, this process of co-construction of humans and nonhumans can be called a "political ontology", which indicates the constitution

of “a certain political sensibility, a problem space, and a modality of analysis or critique” (Blaser 2013, 552). Therefore, it is proposed that such a political ontology is enacting the sociological imagination of Nammalvar and his alternative seeds that spoke of sovereignty, sustainability, conscience, and in general, which expressed an alternative relation between humans-objects. This “sociological imagination” propagated through the seeds empowered the public,

> to understand the larger historical scene in terms of its meaning for the inner life and the external career of a variety of individuals. (Mills 2000, 5)

Overall, the term ontology of seeds refers to two interlaced meanings- one at the biological level and the other at the level of a differential approach to the world itself. Firstly, as an entity, the seeds popularised by Nammalvar are materially and ideologically mobilised against the green revolution, and gene revolution seeds and thus, these seeds are distinctive biological entities. Demeulenaere calls these seeds as “biological ontologies” that refers to various kinds of objects seen through the different epistemic fields (2014, 46) and secondly, in addition, the seed becomes a tunnel for the constitution of the alternative worldview inferred as “relational ontology” against the modern liberal worldview (Escobar 2010, 39). The highlighting of the seed constitution in the discourses of Nammalvar has not only shown the interlinkage of the biological life processes of the seeds within the social but also places the human becoming as an entangled aspect of the biological. In this narrative, the seed is becoming, and the human becoming is understood both as social and biological “that [is] every trajectory of becoming issues forth within a field… [of] *biosocial*” (Ingold 2013, 9). The politics of seeds that Nammalvar explicated did not end with the object seed, but the language and grammar of things and human-object relation as becoming were subsequently conceived as relatable to the other objects, for which, in fact, he extended the networks and was committed in collective action. The spilling over effect was not a mysterious force but due to the provocation of thing-power and the material capability of the nonhumans and the ecology that decentred the humans. In turn, these objects began to be elements of critique and politics that occupied many layers of social interactions right from the everyday conversations, small community engagements, civil society activities to larger social movements.

For an understanding of the political ontology of the seeds in the imagination of Nammalvar, it is essential to have a general overview of the human-object relationship. In fact, the seed communicated within this political ontology has produced an alternative subject-object relation. The voice of Nammalvar is nothing but an alternative worldview that reconstitutes the

existing human-object relation, and the entity of seed is performed as the initial tool of change. The general discussion of human-object relation is important since the life of Nammalvar is situated in a particular socio-historic period, and his politics is a critique of the violence perpetuated into the ecology and the life of farmers in the name of science and technology under the banner of green revolution. His struggle also went on against the patenting regimes and the introduction of genetically modified seeds. His politics led to an alternative material imagination of human-seeds but not limited to the farmers.

Thus, the comprehension of the seed as an object through the object-oriented approach is useful for construing them as individual entities of concern in the relations (Latour 2005a and Bryant 2010). In other words, it left us to think more on the liveliness of the things and created a fascination to acknowledge the objects away from the narcissism of the humans (Bennett 2010, xvi). However, in order to talk about the political ontology, a collective constitution of reality that involves the humans and the seeds in the composition of a particular kind of mood, space, and critique of objects constructed against the assembles of green and gene revolution, it is inevitable but to talk about the "genealogical critique of the object" (Ibid., 17). Thus, the processes that shackled the thing-power of the objects by consigning them to a passive and instrumentalised zone are significant to understand the so-called modern human-object relationship.

Nammalvar mobilised the space, leaders, voices, techniques, networks and things in constituting a differential human-seed relationship against the industrialised human-seed relationship. His imagination cannot be restricted to the farmer-seed relationship, since he aimed at mobilising the general public and declared the issue of seeds, water or land not as issues of the farmers but of the Tamil society at large (Vikatan 2017, web videos, posted on April 6, 2017). His two famous "techniques of representation" (Latour and Sánchez-Criado 2007, 365) of seeds include the popularisation of Masanobu Fukuoka's seed ball technique and his own "ontostory" that he narrates in his public meetings, workshops, and in the popular magazines (Bennett 2010, 4). These techniques aided in the reorientation of a human-seed relationship as "becoming" (Kirksey and Helmreich 2010, 548) rather than the constitution of seeds as an inert object that is left to the human will within the modern paradigms of green and gene revolution. It is claimed that these techniques became bandwagon on the one hand to construct a space of critique and on the other hand to mobilise an alternative human-seed relationship. The primacy of things in his persuasion is the crucial vantage point from which the entire argument of the chapter is developed.

In his narratives, the things are the subject of politics and the humans are conceptualised "not as *beings* but as *becomings*" entangled in the matrix of "the becomings of other constituents to which it relates" (Ingold 2013, 8). Nammalvar's ontological stories of the things and his popularisation of the seed ball technique will be detailed as the methodologies of propagating a public mood conscious of the "thinghood" and "One moral of the story is that we are also nonhuman and that things, too, are vital players in the world (Bennett 2010, 4). However, Bennett in her narrative avoids a historical critique of the objects that are created through the modern scientific and capitalistic assembles and contends that such a critique might "obscure from view whatever thing-power there may be" (Ibid., 17). In that case, it is proposed that these methods of representations like that of the seed ball technique and the ontological stories of the things can be seen in duality as techniques of critique and also as a way of creative talking about the thing-power.

The next section of the chapter will discuss the limitations of the object-centric politics in dealing with the genealogy and critique of the objects. By saying that, it tries to bring in the concern of objects as developed by Adorno taking cues from the works of Bennett (2010) and Morgan (2017) who invoke Adorno to complement the missing critique of subject-object relationship in the Latourian and OOO theorisation. Further, the subject-object relations as imagined in the politics of Adorno and Bennett are rehearsed to locate the human-seed relation constructed in the discourse of Nammalvar. Firstly, the significant difference in their approaches is that Adorno's human-object relations mainly critiques the processes of capitalism and scienticisation for mystifying the relation between the mind and the matter. For Adorno, the separation of the subject from the object is an ideological persuasion (Horkheimer and Adorno 2002, 1-20). However, Bennett's politics is not an attempt at giving any critique of the historical process in constituting the human-object relations. It composes the materials as active actants in the assembles. Secondly, in the works of Adorno, the idea of the human subject in relation to the passive object is sustained. However, there is something 'outside' that the concept of the subject cannot represent and by knowing that inadequacy of our subjectivity to capture everything, there has to be learning about the world around us. For Adorno, the subject should be able to apprehend the nonidentity of the things by developing concepts and languages that sustains the inability of the subject to be the master of the object. However, for him, objects cannot be made to sit on the royal throne after the removing of the subject (Morgan 2017, 14). Bennett's materialism begins with the idea of rendering vibrancy and liveliness to the object by firstly decentring human from the ontological centre gazing at the objects and

secondly, taking some time to observe the vitality of the things without the dominating relations of the humans. Though both of their conceptualisations acknowledge the importance of the 'outside' of the human subjectivity as ethical and political essentiality, their methodology in acknowledging the outside varies. For Adorno, knowing of the object entirely is problematic as it will lead to the control of the objects rather than reconcilement with the object. Nevertheless, for Bennett, the objects are not at the disposal of the concept, and the things exist in terms of their liveliness. Thus, a positive politics will connote human as an interconnected element of the matter with some particular capacities and not as a sovereign. To create such a public mood, the things have to be made visible and vibrant using scientific explanations unlike leaving the outside for imaginative language as attempted by Adorno (Bennett 2010, 13-19).

The following section will convene a discussion of both these scholars' view of human-object relation. This discussion will form the background to comprehend Nammalvar's imagination of the human-seed relations that seamlessly incorporates both these claims in reimagining human-object relationship without any manifest contradiction. The conceptualisation of things and mainly, the seed reflects the ideology of the permaculture design as polysemous, accentuating the material relationality with the humans by many anthropologists (Forde 2017, Veteto and Lockyer 2008, 50-51). Thus, the design along with practices, objects, individuals and collectives perform an ideological critique and leaves space for a human-object interaction and outside the overpowering logic and interaction of the modern order of things.

II

Human-object relations in the works of Adorno and Bennett

Latour's approach and the Object-Oriented Ontology are criticised for inadequately presenting the subject in the assemblies owing to the human subject's socio-political capacities. Žižek expresses his apprehension over the politics of OOO by questioning the political outcomes and sustainability of merely adding vulnerable objects/ actants in the social and political theorisation without a strong ideological and symbolic underpinning.

> one should include into analysis external (transideological) perturbations, the crucial factor is how these perturbations will be accounted for (symbolized) by an ideological edifice…Why does ooo ignore the key role of this "totalizing" symbolic gesture. (Žižek 2016, 183)

Similarly, Morgan claims that Latour and other OOO proponents as anti-subjects since for them human subject cannot be the representative of the reality anymore. In their turn to the objects,

they neglected the question of the subject, concept and subject-object relationship, which elides the history of the construction of the objectivity and the subjectivity (Morgan 2017, 16). Morgan's concern is similar to that of the concern of Žižek. Both emphasise the need for an ideological engagement to democratise not only the objects but also the subjects from repressive socio-historical assemblies.

> A critique of "matters of concern" is not the unmasking of illusions to unveil a greater reality, but the question of whose interests are served, at what cost are these assemblages formed, and what possibilities are there that lie discarded along the way. (Morgan 2017, 28)

Such criticisms make us think that there is a fundamental limitation found in the Latourian and OOO theorisation that seem to just deal with the politics of assembling the actants and mapping the machines concerning a particular process or an event. Though Latour comments on the non-hierarchical actants in the assemblies (Latour 2005a, 72), the definitive sketch of the critical human actant and her role in assembling the right kind of network is not manifest. Bennett talks about the differential capacity of the humans in the assemblage and the need for the political cum ethico-aesthetically informed public to value of the vital matters (Bennett 2010, xii). However, the way to imbue the criticality in public through describing the historical constitution of the subject-object interaction is not within the objective of *Vibrant Matter* (2010). However, the subject that needed to be conceptualised is not in a hierarchical relation but as a human subject with its capacities to include the other entities in the performance, which is relevant for socio-political action. A subject with the critical capacities to be a part of the everyday assembles and in the mobilising of the things. Such a conceptualisation of the subject is not within the theorisation of Bennett. One the one hand, the previous chapter acknowledges and details on the objects as a constitutive element of the relations (Bennett 2010, Bryant 2011 and Harman 2018). On the other hand, it is realised that only such an acknowledgement is not complete in itself without critically reviewing the process that has hierarchised the object-subject relationship socio-historically. It is only through understanding the process and a critique of that process itself; there is a possibility to talk about recovery. Here, the recovery is extended to the humans along the objects as actants in the oppressive assemblages.

Adorno is particularly relevant here. For him, capitalism, science and technology that began to develop from the period of enlightenment are the historical forces that relegated nature to a passive and commodified status on the one side and made man the master of everything objective and natural on the other side (Horkheimer and Adorno 2002, 1-34). Adorno is also a social theorist who witnessed the Holocaust and knows the extent to which scientific methods

can lead to violence under the banner of modernity (Bowie 2013, 8-9, 19). Therefore, his proposition that objects pre-exist and should not be conceptualised exhaustively through the concepts comes as a critique of the violence perpetrated at the heights of capitalism and scienticization. Everything started with the creation of 'happy match' between the mind and the matter that resonated with the overall disenchantment with nature (Horkheimer and Adorno 2002, 2). He claims this as irrationality that gave way for the imagination of man as the master of everything. This unification of the mind and matter reflected the metaphysical position of the dominant knowledge of the Enlightenment. Moreover, the knowledge, in turn, served the capitalist economy and the sovereign with the underpinning of mastery over nature.

> Myth becomes enlightenment and nature mere objectivity. Human beings purchase the increase in their power with estrangertrent from that over which it is exerted. Enlightenment stands in the same relationship to things as the dictator to human beings. He knows them to the extent that he can manipulate them. The man of science knows things to the extent that he can make them. Their "in-itself" becomes "for him". (Ibid., 6)

Both knowledge and capital widened the gap between the human and nature and exploited them for the survival of the capitalistic system with the power of the state. It is presumed that the scientific knowledge together with the capitalistic forces is instrumental in separating the human from nature and in turn, rendering the nature as an entity of scientific inquiry and capitalistic production. The nature-culture dichotomy became stabilised through these socio-historical processes. Thus, the seed is an object of scientific inquiry and a commodity in the capitalistic regime, and the relation between human-seed is consigned within the purview of seeds just as carries of techno-scientific and products within the capitalistic assemblages (Muller 2014). The same argument is put forth by Kloppenburg, where he claims how the development in the plant sciences and biotechnology has led to the commodification of seeds, which were earlier the means of production controlled by the farmers themselves[22]. Nevertheless, seeds remained an ineluctable object for the capitalist regime for a long time since naturally the genetic material in the seeds are biologically reproducible that can escape the circuit of the capital. It was only due to the developments in the field of the science and technology and further, through the socio-legal decrees, the commodification of the seed was made possible in the agricultural production. This made plant breeding a Science rather than an art controlled by the scientists that were earlier mastered by the farmers in their farms (Kloppenburg 2004, 37-45,66). Today, in the era of biotechnology and bioprospecting, life

[22] In a figure, Kloppenburg presents the seeds and the circuit of capital citing how there occurs a short-circuit in the inclusion the seed in the capitalistic production process. Refer the figure in the appendix 2.

itself hangs on to power and capital. Moreover, the story of seeds cannot be anything more than of a "*biocultural*" object weaved in the complex web of patenting, rights, biotechnology, corporate, laboratories and bioprospecting regimes (Chandra 2016, xxiv). Nevertheless, the history of bioprospecting cannot be separated from the history of colonialism and seeds and plants were an integral part of the trading and geo-political cartograph of colonialization (Ibid., 1). Jasanoff observes that the modern biotechnology through its top-down ideological perpetuation, lawmaking, and administration reflects the same empire-making tendencies, which was previously supported by the Life Sciences in the times of colonialism in her article called "Biotechnology and Empire" (2006).

Under this complex order of things, seeds are not anymore just an object of common ingenuity and care of humans and are nor "objects of pleasure, urge, and need" that are held in a sensorial relationship (Muller 2014, 3). The coevolving relationship of the seeds and humans independently outside these systemic controls are criminalised in the patenting regulations. Further, in these approaches, the seeds are reflected as an object of possession, control and regulation. Scholars who speak of companion relationship with the other nonhumans, post-human scholars, Actor-Network theorists, and feminist materialists ask some broader questions, which in the words of Muller in the context of human-seed relations,

> How are seeds regulated and categorized, and how are the political, social, and economic relationships of people shaped through the types of seeds they use? We are interested in the sensorial connections between people and plants, the relationships of power that impact and frame them, and the reflections and contestations that they are a part of. (Muller 2014, 4)

The ontological turn in the social theory has paved way for talking about the objects within the "relational ontologies" (Escobar 2010, 39) that creates a space outside the modern dichotomised worldviews, which considers the human-nonhuman (here human-seed) relations as 'being and becoming in the world' (Muller 2014, 5). Muller goes on to comprehend the ontic (a kind of connection to the reality that is pre-categorical and pre-objectual) relationship between the humans-seeds that include the sensorial relations such as touch and warmth of these objects as the source of resistance expressed in the seed freedom movements (Ibid., 10).

> In other words, for humans to engage critically with the world and become able to act, abstract moral law and rational thinking is not sufficient; such engagement requires first and foremost lived contact with the world damaged by instrumental rationality and the technological apparatus. (Ibid., 5)

Therefore, reinstating the real warmth of the things is one of the important aspects of many alternative ontologies including the discourse of Nammalvar to critically engage with the world. For Adorno, the real warmth of the things (Adorno 1974, 43) is demystified by the conception of autonomy of the subject. For him, the autonomy of the subject is given an ethical substance only when the quotient of the intimacy with the object is reinstated (Macdonald 2011, 671). This intimacy is a movement of being oriented to the world, and in contact with the things, Patočka calls this affective movement (1998, 148). Therefore, this being in the warmth of the thing is an essential aspect to reconstitute the relationship between humans and the objects without the preoccupation of reasoning and logic of consequence like in the act of gift giving (Guzzoni 2008, 129). As per the argument of Muller, the ontic relationship between the farmer and the seeds as companions became the vital source of commitment and criticality in the seed struggles in France and Latvia. The ontic association not only brought a critical consciousness among the farmers but amongst various stakeholders of the society at large (Muller 2014, 8-9). In the case of Nammalvar, it can be noticed that both the ontic and the conceptual mediations were employed to mobilise the public to imagine an alternative kinship with the seeds. The seed ball technique that he popularised can be taken as a source of ontic engagement with the seed in the assembles. Moreover, as a storyteller, he narrated short thing-stories, which detailed things as actants (Latour 2005a) and as vital matters (Bennett 2010) in the assembles. Therefore, the human subject re-established with critical concepts are essential along with the pre-categorical engagement with the things to talk about the right kind of autonomy (Macdonald 2011, 671).

Bennett talks about Adorno and his 'specific materialism' in discussing her claim called the vital materialism (Bennett 2010). Adorno's materialism stresses that the realm of nonidentity (outside) of the object that should not be invaded and should not be controlled, but the subject has to rationally and aesthetically be accultured to comprehend and accept that there is something more to the object that the concept cannot capture in entirety. Therefore, Adorno's Negative Dialectics is a pedagogy proposed through his idea of materialism. This dialectic is not very positive about complete knowledge of the object through conceptualisation and emphasises the 'preponderance of the object' (Ibid., xvii). Bennet calls this modality of Adorno as "homeopathic: we must develop a concept of nonidentity to cure the hubris of conceptualization" (Ibid.). This development of nonidentity has to take multiple pedagogical practices involving the intellectual and aesthetical capabilities of humans. However, the preoccupation of the vital materialist is not to prove that objects escape the concept and the

acknowledgement of the nonidentity. Perhaps, Bennett feels that the need of the hour is to use the scientific knowledge in the right way to tell more about the thing-power and onto-story. In brief, the onto-story decentres humans and brings out the capabilities of things, and such expressions of the ability and performances of the thing are called the things power. The aspect of materialism proposed by Adorno and the thing-materiality of Bennet are not contradictory and are seen to co-exist within the discourse of Nammalvar.

Both Adorno and Bennett are committed to an ethical and political position entailed in realising and recognising that humans are just an element in the universe of vital matters and living with other vitalities surround us. Therefore, humans should be able to comprehend the presence of nonhuman vitalities and be able to accept the reality. In many senses, like the objective of Adorno, Bennett's thing-power is nothing but a pedagogy of storytelling. The difference is the inclusion of mimetic aspects in the pedagogy of Adorno whereas Bennett expresses the thing-power through the scientific knowledge and rational material relations with the things around the humans. Like Latour, Bennett is also involved in the question of composition rather than a critique, where science plays a crucial role (Latour 2004b). For instance, Bennett puts forth scientific knowledge as a medium to understand the vitality of the matter itself. However, the need for a critique of capital and science has not eclipsed. Adorno is critical of the science but not anti-science, and he recommends a second order reflection of its methods and application in the society. Therefore, the thing-power can be the right way to begin the importance of the objects but cannot be envisioned as the end of the politics itself.

In the formulation of Adorno, on the one hand, the subject should be imbued with the sense of a withdrawn object through the language articulated. However, on the other hand, there have to be other expressive languages that naturally instates the attraction between the subject and object. This is for Adorno a "*mimetic* language of things- a language that expresses both subject and object, and the affinities between them prior to their conceptual form" (Finke 2008, 78-79). The conceptualised experience of the so-called rational paradigm has produced an image in which language of subject-object relations seem to be fixed and could not be otherwise. However, the mimetic language can lead to a knowing, which will be able to bring things to the purview and this language will be sensitive to the things and brings out the kinship of the subject and the things nonhierarchically (Ibid., 90-93).

> Mimesis is thus conceived as a form of participation in which the subject transcends itself towards things so as to release them in their otherness to subjectivity. Through mimesis, a thing both withdraws and reconstitutes itself (Ibid., 93).

In many sense, Bennett's approach of vital materiality wants to stress the enmeshed vitality of humans with the other things by knowing more on it, but Adorno wants to leave the outside since more knowledge of the outside will let the object to escape the view (Bennett 2010, 16). Bennett calls the approach of Adorno as historical constructivism that gives much scope to the human power and considers humans as the source of the all sort of construction both scientific and social like there is almost nothing to talk about the thing power. The predominance of the objects explained by Adorno is the thing-power of Bennett. The outside that can never be captured in the concept is to be left without any inquiry, and the humans can be creative and maybe spiritual in attending that outside for Adorno (Finke 2008, 92 and Bennett 2010, 16-17). However, for Bennet, it is more favourable to tell stories about the thing-power using the accounts of scientific rationality, anthropomorphic metaphors for bringing a sense of kinship amongst vital matters. Though there is a greater significance in talking about the systems of object-subject relations, Bennett postpones the critical approach of objects temporarily to say more on the thing-power itself.

> Vital materialists will thus try to linger in those moments during which they find themselves fascinated by objects, taking them as clues to the material Vitality that they share with them. This sense of a strange and incomplete commonality with the out-side may induce vital materialists to treat nonhumans-animals. plants, earth, even artifacts and commodities-more carefully, more strategically, more ecologically. (Bennett 2010, 17-18)

The centralising of the objects is exciting, and it creates several avenues for understanding the thing-power. In fact, these narratives of thing-power can be useful to tell many stories about the objects of science and technology that are ecologically significant. These unique sites of stories telling of the thing-power are productive but go without many imprints if the historical constructivism of the subject-object relations is not brought out eloquently. The postponement of the critique is conceivable as Bennett explains but neglecting the critique at the cost of thing-power may not answer the questioning of suffering both of the subject and object. In the politics of Nammalvar, the aspect of the critic, the preserving of the warmth of things and the evincing of the thing-power resides simultaneously without any contradictions.

III

Biography, Works and Politics of Dr G. Nammalvar

Nammalvar (1938-2013) is a well-known organic scientist and a farmer from the state of Tamilnadu who spearheaded the organic farming movement in Tamilnadu. Nammalvar graduated in Agriculture from Annamalai University and joined as a farm scientist in the Agricultural Regional Research Station in Kovilpatti where he worked from 1963-1969. The station was conducting trials on the new chemical fertilisers and High Yielding Varieties (HYV) of rice. Nammalvar raised his apprehensions over the introduction of expensive inputs like the hybrid seed varieties, chemical fertilisers and pesticides to the rainfed farmers who are already resourced poor. However, his interventions were turned down and simultaneously, in frustration, he resigned from the work at the station (Nammalvar 2014, 24-27). Subsequently, he joined the Island of Peace, an organisation found by the Noble laureate Dominique Pire in Kalakkad block, Tirunelveli, where he worked as an agronomist for a decade. Nammalvar, during this period, met the communist leader Nallakannu whom he lauds for taking up the struggle of local farmers who were exploited by the upper caste landlords of Vadakarai village (Ibid., 122-127). Around the same period, Nammalvar was influenced by the ideas of Vinoba Bhave, principles of J.C. Kumarappa and Paulo Freire's thoughts on education and freedom. In his book, *Uzhavukkum Undu Varalaru* (2016), Nammalvar writes a chapter titled "Who can be called the father of the green revolution in India?". He discusses the role of C.Subramaniam and M.S.Swaminathan in architecting the so-called green revolution in India and remarks that then began the new history of recolonisation of Indian seeds and lands by the U.S. corporates and research foundations (Nammalvar 2016, 91-105). Nammalvar began his politics against the green revolution and followed the works of Bhaskar Save, Shripad Dabholkar, Bernard deClercq, Claude Alvares, and Vandana Shiva amongst others. Also, he vastly wrote in Tamil on the significance of books like Albert Howard's *An Agricultural Testament*, *One Straw Revolution* by Masanobu Fukuoka, Rachel Carson's *Silent Spring*, and on a range of books written by Bill Mollison on Permaculture.

By 1980s, Nammalvar along with Dr Gandhimathi (a sociologist and environmentalist) and Mr. Oswald Quintal (a civil engineer) established a community development initiative called Kudumbam in Trichy, which as a society was started to sensitise the rural communities about the importance of the right to water bodies and created awareness about the cultivation of drought-tolerant traditional crops. The society also created community leaders who were

mostly women and youths to participate in creating and managing of waterbodies, promoting plant nurseries and community forests in each village. Kudumbam campaigned against the planting of Eucalyptus in Pudukkottai under the forestry scheme sanctioned by the government, which was sponsored by Sweden. As an alternative, the society took up efforts to reforest the Ammankorai barren wasteland into a community forest between 1982 -86 and succeeded in its mission (Baluchamy 2015, Documentary, *Nammalvar's Permaculture*) (Nainar 2015). Through Dr Gandhimathi, in the mid-1980s, Nammalvar happened to meet Bernard deClercq during a social forestry workshop organised in Auroville, Puducherry. The meeting changed the life path of Nammalvar. Nammalvar learnt the techniques and the art of natural farming and in specific permaculture from deClercq (Nammalvar 2014, 196-198). Bernard deClercq is one of the pioneers of organic farming in India. The organic farming movement in post-independence India can be traced from the first all-India meeting of organic farmers, a conference that was organised in Sevagram at Wardha in 1984 called Association for the Propagation of Indigenous Genetic Resources (APIGR). The association for the first time threw open the issues and shortcomings of the modern industrialised farming and the discussions for the safeguarding the genetic resources began from there. This conference was followed by the national society established by Bernard deClercq called Agricultural Renewal in India for a Sustainable Environment (ARISE) in Auroville in 1995 (Shetty et al. 2014, 1). Nammalvar eventually became the state coordinator of ARISE when deClercq was the national coordinator.

Following the success in community forestry engagement through Kudumbam, Nammalvar wanted to prove sustainable agriculture as profitable after learning the history, methods and philosophy of natural farming from deClecrq. Therefore, he along with few other enthusiasts bought twenty acres of land in Odugampatty village in the district of Pudukotttai in 1990. They formed an ecological farm and training centre called *Kolunji* (Kolunji Ecological Farm Training Centre), which as a model farm began to cultivate with total organic input, and recycling was done through vermicompost. The centre soon became a source of knowledge, and Nammalvar conducted a series of workshops. The important commitment was to emphasise the creation of agroforestry systems for sustainable agriculture and livelihood. The society extended to form a network called Low External Input and Sustainable Agriculture (LEISA) in the 1990s which by 2015 holds membership of 82 Non-Governmental Organisations (NGOs) and 50,000 farmers. The network initially started with 11 NGOs and 20 farmers (Nainar 2015). In an interview to Alvares, Nammalvar talks about his mission and says,

> First, very intensive work is needed to continue our campaigns of promoting organic farming, achieving a GMO-free India, making farmers' seeds local, promoting rainwater harvesting and millet crops, converting urban waste to useful products, protecting water sources, establishing seed certification, and protecting the cow. For all these to have an impact, a nationwide NGO-farmer network is essential. Second, to carry out these activities on a wider scale, we need a large number of trainers. So we have to continually conduct training programmes and support trainers who can educate people at the local and grassroots level on all aspects of organic farming -- cultivation, marketing, preservation techniques, etc. (Alvares 2009, n.p.)

In a commitment to his vision, Nammalvar fought against GMOs, campaigned against the U.S. seed companies' monopoly, advocated seed saving and traditional hybrid varieties, mobilised the public for the conservation of forests and water bodies, and he went on for padayatra throughout the state spreading the need for organic farming and nature conservation. Nammalvar was also a part of the vast campaign that struggled for the revocation of neem patenting and went to Munich, Germany along with Vandana Shiva and colleagues (Shiva, Bhar and Jafri 2002, 7). He travelled widely and collected traditional rice varieties, which were then exchanged through various national and state level events. Poonambalam. R. of CREATE, an NGO from Tamilnadu observes,

> I still recall the state-level conference of farmers and traders at Thanjavur in Tamil Nadu in 2006 where I and the late G.Nammalwar were invited to speak. It was here that I reiterated my suggestion of seed exchange by farmers which was launched the next year, in 2007, with 15 varieties. What made that event memorable was the presence of the late G Nammalwar, an ecologist, naturalist and a crusader for non-chemical farming. In fact, he remains the motivating factor behind the seed exchange. (Sharma 2014, n.p.)

Nammalvar collaborated with the Tamil Nadu Agricultural University (TNAU) and was continuously deliberating with the agricultural scientists of the state. He was a part of the TNAU that was formed to draft the state policy on organic farming. After the initial state-level meeting that held for initiating the policy work on organic farming, Nammalvar remarked that,

> While climate change is a common threat, the poor in poor countries are going to be affected more than the others. India with 37 per cent of its population living below the poverty line is going to put up with these effects with difficulty. Scientists are suggesting the processes of mitigation and adaptation to face the effects…Soil contains physical, biological and chemical properties. When we ignore the first two properties and concentrate only on the third, then we make it lose its natural content. (*The Hindu* 2012, par.7)

Nammalvar throughout his lifetime advocated the benefits of turning to the natural farming and trained many thousands of farmers, youths and civil society volunteers in permaculture and social forestry. He had set up more than thirty training centres and farm research institutes in Tamilnadu through which many experiments and workshops are conducted to educate farmers in various natural farming methods. Though his work is primarily situated in Tamilnadu; he travelled widely all over the world to promote and learn the various techniques of organic

farming. He worked closely with many civil society organisations in Kerala, Andhra Pradesh, Maharashtra and Karnataka. Nammalvar was closely associated with the Deccan Developmental Society, and P. V. Sateesh of DDS gave an honorary account in Nammalvar's collected book of his previously published articles (2014, 266-67). Nammalvar cofounded the Millet Network of India (MINI) with P.V. Sateesh of Deccan Developmental Society and the idea for such an initiation was conceived during their meet while attending the conference called Biodevastation II in New Delhi in the year 1999 (Sateesh 2014). Post-tsunami in 2005, Nammalvar took up a campaign of desalination of the land and simultaneously converted 6000 acres of land in the Tsunamic areas in Tamilnadu and also, he travelled to Indonesia for similar reclamation activity (Alvares 2009). Recognising his contributions in the field of agriculture, Gandhi Gram Rural University conferred him with a Doctorate of Science degree in 2007. Also, in 2009, he founded an ecological foundation called Vanagam, in Karur district, which is primarily continuing the legacy of Nammalvar. The foundation functions as a model farm for practising and researching permaculture and bio-dynamic agriculture. It conducts various workshops and training programmes on organic farming and is also committed to the practices of indigenous medicine (Siddha).

Nammalvar can be identified as the most influential figure in the history of protests that haunts the politics of contemporary Tamilnadu. His role in politicising and mobilising farmers and village communities about the issues of Cauvery delta cannot be undermined. Nammalvar called for wide support from the people of Tamilnadu and claimed that the issue of Cauvery delta is Tamilnadu's issue immediately after the licensing and environmental clearance granted to Great Eastern Energy Corporation Ltd. (GEECL) for the exploration and extraction of methane in the Cauvery delta. Eventually, many demonstrations and resistance came from several civil society organisations working on farmer's rights and ecology. He objected the scientist led panel constituted by the state government to look into the matter of methane exploration project. Nammalvar said that he would form a committee that would represent the farmers' voice and opinions about the ill-effects of Methane gas project. He added that "Anything will happen in a country like ours where 67-types of pesticides, banned world over, are still in use" (Times of India 2013, par.2) in the same press meet. After the statewide resistance, the project was called off by the then Chief Minister Ms J.Jayalalitha (Ravi Kumar and Ramakrishnan 2013). On 30th of December 2013, Nammalvar collapsed and eventually passed away after giving his final speech against the methane extraction project of ONGC in a village near Pattukottai.

Nammalvar wrote hundreds of articles in Tamil and was one of the important contributors of the Tamil fortnightly called *Pasumai Vikatan*. The *Vikaten* publications published his collected essays and other books that Nammalvar wrote on agricultural Science, politics, and natural farming. Some of his books include *Uzhavukkum Undu Varalaru* (2008), *Ini Vidhaigalae Perayutham* (2016), *Naan Nammalvar Pesukiren* (2014), *Yennanudaiya Iyarkaiyae Potri* (2012), Thai maan (2018) amongst several others. Nammalvar was associated with the Safe Food Alliance of *Poovulagin Nanbargal*[23], a significant civil society organisation that works on the issues related to science, technology and environment (Karthick 2013). This section ends with a quotation that will layout the life, work, politics and influence of Nammalvar in Tamilnadu.

> When in the end of January 2017 lakhs of demonstrators occupied the Marina in Chennai to support Jallikattu and protests against the ban of the sport took place in numerous towns all over Tamil Nadu, this drew national attention, but it was not widely understood at that time that this was also a powerful expression of the long-drawn crisis in agriculture. The crisis was already in full view in a mass meeting in Tanjore on 31st December 2016, the third death anniversary of Nammalvar, the organic agriculture farmer and scientist, who had mobilised the Cauvery Delta against Methane mining and died in the strain of that mobilisation three years ago. (*Counterview.org* 2016, par. 2 and 3)

The other article on Nammalvar's contributions reads,

> "From jallikattu to methane, it looks like Tamil Nadu will have to get used to reclaiming everything that's its own, only through remonstration." Nammalvar's quest to promote natural farming was at times lonely, at times obstinate, but years after his passing, the stirrings of the movement he started are continuing to steadily manifest in the visions of a range of people — from those working in the agro, food and wellness sectors to protesters fearing loss of Tamil culture. (Times of India 2017, par. 4-5)

The politics of Nammalvar has not just opened the space for resistance from the farmers of the state of Tamilnadu but has given an expression for the thing-politic: a politic of nonhumans, objects and materials as entangled with the humans. In the works of Nammalvar, two important techniques can be seen to have inculcated such a strong public mood. This public mood, as Bennett has commented is "the mood of enchantment or that strange combination of delight and disturbance [with the things and the nonhumans]" (Bennett 2010, xi). The two techniques of representing the things, in particular, the seeds as actants in entanglement with the humans in Nammalvar's politics are the ontological stories of the seeds and the seed ball technique (Kannadasan 2012).

[23] Poovulagin Nanbargal is one of the major organisations that is now brought under the vigilant surveillance of the state for its continuous works and resistance against many of the unsustainable science and technology projects in Tamilnadu (*Tamil Hindu* May 2, 2018).

IV

Nammalvar and the Entity of Seeds

The concern about seeds is the beginning of the social life of Nammalvar. After learning the basics of permaculture from by Bernard declercq, he began to practice it in the deserted land and converted it into an agroecological farm and natural farming research institute called Kolunji. Kolunji is the name of a tree that grows without human support and in turn produces numerous seeds for regeneration (Baluchamy 2015, Documentary, *Nammalvar's Permaculture*). Subsequently, he realised the massive impact of the green revolution in the degradation of soil, micro-organisms and water and grew more critical of this revolution which jeopardised the self-reliance and the sovereignty of the farmers in the agricultural production. He campaigned vigorously against the state-sponsored green revolution and claimed it as an unholy alliance of the state-scientist-corporate in destroying the agricultural and ecological diversity of the country making farming an unviable mode of occupation and living. He spoke about Bhaskar Save's *The Great Agricultural Challenge* in all his speeches and writings (Nammalvar 2012, 80-81). The book is an important collection of letters from Save that opposed the national commission formed under the headship of M.S.Swaminathan. Bhaskar Save compared his natural farming methods with the science and technology of green revolution and challenged the scientist about the credibility of the industrial agriculture that he continued to recommend in the name of Science (Save 2008). In the words of Nammalvar,

> Only less than 25 farmers out of 100 economically benefitted from the so-called green revolution. This revolution left the farmers without any option but to use the high-yielding hybrid variety seeds and the fertilisers that facilitate its growth. We lost out rich traditional varieties of seeds. Without the vast subsidisation for fertilisers, seeds and electric power from the state this intensified agriculture would not have been possible, and it was the fertiliser's and other industries that truly benefitted out of this revolution. (Nammalvar 2016, 15-16, Translated from Tamil)

In that spirit, Nammalvar encouraged the local farmers to identify, know, collect and share the traditional varieties of the seeds. Nammalvar in the year 1996 went on for a 'seed travel' in Tamilnadu during which more than fifty traditional paddy, pulse and vegetable seeds were identified and shared among the farmers all over the state. For him, seeds and plants are a wealth of the humans in the traditional subsistence agricultural households. Also, seeds in the local subsistence are objects of social cohesions, activity, interaction, relationship, memory, ritual, gifting, kinship, responsibility, ethics and overall, defines and redefines the sense of collectivity (Campbell and Veteto 2015, 452-53). During his social forestry project in Ammankurrai village near Pudukottai, Nammalvar reforested the sparingly planted forest into

a dense community forest by collecting up to 52 varieties of seeds and plants that are useful for the villagers in terms of medicinal, cattle grazing, nitrogen-fixing plants and also for local fuel needs (Baluchamy 2015, Documentary, *Nammalvar's Permaculture*).

The question of seed sovereignty is always associated with the concern of food sovereignty of the farmers, local communities, region and also at the national and the global level (Campbell and Veteto 2015, 447-448) (Shiva 2016, 2-5). A sustainable food system should be locally grounded and has to rely less on the external inputs for the production. When seeds are converted from a public good to a commodity in a corporate monopoly not only are the farmers deprived of the freedom of seed saving, but it will also lead to erosion of agroecological biodiversity at large. According to the reports of the Plant Genetic Resource Conference, more than seventy-five percent of all agricultural biodiversity disappeared in the twentieth century due to the monocropping method of 'modern' industrialised agriculture (Shiva 2012). This commodification of seeds entwined with the question of power where the control over biodiversity is taken over by the corporates from the local farmers and the seeds are just the plant genetic resources to be tapped and controlled. Nammalvar quotes Vandana Shiva extensively and rehearses her argument of centring seed as a grain of sovereignty in the time of biotechnological empires similar to how spinning wheel became an object of Swaraj during the independence struggles against British colonialism (Jasanoff 2006) (Nammalvar 2008, 115).

Nammalvar was associated with the *Save Our Rice* campaign from the days of its deliberation and genesis in the year 2004 (Paddy Team 2014). Many reports inform us about the activities and awareness programmes of seed collection and sharing festivals and padayatras that are conducted today in the memory of Nammalvar (Valayapathy 2017). Nammalvar's death anniversary is celebrated as 'Seed day' in Tamilnadu (*The Hindu* 2014). Various events were arranged for the gifting of seeds to the public, to bring awareness about the importance of saving traditional seed varieties and the dangers of genetically modified seeds are also discussed in these range of events. Nammalvar began a state-wide signature campaign against the introduction of Bt Brinjal after it was approved by the Genetic Engineering Approval Committee (GEAC) in 2010 (The Hindu 2009). According to Nammalvar, the genetically modified seeds are considered as an entity of neo-colonialism, and he adds that,

> There is no necessity for the introduction of a Bt brinjal in India, which holds the merit of having huge biodiversity. We have 2,500 traditional brinjal varieties in India. Every community

> is used to consuming a particular variety, i.e. locally produced. Introduction of Bt brinjal with false claims for its advantages will contaminate the local varieties and erode the biodiversity of the vegetable that is consumed by millions. (Seedling 2010, par.3)

The gripping influence of Nammalvar to what is proposed as thing-politic should also be understood from his commitment in creating multiple leaders who were able to reach out the communities on the importance of seeds, home gardens, organic vegetables, planting of trees, and waterbody conservation. *Nel*. Jayaraman (where *Nel* in Tamil means paddy) is one of the many campaigners for seeds and has saved more than 156 varieties of traditional paddy seeds, calls Nammalvar his guru. Mr Ponnambalam of *Save our Rice campaign* notes that " Dr Nammalvar, the legendary organic farmer in Tamil Nadu began talking about it at every meeting and slowly the word spread" (Kutty n.d.). In his politics, the very term *vidhagal* (seeds) became a "semantic innovation", which is "the first step in effective mobilization" (Demeulenaere 2014, 46). Two of his major works are centred on the object of seeds: Ini Vidhakalae Perayutham (2017) (Seeds: The Future Arsenal) and Vidhaiyilirunthu Thulirkum Maruthal (2017) (The Change begins from the Seeds).

Seeds are not only an object of concern but are also a nonhuman agency entirely tangled with the human agency in the politics of Nammalvar, which can be deciphered from the titles of both of his works. He constituted the idea of freedom of the seeds along with the freedom of humans. Seeds, on the one hand, are agents of sovereignty and on the other hand, they are also a source objects for an alternative politics. Seeds are for him the basic unit of contention, and it is not the farmers alone who are liable to pursue the issues of a constituent element of our ecology like the seeds. Instead, he took the issues to people from many walks of life and stressed that the Tamil society as a whole should fight for the sovereignty of such a significant object. Seeds are not only the objects of mediation for the construction of a critical sociological imagination amongst the humans, but they are the agents in constituting such an imagination. In the words of Kloppenburg, seeds are inherently an object of resistance that slips from the circuits of capital due to the capability of reproducing the genetic material (2004). Therefore, seeds cannot just be mediation of politics but the very object can be an entity of subversive potential, and its performative nature enables a possible human action in this case. Seeds are the subjects in the politics of Nammalvar, which are the primary catalysts in assembling the agents around the question of things and nonhumans in the politics of things to come in Tamilnadu and humans are one of the actants in the assembly. Bryant calls such objects capable of assembling and directing the actions of other actants as bright objects (2014, 198-199). Nevertheless, if one has to understand the networks, personalities, things, institutions, ideas

and collectives involved in the narrative then the subject called Nammalvar is also a bright object of the assemblage consolidating an object-oriented politics in the state. Therefore, for analysis, two bright objects are indicated: the seed and Nammalvar who were acting as agents with differing capabilities in the process of consolidating the thing-politic in Tamilnadu.

Without any doubt, seeds are the primary object of concern of mobilisation in the politics of Nammalvar that brought in many other objects of concern to propagate a thing-politic in the state. Mainly, the attention to the material stems from Nammalvar's permaculture background. Permaculture, a term coined by Australian biologist called Bill Mollison (permanent agriculture) is a,

> conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability, and resilience of natural ecosystems…integration of landscape and people providing their food, energy, shelter, and other material and nonmaterial needs in a sustainable way. (Mollison 1988, ix)

As an assemblage, the system integrates the conceptual, material and other strategic aspects that are functional in benefitting all life forms and it works along nature rather than against it. It also takes up elements from the traditional culture, new science and technology and systems thinking. This self-sufficient system that attempts to "improve extant agricultural practices, both those of Western agribusiness, and the peasant grain culture of the third world". Also, it is an "evolving system of perennial or self-perpetuating plant and animal species useful to man" (Morrison and Holmgren 1978, 1). This ecologically planned landscape can be a small garden, horticulture unit, or an agroecological farm that functions with three ethical principles: earth care, people care and fair share (Veteto and Lockyer 2008, 51). There is various ethnographical and sociological analysis of permaculture for understanding it as an alternative assemblage to modernity (Aistara 2013, 118), i.e. as a system of radical agroecology and new materiality (Forde 2015, 157-160) that centres the human-nonhuman coexistence. Permaculture is also understood as a developmental strategy grounded in the grassroots (Veteto and Lockyer 2008). Here, for focus, only the comprehension of permaculture from the viewpoint of new materialism and alternative assemblage are taken. Aistara understands the design of permaculture as a monist model or a hybrid model without the distinction between nature and culture in a Latourian framework (2013, 118, 124). Further, the concern of the seeds as an object becomes highlighted since all the materials, which includes the nonhuman and other objects in the permaculture system are vital matters (Bennett 2010) in its intra-action between

the other phenomena (Forde 2018, 119, 126-128). The agency of the materials in the design is highly visible in relation with the other phenomenon. However, this agency in a relation cannot darken the thing-power of individual objects in the assemblage (Ibid., 119-120). The approaches of Bennett (2010) and Bryant (2014) acknowledges the individual agency of things and its notable performances and capabilities. For instance, Bryant gives the example of rice as the most critical bright object of the human food system and also as a subject with an agency in the broader ecosystem. Therefore, for Nammalvar, seed as an object in the setting of permaculture is nothing but an entity of vitality and thing-power.

Permaculture as a design and methodology inherently moves beyond the concerns of human ecology weaving nonhumans and other objects into a cohabiting system. Permaculture is a design of sustainable agriculture along with human habitats that observe and mimics the material relationship in the natural ecology. As a result of Nammalvar's basic orientation in permaculture, the idea of material agency is the vantage point for his reimagination and politics against and outside the modern agricultural production that dematerialises and renders the thing-power of the nonhumans and objects as passive. It is now evident that sustainability and the agency of the human-nonhuman are not distinctive and comprehended as co-existing within the material design of permaculture in which human-seed relationship is of no difference. Bill Mollison, the father of permaculture in his initial pamphlets, wrote on the commitment of permaculturalists towards the seeds. The control over the seeds by the practitioner is a prerequisite for the self-perpetuating system like that of permaculture. Mollison remarks,

> Holing up in two acres out in the New England forests isn't going to get you out of the system unless you are into a seed-growing operation and know exactly what you're doing. (Mollison 1981)

Nevertheless, Forde (2015) perceives permaculture not as an unproblematic radical ecology but remarks on how the design zones human from the nonhuman and approaches nature in the lens of harnessing the potential. All that said, this design will not be an obstacle for the expression of thing-power in relation to humans as Bennett notes that certain amount of self-interest can be motivation and is needed for political and social collectivisation and action (2010, 101-105). Nammalvar expatiated on a range of things, in general, resonating the material-semiotic potential that he gathered from the assemblage of permaculture. These expositions of Nammalvar did not end with the village community or within an environmental activism niche group. It extended and gathered momentum at the level of the state due to many reasons that are both personal and contextual. The personal aspects include his charisma,

language and storytelling ability, his identity as a grounded, saintly and straightforward figure along with his techniques of representing things. M.J. Prabhu, a noted columnist on agriculture, science and technology, observes,

> In politics and cinema, mob frenzy is quite common. But what about agriculture? If there was one person who could stir the same kind of fan following being in the field of agriculture, then it could only be Dr. G. Nammalvar, a scientist and a self-proclaimed organic right activist. (Prabhu 2015, par.1)

Nainar in her article titled "A surprisingly delicious revolution" on the spread of millet grains and foods in Tamilnadu writes as follows,

> Overlooked since the 'Green Revolution' of the 1960s, these forgotten food grains are making a comeback because they have proven to be drought resistant…Spending a week at a workshop on sustainable living conducted by organic farming pioneer Nammalvar in 2013 convinced G Sathyabhama to switch over to a more nature-aware lifestyle and set up a shop to sell organic food products. (Nainar 2017, par.1 and 6)

Nammalvar travelled widely all around the state, conducted workshops, involved women and young population in community works, created multiple leaderships, and networked with a range of collaborators from scientists to spiritual gurus in talking things (Mani 2012). Since seeds are the objects of focus two important techniques of mediating and representing thing-power of seeds will be expounded in the next section: firstly, by arbitrating seed-power through storytelling that are nothing but "onto-stories" (Bennett 2010, 4) and secondly, entailing an ontic relation between the human-seeds through popularisation of the seed ball technique.

V

Onto-stories and seed balls as techniques of representation

As mentioned earlier, Nammalvar is a popular raconteur and wrote vociferously in Tamil in a simple language, and his enthralling narratives touched particularly on four areas: nature, science, development politics and the Tamil past. He regularly contributed to the leading green magazine in Tamil called *Pasumai Vikaten* (Nammalvar 2014). His idea of nature though not entirely outside the spiritual binding is definitely about the material composition of the things around us and persuaded to "situate humans in nature" (Veteto and Lockyer 2008, 51). Nammalvar is a self-proclaimed atheist but draws the quotient of spirituality from the inherent features of thing-power from the design of permaculture (Holmgern 2002, 3-4 and Bone 2016, 255). His ideas on science, nature, and development come from the merits of permaculture (perennial culture or permanent culture) that he learnt from Bernard declercq. The principles of permaculture are founded based on the scientific

research. Nevertheless, it is a community based, participatory, sustainable and polycropping system that developed post-energy and environmental crisis in the mid-twentieth century (Green 2015, 1128- 1130). Inheriting the methodological commitment of permaculture, Nammalvar moves beyond the positivistic view of nature and takes up the aspect of relationality amongst the material as the central ideology of his politics and socio-ecological imagination. This viewpoint decentres human and focuses on the relational assembling (Forde 2015, Rothe 2014, 8-10) and vibrant things of which humans are a part.

Nammalvar pursued permaculture as an essential substitute of the industrialised agriculture that left the farmers in debts, jeopardised the food sovereignty, degraded the natural resources, displaced the cattle and other farmer friendly nonhumans from the farms and overall, rendered agriculture unsustainable (Baluchamy 2015, Documentary, *Nammalvar's Permaculture*). Nammalvar is not anti-science but was against the corporate-scientist-state nexus in commodifying the things around us making living subservient and unsustainable. The design of permaculture is itself based on the science of ecology, ethnobiology and landscape geography (Green 2015). However, in the language of Bennett, permaculture's design is an assembly of thing-power that expresses the material agency of the objects other than humans against the passive and utility orientation with the nonhumans in the industrialised agriculture (Bennett 2010, 20).

Also, the question of region and Tamil cannot be separated from the politics of Nammalvar. In his biographical account, Nammalvar more than once discusses his apprehension by saying how can some scientists in Delhi decide what is appropriate for the ecology of Tamilnadu. Nammalvar was not officially a member of any regional parties, but his brother Mr G Elangovan was former Member of Legislative Assembly (MLA) from Dravida Munnetra Kazhagam (DMK). These associations and instances have to be interconnected to understand his region-centric politics. He continuously invoked the literature, songs, poems and proverbs in Tamil to convey his thoughts precisely to the public. His speeches were folkloric, and he was very successful in conveying his ideas, methods, politics and vision to the public. He was able to mobilise both the rural and urban communities through his networks with a range of farmers and urban-based civil society organisations. By 2010, Nammalvar rose as an important farmer leader and environmental activist in Tamilnadu. The politics began with the constitution of seed as an arsenal of politics through two techniques of representations: firstly, seeds communicated in the form of "onto-story", evinces its thing-power and secondly,

the popularisation of seed ball technique as a methodology of reframing human-seed relationship.

"Onto-story" is a term and conception of Jane Bennett; she defines these stories as techniques of expressing the inter-connections amongst the material things. The stories convey the liveliness and agential power of the things, and nonhumans are decentring the humans Bennett 2010, 4). Stories are understood as social performances; stories are commonsensical than scientific, and stories are based on concrete issues rather than abstract things. Stories are performances that are constructed interactively and "assessed by their audiences in relation to hierarchies of discursive credibility" (Polletta et al. 2011, 110). Stories shape the self and the collective and also the interactions between them and politically, stories can be the basis of disciplining authority. Stories are also a potentially liberating discursive medium. Nammalvar is often remarked as an enthralling storyteller who can narrate, interact, coordinate and collectivise people from various backgrounds. Some of the newspaper articles remark Nammalvar as a,

> Gifted story-teller that he was, Nammalvar's voice is accompanied by the sound of birds, the wind, and the rustle of leaves in the documentary. "We didn't see the need to decorate it with a background score," feels Vinodh. "There is a certain vaseegaram (appeal) in his voice." (Kannadasan 2015, par. 6)

> Nammalvar was not just the wise old man who was revered by farmers. He was a poet, a story-teller, and sometimes, when he was in a good mood, a child who cracked jokes and laughed endlessly. He was idealistic and sometimes stubborn — perhaps that is why he was so successful in transforming the minds of farmers who followed certain practices for generations. As we sat in a circle in a thatch-roofed enclosure at Vanagam that morning, he introduced ideas and opened discussions effortlessly. (Kannadasan 2013, par. 4)

The storytelling as a communicative process brought the material to the fore for the humans to understand the biophysical, social and political entanglement of the objects, humans and nonhumans. Therefore, "onto-story", "hazards an account of materiality… [where the] story will highlight the extent to which human being and thinghood overlap" (Bennett 2010, 4). The onto-story is a story that narrates the ontological materialism of things around the humans. Such narratives will be able to bring the individual capacity of things and also the relational materiality of the humans and nonhumans. The design of permaculture pre-defines the thing-power of the individual things in the farm that includes the humans, nonhumans and objects; they construct a system of relational materiality based on the comprehension of the thing-materiality. These concerns of thing-materiality and further, the relational materiality

resonates in the stories of Nammalvar-therefore, called the "onto-stories" (Ibid.). Bennett hopes that expounding of thing-power as an act of,

> fostering greater recognition of the agential powers of natural and artifactual things, greater awareness of the dense web of their connections with each other and with human bodies, and, finally, a more cautious, intelligent approach to our interventions in that ecology. (Bennett 2004, 349)

Nammalvar's book called *Ennadudaiya Iyarkaiyae Pottri* (2012) explicates on various objects of concern relevant to his alternative politics. The things discussed in separate chapters include seeds, GMOs, micro-organisms, weeds, farm insects, cattle, water, soil, indigenous hens, urea, neem. It is claimed that through widely discussing things, Nammalvar stressed on the question of material. This concern for material began from his reimagination of seeds that instated a critique of science-corporate nexus and also condemns the disregard it manifested over the question of indigenous knowledge, culture and community rights of the people living in the periphery. Nammalvar explicates,

> A massive amount of investments is made in the researches on genetically modified seeds. These seeds, in turn, produce sterile second-generation seeds that drive the farmers to the market depriving him of self-reliance over the input for agriculture. With a complete disdain for the traditional knowledge systems, these activities are camouflaged under the so-called banner of "development". (Nammalvar 2014, 14, translated from Tamil)

These narratives not only bring the sociological imagination of seeds but inherently is talking about the material significance of the object like that of seed. The importance of seed diversity, saving of seeds, reclaiming millets are nothing but expressions of the material capability of the seeds. Thus, a "materialist tale is that we are also nonhuman and that things too are vital players in the world" (Bennett 2004, 349).

In general, within the design of permaculture, seeds are actants in the assembly of ecology, cropping, exchanging, saving, community, local knowledge system, and other collectives. However, seeds are more than that within the normative conceptualisation of Nammalvar. In the same chapter on seeds, he presents a Tamil poem and song that echoes the coexistence of humans, plants and animals. Thus, his thing-politic brings out the materiality through several shades that include the mimetic language (Nammalvar 2012, 11-14) (Finke 2008, 78, 92). In such a representation, seeds are more than an entity of scientific inquiry or for that matter more than a material cohabitation. Seeds can also have an existence outside relations and conceptualisation of the social relations and the human mind. The "outside", the

elusive force outside the human experience (Bennet 2010, 14) of the seed in Adornian terms can be explicated in many ways. Like seeing seed as a piece of "natural beauty", a myth performed through a ritual, and an entity of art. Therefore, "mimesis recovers an experience of things that has been displaced by logos" (Finke 2008, 92). Mimesis is a way of participating with the things, where the subject is constituted with the thing. The subjectivity is transcended so that the subject can relate to the things in significantly other forms of relation. This will enable the subject to see the thing as withdrawn as well as connected to the subject in other ways outside the "*logos*" and capitalism (Ibid.). In the practices of Nammalvar, the seed is not restricted to the coil of capitalism and scientific knowledge system and control.

This narrative of seeds places the biography of seeds with its larger socio-historic context, which is interconnected with the social and political life of humans. Nammalvar pursues the strategy of storytelling to tie his private life experiences as a scientist turned permaculturalist with the broader public contentions about the science and technology of green revolution and biotechnology. These stories question the order of things and propose alternatives, and one of the significant aspects of Nammalvar's stories is the way that the things evince its thing power that "manifest traces of independence or aliveness constituting the outside of our own experience" (Bennett 2010, xvi). Thus, seed, is an object of concern, a vital matter, and also a metaphor in the assembly with the other actants, which continuously expresses its thing-power in the stories of Nammalvar.

The next technique of representation of the things is the popularisation of the seed ball technique that Nammalvar took up to redefine the seed-human relation outside the modern scientific and industrial rationale. Seed balls are small balls made of clay, seeds and compost-created as a social activity by groups of environmental enthusiasts. These balls are later flung in wastelands, and potential grounds and the seeds can germinate under the right circumstance. Seed ball technique is now popular all over the world that gained significance after Fukuoka's emphasis on the technique as one of the efficient way to grow trees without much efforts from the humans. This method was also widely popularised globally by the "guerrilla gardeners" (Wenger-Schulman and Hoffman 2018, 21). Today the activity of making and distributing seed balls have become the principal engagement of many civil society organisations working on the issues of science, ecology and development in Tamilnadu inspired by Nammalvar (*The Hindu* 2017) (*Outlook* 2017). The method is not efficient like the hand sowed seeds, but this whole activity has to be understood as a social performance, where not just environmental enthusiasts but women, children, Information and Technology professionals, and community

dwellers participate. Nammalvar's organisation called Kudumbam founded in the 1980s can be considered one of the earlier propagators of the seed ball technique in Tamilnadu. As an organisation, it is involved in the social forestry project in the southern districts of Tamilnadu. Kolunji, Nammalvar's another farm organises seed ball drives regularly. These performances cultivate certain behaviours and attitudes, which creates a sense of belonging with the seeds, mastery over knowing the seeds and their functionality, and warm relation with the seeds. The participants "contribute productively to their community, pollinators, and the earth without expecting a return" (Wenger-Schulman and Hoffman 2018, 22). The phrase, "without expecting a return" explains an oriented action performed not for individual gains but for a larger good that is decentring human. Gift-giving,

> means choosing, expending time, going out of one's way, thinking of the other as a subject: the opposite of distraction. (Adorno 1974, 42)

The activity brings seeds and humans together in a performative relation which is undoubtedly outside the logic of capital and scientific inquiry that fosters an affective and sensorial relation with the seeds (Muller 2014, 3-6) and can be called an ontic relation (Ibid., 6). Muller is right in pointing that such being in touch with the warmth of things can acculture a critical attitude about the social processes that destroy the sensorial connect between the humans and the other nonhumans. Therefore, the popularisation of seed balls is a social activity within the politics of Nammalvar aimed at orienting a sensorial relation with the seeds. The activity relates the humans in the warmth of the seeds is also a process of instating ideologies of critique, mobilising the community, and emphasising on the essentiality of collective action.

Storytelling and the seed ball method are essential techniques of representing seeds as co-evolving subjects that supplemented a reimagination of human-seed relationship outside the regulating, market-oriented logic of capital and created spaces of material relationality rather than a positivistic view towards the things. This beginning of sociological imagination of human-things as materially relational did not stop with the human-seed relationship but has to be construed as resonating with regards to the other objects of concern and contentions seen through the biographical time of Nammalvar and the politics of things in Tamilnadu becomes sociologically comprehensible.

Conclusion

The figure and the phenomenon of Nammalvar are not unproblematic. His ideas of spirituality were interpreted as 'soft-Hindutva' in the name of alternative politics by specific

Dravidian and communist brigades in Tamilnadu. He was called as pseudoscientific, parochial, and a Tamil revivalist. Again, his association with Isha yogic foundation drew apprehensions amongst the environmentalists in the state. However, from his writings, one can learn that he has been influenced by the Gandhian philosophy of J.C.Kummarappa and later, became associated with the larger organic movement that spread all over India. He was also a part of many left-based farmers associations and admired the regional communist leader Nallakannu and lauds his significant work for the cause of farmers and "backward" caste groups. Moreover, Nammalvar is a self-proclaimed atheist who is known only to a few of his associates (Nammalvar 2014, 128-131). As a leader-figure, his objective was to spread the significance of natural farming, ecology and merits of traditional lifestyle. Stakes on the issue of ecology preoccupied his actions and never took attention at consolidating a position between the left or right of politics.

The question of spirituality can be seen as his unresolved viewpoint in approaching the question of 'outside' of things. For Adorno, the outside of the things can be left to a mimetic language rather than rational identification of it through science and concepts (Finke 2008). However, for Bennett (2010), one should strive to understand the nonhumans and objects to relate to their material connectivity, and therefore, Science becomes paramount. In the case of Nammalvar, there was no explicit paradox observed between these two approaches- between materiality and spirituality. This spirituality of Nammalvar is an expression of the mimetic language that Adorno talked about as a creative zone for dealing with the nonidentity of the objects, and simultaneously, it can be very well an expression of thing-power of Bennett. His politics did not acknowledge an inherent schism between these two aspects. Holmgren is a co-originator of permaculture design along with Mollison. Holmgren, who is an atheist in commenting about the spiritual angle of permaculture expounds that

> Permaculture attracts many people raised in a culture of scientific rationalism because its wholism does not depend on a spiritual dimension. For others, Permaculture reinforces their spiritual beliefs, even if these are simply a basic animism that recognises the earth as alive and, in some unknowable way, conscious. For most people on the planet, the spiritual and rational still coexist in some fashion. Can we really imagine a sustainable world without spiritual life in some form? (Holmgren 2002, 3)

This moving beyond the duality of material and spiritual in permaculture reflects in the politics of Nammalvar.

Overall, the politics and sociological imagination of Nammalvar created a sense of trouble, trouble that connects the history and biography of not only the individual but of the

region in a broader sense. The issues that he spearheaded starting from Cauvery and land degradation of delta farmers due to the Methane project are central for the modern imagination of Tamilnadu as a region, and of course, these issues have begun to define the politics of state-oriented towards the things. These politics of things can be seen as isolated events without having any central organisation, leadership, and movement. However, through the discourses and works of Nammalvar, one can sociologically construe how most of it started with the initial campaigning of Nammalvar against the green revolution in the 1980s. Theoretically and philosophically the undertones of such a material relational worldview to the things can be traced from the methodologies of permaculture. Seeds are designated central in the imagination of Nammalvar, and the sovereignty of the seeds are paralleled with the sovereignty of the region. The inherent materiality of the seeds, i.e. the regenerative capacity became the subject of the politics assembling multiple actants around various assembles. The political sensibility, space and the modality of the thing-politics get constructed within the complexity and layers of the capacities of nonhumans, humans, and the objects, where the question of the region becomes central as seen in the imagination of Nammalvar. Therefore, the postcolonial STS cannot comprehend the question of alternatives taking nation as the index of imagination, and for a contextual reading of the resistances, mobilisations, and aspirations, the question of the region has to be incorporated along with the question of nonhumans and objects.

Conclusion

The focus on nonhumans in the sociological narratives with philosophical and theoretical expositions of human-nonhuman dichotomy as only one way of approaching the world is still an "epistemological exclusion" within Indian social sciences (Srinivasan 2010, 25). Though Srinivasan is more concerned with the nonhuman animals, the thesis encapsulated the term nonhumans with the categories like object, things, and machines. Relatively seeds are complexly theorised objects in the social sciences and particularly, in India under the postcolonial STS. Chapter one began with the basic disposition of the study, which detailed seeds as the other "becoming" along with the humans and thus, it was affirmed that there should be a sociological imagination of how such a becoming of human-nonhuman is defined within the entanglement of relations (Ingold 2013, 8). The sociological imagination connected the biography of the seeds and the humans with the larger processes of history like the development of capitalism, colonialism, Mendelian genetics, green revolution politics, biotechnological and patenting regimes. Thus, the touch between the human and seeds are defined through the larger practices not to forget the alternative worldviews of human-seed relations outside and against the modernist order of things that separate the nature-culture and subject-object. To reiterate the phrases of Haraway, it is essential to comprehend "Which worldings and which sorts of temporalities and materialities erupt into this touch" of the objects not only from the aspect of ethics and ecology but here to picturise how the relations get choreographed in the performances (Haraway 2006, 145). Precisely, to begin with, the politics of composing a "becoming," one has deconstructed the ontological separation of the subject-object and nature-culture (Ibid.). Hence, seeds are established as the subject of the narratives in the first half of chapter one. Seeds were grasped as a crucial thing to engage sociologically to realise the fundamental materiality of relationships, which is blurred by the exaggerations of the discourses on symbols, meanings, abstractions, identities, and representations.

The review of the literature did not rehearse the works on nature-culture or subject-object but dwelled on the discourses of ontological politics within the rubric of STS by following the works of Latour, John Law, Callon, and Pickering. By outlining their theoretical propositions, the separation of reality as natural and social along with the question of the division of subject and object is demystified. The reality is therefore understood in the practice of entangled human and nonhuman realities. The reality is construed as context-specific, performance-oriented, and plural. Though seeds are nonhuman plant species, they were

comprehended as objects for the expository purposes following the conceptualisations of Object-Oriented Ontologists. In OOO theorisation, the reality is presumed as being thronged-with objects having tense relationships but not identical in their properties and each object "must be given equal attention, whether they be human, nonhuman, natural, cultural, real or fictional" (Harman 2018, 9). Latour calls such an approach as composing the real social, which is called the sociology of associations (Latour 2005, 9-12). The situating of ontological politics in STS and the seeds as objects within it through the OOO theorisation were the fundamental propositions of the thesis.

The chapter one also provided the rationale for selecting an object like that of the seeds. Firstly, decentring the focus of the politics from humans to nonhumans and objects is a necessity of the time and sociologically understanding the realities constituted in the enmesh of nonhuman and object agencies can only picturise the social and political life. Seeds are interpreted as objects capable of making and remaking of the social and thus, seeds are the subject of politics and a possible object of reality constitution. Seeds are one of the critical objects listed in the lexicons for anthropological engagements in the era of Anthropocene and climate change (Howe and Pandian 2016). Seeds are objects of contention seen through the lens of post-green revolution crisis and in the era of cutting-edge biotechnological research and simultaneously perpetuating patenting regimes. It is explicated in the introduction, why the very biological composition of seeds, which is the Plant Genetic Resource (PGR) contributes to the contention amongst various stakeholders. The biological materiality of the seeds cannot be disentangled from the social and the political. Jasanoff comprehends seeds as objects of the biotechnological empires that propagates the similar logic of colonialism and Science nexus within today's globalised scheme of things (Jasanoff 2006). Not only within these technological innovations but human and seeds, in general, are "biosocial becomings" seen in the scale of evolution (Ingold 2013). Seeds and humans are twisted with the rope of biology and social. However, Chandra complicates the argument by understanding plant genetic resources and the politics of entitlement around it as biocultural, in which the rights of people from various socio-cultural structures are intertwined (Chandra 2016). Visvanathan in his essay on gene diversity studies the polysemic approach towards nonhuman entities in terms of seeing seeds and plants as elements of magic, ritual, aesthetic, economy, livelihood, and power as giving space and potential for the conservation of biodiversity than the production-oriented monocropping of western agricultural and forest management systems (1997, 66). Through the revision of these arguments, seeds are established for what it is in both material and social

attributions rather than compartmentalising the social within the paradigm of humans, symbols, and meanings.

Moreover, a review of the sociology of seeds has shown how the seeds are approached and theorized through the colonial seed travel, medicine, and knowledge production; as objects of scientific controversies and legal battles; entities of food sovereignty, through the ethnographies of seed saving; and as a concern of ecologists and biodiversity conservationists. From this literature, the ontological politics diverges in its concern by studying objects (here seeds) in the practices of particular relations where the objects are constituted in the entanglement of natural and social processes (Law 2004). Also, the ontological politics is preoccupied to see the world in terms of material-semiotic composition. Therefore, unlike the other literature on seeds, the ontological approach of the seeds will act as an exemplum where materials are narrated as the constituents of the social. It is here, the alternative human-seed constitution of Nammalvar is situated. The seeds constructed in the politics and imagination of G. Nammalvar is studied through the symmetrical approach of STS and also within the postcolonial STS' commitments towards comprehending the alternative practices, objects, and realities as subversive towards the structures of monopoly, centralisation, and monoculturalisation. Thus, the chapter one placed the current disposition of the seeds and narrated how the ontological politics and seeds as objects have provided a difference in comprehending the seed question as producing realities within the alternative practices than as a pre-given entity (Ibid., 42-45). Moreover, seeds as the subject of these alternatives are established subversive to the modern order of things that question the single ontological plane and demonstrates how the constitution of the world could be otherwise (Pickering 2009, 9).

Chapter two grounded the debates of epistemology and ontology within the discourses of STS in the west and postcolonial STS in India. The practices of STS in the west and east are understood through their encounters with colonialism, modernity, Science, and democracy. The concerns of knowledge and worldmaking in the western STS are traced from the engagements with the idea of scientific institutions and its contextual development, the social history of Science, internalist history of ideas and scientific knowledge, Science education, and laboratory studies. It is not to say that the questions of social movements and democratic assertions did not influence the science-society relations in the west and its further knowledge production in STS. However, when juxtaposed with the commitments of postcolonial STS, one can see how the questions of indigenous knowledge, colonialism, civilisation, nationalism, social movements, the political economy of neo-liberal orders, alternative sciences, regional

politics, ideologies, and worldviews are defining the epistemological and ontological commitments of postcolonial STS. The question of alternative practices and multiple modernities addressed within the postcolonial STS decentre the unilinear historicism of Science, developmental practices, and modernisation theory (Anderson 2002). The politics of Nammalvar advocated an alternative agroecological system, which was situated in the engagements of the alternative sciences of the postcolonial STS. The chapter is mainly a brief review of the social, historical, and philosophical scholarship of postcolonial STS in India. By such a review, the scope and the divergence of postcolonial from the mainstream STS are brought out. The chapter was concluded by beginning the discussion of Latour's and other actor-network-theorists' preoccupation with ontology and objects moving away from the long history of epistemological engagements within STS following its lineage from Sociology of Scientific Knowledge. Pickering called this shift as "Science-as-Knowledge to Science-as-Practice" (Pickering 1992, vii).

The chapter three is entirely theoretical. The aim was to place seeds as objects by reviewing the available literature on the sociology of seeds through the understandings of object theory of Latour and other Object-Oriented ontologists. The first section of the chapter detailed on the question of ontology and objects in the politics of Latour. The imagination of nonmodern in the politics of Latour was welcomed. However, the limitation of the constitution of nonmodern within just the scientific and western discourses leaves a wide gap in approaching and applying the politics of Latour in the postcolonial context. This complication and inconsistency within the Latourian framework were cited. Nevertheless, the nonmodern juncture is significant for composing reality without nature-social division, which leaves a way for the object politics in STS theorisation.

Latour, Bennett, and Bryant are the three major object theorists discussed in the chapter. Latour's quasi-objects and the *dingpolitcs* (2005b) were revised to affirm the productive results of engaging with the objects in the era of Anthropocene and climate change where the question of approaching the nonhumans and objects will be crucial in the constitution of social and political life. Bennett moved away from the term object to use things, which she points are denoting the material than the objects that prioritises the concept and human. Both Latour and Bennett were constituting a thing-politics. Latour imagines specific techniques of representation of things in the public and Bennett deploys an ethical-aesthetic politics to acculture the public with the sensibility of the vitality of the things. One of her techniques was telling material stories of the things called onto-stories. Bryant's machine-oriented approach

has a broader view of the reality, in which every entity is understood as a machine. The question of representation of the objects or reality was side-lined, and the question of performance of the machine was focused. Therefore, all these three approaches focused on the question of material and thus, provided the basis for a materialistic understanding of the seeds. The seeds as an object placed within the politics of postcolonial STS was approached through these material conceptualisations. The seeds were established as thing-power by rehearsing the approaches of Mooney (1979) and Kloppenburg (2004). Also, seeds were deliberated as black-boxes, and quasi-objects understood through the prism of the Latourian framework (Latour 1993) (Latour 2005a) (Harman 2009). Finally, seeds were comprehended as machines by reading the accounts of Visvanathan (1997) and Shiva (1991). Thus, chapter three affirmed the material aspect of the seeds.

Chapter four began by detailing the question of thing and thing-politics in Tamilnadu. In the initial sections, the account produced various regional narratives to substantiate the contributions of Nammalvar in initiating the recent thing-politics in Tamilnadu starting from his contentions and resistance against the methane extraction project in 2010. Nammalvar was concerned with various thing-politics beginning from soil degradation, fertilisers usage, neem patenting, Bt. Brinjal, eucalyptus plantations, Cauvery issues, palm tree conservation, poultry politics among others. However, reading the biographical accounts and politics of Nammalvar, one can understand how his alternative politics began opposing the science and technology of green revolution. Moreover, seeds were his primary object of concern and contention. He imagined seeds as the embodiment of sovereignty and self-sustenance of the region. For him, the sovereignty of the seeds was associated with the sovereignty of the region. Seeds became a metaphor and "semantic innovation" in mobilising the public towards his larger thing-politics (Demeulenaere 2014, 46). Seeds were construed as coevolving(s), and its capacity for regeneration was understood as the agency for human resistance and independence. He imagined a politics of relational materiality with the seeds, which is the undertone of permaculture agroecological system that he propagated as the alternative to the industrialised agriculture.

The design of permaculture within the new materialist approach is understood as instating a material relationality not only between the objects in the agroecological system but also between the human and objects. The seeds, humans, plants, water bodies, technologies, tools, and machines are comprehended as distinctive material capacities capable of affecting the other objects in the design. The contra seed imagination outside the industrialised

agriculture system of Nammalvar comes from the permaculture design that moves beyond the "natureculture" separation (Aistara, 2013, 116). The alternative seed imagination of Nammalvar countered the human-object relation of the capitalistic and scientific worldview. The human-object relationship conceptualised by Adorno and Bennett was discussed to delineate the position of Nammalvar in constituting the human-seed relation as both mimetic and vital materialistic. Nammalvar installed both a material-relational and mimetic language in his sociological imagination of human-seeds relationship. The seeds were simultaneously expressing aspects of material relationality with the other objects and the humans and were also construed as a thing of aesthetic and spiritual being in his politics and imagination.

Nammalvar represented such materiality of seeds through two techniques of representation: one is his onto-stories, and the other is through the popularisation of seed ball techniques. As a spellbinding storyteller, he narrated the capacities and thing-power of the things in his orations and writings. His charismatic outlook and flair in the Tamil language influenced people towards his ideas. The seed ball technique instated a sensorial relationship with the seeds, which is understood as a significant aspect of raising critical consciousness against the processes that destruct such sensorial relationships with the nonhumans (Muller 2014, 4-8). Thus, the politics of Nammalvar is an ontological politics, which emphasised a region-based alternative worldview from that of the modern order of things. Escobar calls this "relational ontologies" (2010, 39).

Firstly, the thesis centred the seeds as the constituent of the social and the subject of politics. The seeds are deliberated within the material theorisation of Latour, Bennett, and Bryant, which established objects in the forefront of the postcolonial STS' alternative practices. Secondly, the seeds are produced as relational objects evincing its thing-power in the designs of permaculture as advocated in the politics and seed imagination of Nammalvar. Such an alternative human-seed relationship produced in the engagements of Nammalvar is recognised as the beginning of the thing-politic to commence in Tamilnadu seen through the biographical time of Nammalvar. Moreover, the question of the region is emphasised within the discourse of postcolonial STS as practised in India, which is preoccupied with notions of nation and civilisation. The centring of the narrative around the seed-thing in the politics of Nammalvar has given an account of the object and its politics within the commitments of postcolonial STS in the thesis, "The Material Aspects of Science and Technological Studies: The Narratives Around Seed as a 'thing' in Tamilnadu."

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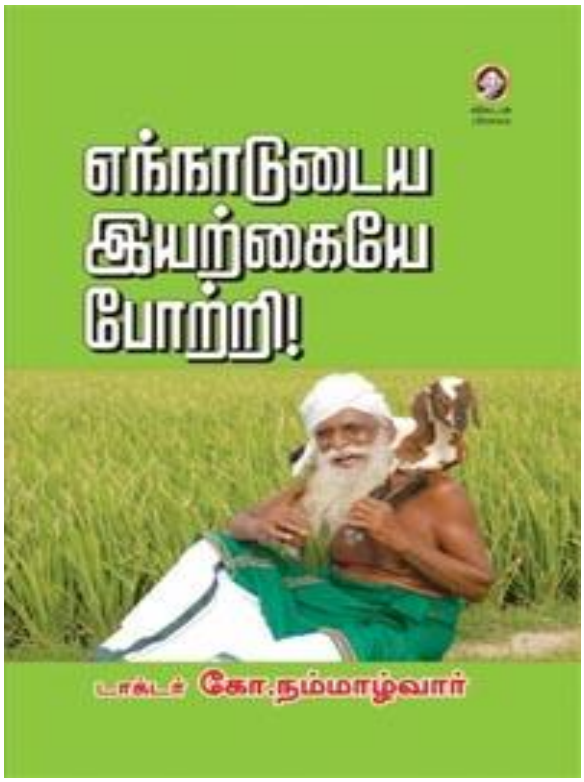
Appendices

Appendix 1



Cover page of Nammalva's book Ennadudaiya Iraivanae Potri
(Nature, the lord of all lands, Praise) (2012)

Nammalvar as a storyteller. (*The Hindu,* Nammalvar Remembered 2014)

Appendix 2

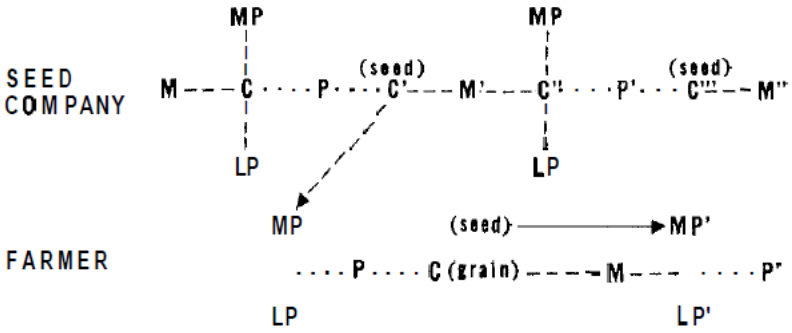


Figure 2.1. Seeds and the circuits of capital. Key: M = investable funds; C = conimodities; MP = means of production; LP = labor power; P = production process; – – – = exchange relations; ··· = production relations.

Source Book: First the Seed-The political economy of plant biotechnology 1492-2000 (Kloppenburg 2004, 39)