Perspectives: From Ecofeminism to New Materialist Feminism and Critical Posthumanism

The Seeds of Violence. Ecofeminism, Technology, and Ecofeminist Philosophy of Technology

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1 Introduction

Ecofeminist philosophy is a development of feminist philosophy that addresses the intersection of sexism and environmental issues. Coined by Francoise d'Eaubonne (1974), the term "ecofeminism" refers to a diverse collection of feminist thought that shares the conviction that the present environmental crisis is due not solely to the anthropomorphic nature of dominant conceptualisations of human-nature relations, with their emphasis on notion of mastery and control, but also to their androcentric nature. Ecofeminists hold that there is a strong connection between the oppression of women and the oppression of nature and that failure to pay heed to this women-nature connection threatens to compromise both environmental and feminist activism. Opinion differs amongst ecofeminists on the correct way to address this issue, with some arguing that liberation necessitates that women should reject the women-nature connection and others that they should affirm it.[1]

The variety of ecofeminism that I will explore in this paper, *transformative* ecofeminism, takes a social constructivist position on the women-nature connection.[2] Transformative ecofeminists argue that the links between the oppression of women and the oppression require that the liberation of women involve the

[1]Simone De Beauvoir (1952) provides an example of the former, and Mary Daly (1978, 1984) of the latter.

[2]The term transformative ecofeminism was coined by Ynestra King to demarcate her position from those of feminists seeking to either affirm or reject the connection between women and nature (1989).

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liberation of nature, and vice versa. They further argue, against essentialist forms of ecofeminism, that the connection between women and nature is socially constructed and thereby amenable to alteration.[3]

In general, ecofeminist analyses offer a critique of the domination of women and nature through the analysis of the material and spiritual consequences of such domination and of the ideological functions of the conceptualisations of women and nature that underpin and justify such domination. A particular focus of ecofeminist analysis is the role of value dualisms in the conceptual categorization of existence.[4] These dualisms are antagonistic conceptual dyads (man/woman, reason/emotion) that divide reality hierarchically with one part of the pair elevated at the expense of the other. Exposing the ideological nature of such dualisms serves to undermine both the conceptual schemas and the practices of domination that they enable.

Technology features frequently in ecofeminist writings, in analyses of technocracy (Birkeland 1993), Nuclear Power (Caputi 1993), reproductive technologies (Diamond 1990), or the production of computer interfaces (Romberger 2011), to give but a few examples. Despite being a recurrent theme, technology itself as a phenomenon is rarely directly considered. For many ecofeminists technology seems to operate as an umbrella term for a collection of artefacts whose positive or negative characteristics are ultimately contingent upon the manner in which they are employed.[5] The individual technologies appear as value neutral. That is to say that technology, as a class of objects, belongs to the realm of fact and is thus, in and of itself, neutral with regards to human value systems. Issues concerning value would only properly arise when considering issues involving the application of technology, at which point questions regarding values can be directed towards the actions and intentions of the persons employing the technology.

There are of course exceptions to this piecemeal approach to technological artefacts, and in this chapter I shall focus upon two ecofeminist philosophers whose consideration of technology moves from the individual instance towards a more general account of the nature of technology. The first, Karen Warren, gives technology a central place in her philosophical analysis. However, I shall suggest, her commitment to an instrumental understanding of technology renders her approach problematic. I will then consider the work of Vandana Shiva. Best known as an environmental activist and radical scientist, standard analyses of Shiva's work tend to overlook the philosophical dimensions of her thought, in particular the continuous emphasis on science and technology. I argue that Shiva puts forward a

[3]Daly's Gyn/Ecology (1978) is the classic example of such an essentialist position.

[4]See for instance Rosemary Ruether (1975) or Dorothy Dinnerstein (1989).

[5]This situation rather belies the accusation occasionally levelled against ecofeminism of being anti-technological. To accuse ecofeminism of being 'technophobic', as Carol Stabile (1994) does, is to suggest that ecofeminists in general attribute some universal rebarbative character to technology. However, it is precisely the tendency to analyse features of individual technologies, rather than technology in general, that is the norm.

sophisticated technological determinist philosophy of technology that emphasises the role of political and patriarchal interests in technological development and subsequent social and environmental interventions.[6]

2 Warren on Technology

One of the few ecofeminists to make technology central to the application of their ecofeminist philosophical framework is Karen J. Warren. Warren argues that "an adequate understanding of the dual dominations of women and nature must include a discussion of technology'" (Warren 1992: 14). Indeed, Warren characterizes ecofeminism as emerging from the intersection of feminism, environmental concerns, and concerns with science, technology and development (Warren 2000: 44). Just as ecofeminism holds that the environment is a feminist issue, so too, on Warren's account, does it hold that technology is likewise a feminist issue.

Warren states that "a deep conceptual understanding of ecofeminism requires a discussion of the basic structure of beliefs and values underlying environmental exploitation and the domination of women" (Warren 1992: 16). This basic structure is what Warren calls a conceptual framework, a socially constructed set of beliefs, values, etc. which determine the way in which one perceives both oneself and the world in general. According to Warren the primary focus of ecofeminism is on oppressive conceptual structures which are held to be the origin of the domination of both women and nature. Warren defines an oppressive conceptual structure as that which "explains, maintains, and sanctions (unjustified) relations of domination and subordination" (Warren 1992: 16).

Oppressive conceptual frameworks are said to possess five characteristics. These are value-hierarchical thinking, value dualisms, power-over conceptions of power, conceptions of privilege and a logic of domination.[7] Warren defines a logic of domination as, "a structure of argumentation which presumes that superiority justifies subordination" (Warren 1992: 17). It is this last characteristic that Warren holds to be the most significant, in that it is only when this characteristic is combined with the others that one arrives at an oppressive form of conceptual framework (Warren 1996: 21). And, for Warren, all ecofeminists share the belief that it is this logic of domination within patriarchy that has served to justify and perpetuate the domination of women and nature. So, what then is the relationship between technology and these oppressive conceptual frameworks?

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[6]This focus on Warren and Shiva is not meant to suggest that they represent the totality of ecofeminist engagement with the philosophy of technology. Attempts to fuse Heideggerian philosophy with ecofeminist thought represent another potential source for ecofeminist philosophy of technology (Bigwood 1993, Glazebrook 2001, Swer 2008). As does Dinnerstein's engagement with Mumford's philosophy of technology (Dinnerstein 1989), or Ariel Salleh's appropriation of Critical Theory (Salleh 1997).

[7]Chris Cuomo suggests that Warren may have drawn this notion of a logic of domination from Adorno and Horkheimer (Cuomo 1998: 126).

Technology, for Warren, does not seem to be an integral part of the logic of domination, nor imbued with the values of patriarchy. She states that, "Ecofeminism welcomes appropriate ecological science and technology. Environmental problems demand scientific and technological responses as part of the solution" (Warren & Cheney 1996: 254). The application of technology to environmental problems does not appear to be inherently problematic, on Warren's account, but rather necessary and (at least potentially) positive. Given the central place that Warren gives technological matters in ecofeminist analysis, one would expect to find at some point in Warren's work a discussion of the connections between the environment, women and technology which would elucidate exactly why and how these three areas should be considered in conjunction as opposed to separately. Instead, in her paper "Women, Nature and Technology", Warren chooses to explain by offering four examples that she feels demonstrate the connection between environment, women and nature.

Let us focus on one of Warren's examples, the tale of the Chipko movement in India which originated with the actions of 27 women who halted a tree felling operation by threatening to hug the trees. The use of ecofeminist theory in framing her analysis allows Warren to identify connections between what appears initially to be a purely environmental issue and specific women's issues. For example, the reliance of local women on the products of the forest means that the tree felling becomes a feminist issue. Furthermore, by identifying a patriarchal oppressive conceptual framework as the dominant oppressive framework operative in the world, and making it the chief focus of ecofeminist analysis, Warren is able to identify patriarchal elements present in the situations she studies. In the Chipko example, Warren locates patriarchal attitudes at the very base of the tree felling operation in the main ideas of the practitioners and advocates of scientific forestry, who assume that their scientific knowledge is superior to the indigenous scientific knowledge of the local women who use the forest.

The issue with Warren's examples, with regards to technological analysis, is that they don't tell us much about technology. Each of her examples demonstrate that there have been occasions in recent history which, when analysed from an ecofeminist perspective, reveal technological aspects that are indeed connected to both environmental and women's issues.[8] In the Chipko example, the assumption that a patriarchal conceptual framework was a motivating factor in the origins and nature of the dispute allowed Warren to ascertain that patriarchal notions were operative in the thinking and practice of scientific forestry and that they led to the development of a situation that was harmful to both women and the environment. However, neither the Chipko example nor Warren's other examples establish that technology is anyway necessarily connected with the oppression of women or the despoliation of the environment, or even perhaps strongly compatible with such acts. What Warren establishes is that at some points in time technology was either

[8]The term "technological" here is intended to include both technology and science. The deliberate conflation of the two areas is quite common in ecofeminist theory.

used in a manner that was detrimental to women and the environment, or that there are points in time in which a technological intervention of some sort would be conducive to women's well being.

In short, on Warren's account technology is held to be entirely instrumental in character. It simply exists as an object in the world and can be used in either a positive or negative way depending on the context of use and the intentions of the user. Given that technology is apparently neutral with regards to the ends of its use, it is hard to see how one can support Warren's view that technology is a feminist issue or that technology is at the heart of ecofeminist theory. Warren does not give an account of what it is about technology that makes it central to an understanding of nature and women. If technology is a feminist issue then it would appear that it is only ever contingently so. Warren, in other words, does not enquire into the nature of technology. Without such an enquiry one cannot establish what, if anything, in the character of technology connects it with women and nature and their mutual oppression by the forces of patriarchy. Or, alternatively whether technology can fulfill the liberatory potential for women and nature that Warren foresees for it.

A possible reason for Warren's instrumentalist approach to technology might lie in her acceptance of Frederick Ferré's (1995) definition of technology as "'practical implementations of intelligence', where 'intelligence' refers to the 'capacity for self-disciplined mental activity'" (Warren 1992: 22). This rather cerebral definition of technology places emphasis on the individual human consciousness from which technology originates. It consequently ignores questions such as the possibility of there being general characteristics of technology, or whether technologies can develop or exhibit qualities unintended by the creator once they are brought into being and put into operation. Such a view commits what Langdon Winner calls the fallacy of technological mastery, the belief that "men know best what they themselves have made; that the things men make are under their firm control; that technology is essentially neutral, a means to an end…" (Winner 1977: 25).

A more likely reason is that issues of inherent technological values or technological autonomy simply lie outside Warren's field of interest. Warren's primary concerns in her ecofeminist philosophy concern epistemology and ethics. In the first case she critiques value-imbued conceptual schemes that privilege oppressive hierarchies and exclude the situated-knowledge of those on the lower end of such hierarchies. Science, on her account, as a form of knowledge is also value-imbued and likewise situated in a specific historical and social context and she calls for the inclusion of a diversity of perspective within a specific framework of investigation (Warren 1996: 250–251). And at the ethical level she likewise argues for a contextualism, an inclusive approach to justice that fosters equality without uniformity and recognizes the situated, relational nature of ethical discourse (Warren 2000: 88). In effect Warren's philosophy tends to remain at the level of values.

Technology, on Warren's account, appears outside the realm of values. When technology is included in her analysis it is usually in regards to oppressed groups' lack of access to a technology, the unjust exposure of such groups to the negative effects of technology use, or their lack of inclusion regarding input into the

selection of technology (Warren 2000: 178). In other words, technology features in relation to epistemological and ethical issues regarding its use. It however always features as a fact, an object that is itself neutral with regards to human values. Lying outside the realm of values, value considerations only pertain to the application of technological means by human agents.

3 Shiva on Technology

An alternative ecofeminist account of technology to the instrumentalist technological outlook present in Warren's analysis is to be found in the writings of Vandana Shiva. She advances a determinist technological position that rejects that fact/value distinction present in Warren instrumentalism, and places technology and science in the realm of values. Shiva's philosophy of technology is intrinsically connected with her ecofeminism. Shiva portrays science as imbued with the ideology of capitalist economics, and technology as its point of contact with the natural and social world. Shiva also argues that in the modern world we find a convergence of systems of oppression, those of capitalism and patriarchy, such that one can refer to them as one system, that of capitalist-patriarchy. Science then, is imbued with a patriarchal ideology, and technology serves the interests of patriarchy through transformative alteration of the social and natural world. Shiva develops a Hindu-ecofeminist ontology, based upon the feminine principle understood as Prakriti, which she employs as an alternative to what she terms western patriarchal reductionist metaphysics (Shiva 1989).

According to Shiva modern science, both as knowledge and practice, perpetrates violence both indirectly and directly against society and nature. Here Shiva's views on technology and science intersect with her ecological metaphysics, according to which the properties manifested by any element of a system under study are determined by the relationships which are taken to define the context of study. Thus, the selection of the context determines the properties perceived in nature, and the selection of the context is itself determined by the values and priorities guiding the perception of nature, in the case of modern science these determining values being reductionist.

This ontological distortion results in certain reductionist epistemological assumptions, which Shiva identifies as being that knowledge of the parts of a system gives knowledge of the whole, and that experts are the only legitimate seekers and justifiers of knowledge. Interventions in nature in the form of technology do harm due to the producers and utilisers' ignorance of the natural system. The privileging of scientific knowledge, method and knowers not only prevents the study of the other properties of nature by denying the epistemological legitimacy of other modes of knowledge, it also transforms that majority of the populace it 'non-knowers' through the creation of the expert/non-expert dichotomy, even in areas in which they regularly operate. Thus, modern reductionist science carries out violence against humanity at an epistemological level by removing its cognitive authority and it also carries out violence against nature of a physical kind. It

is, for Shiva, the combination of this cognitive alienation and the material consequences of this natural violation that resulted in the environmental and social destruction that she detailed in perhaps her best-known work, *The Violence of the Green Revolution*.

Shiva's conception of technology operates at several levels. Her understanding of technology, like Warren's, includes the notion of technology as a mode of knowledge. However, Shiva's philosophy also understands the term 'technology' to include technology as a system, as an artefact, and as a type of metaphysics. I argue that it is the Shiva's analysis of technology as a system that is foundational to her technological critique. I further suggest that it is an appreciation of the technological at the level of sociotechnical structure that draws out most clearly her argument that technology be viewed, contra Warren and others, as located within the realm of values, in addition to the implications of such a position.

4 Technology as a System

Shiva's analysis of technology as a system undermines in several ways attempts to maintain a fact/value distinction with regards to science and technology. Firstly, Shiva holds technology and modern science to be cognitively inseparable due to their mutually constitutive role in legitimating and perpetuating the power nexus between western patriarchy and modern industrial capitalism. If science and technology are, effectively, identical, then it becomes impossible to hold that there is a fact/value distinction between science and technology. Science cannot be treated as belonging to a world of facts, removed from the ethical issues regarding technological development and application. Secondly, Shiva views science, technology and modern capitalism as forming a sociotechnical system that operates for the extension and maintenance of the power of the ruling elite. Shiva's account at this level of analysis in many ways resembles that of Lewis Mumford. Technics, for Mumford is any system, cognitive or material, which operates along mechanical principles. So, in addition to science and technology as both theory and practice and artefact, Mumford would also include any political or labour structure which operated along centralised lines. To this extent it is fair to say that Mumford's technics overlaps with all the elements present in Shiva's nexus. Both philosophers further agree that there is little distinction to be made between modern science and technology, due to the fact that science's purpose is the production of commercially exploitable technology (Mumford 1970: 123). The implications of treating science and technology (or technoscience) as forming a unit, and that unit as but a component of a larger sociotechnical system, are that technology (in this sense) must be treated as system which has both human and technological components. If technology (as a system) contains humans as components then it is hard to see how it can be treated as lying outside the realm of values. For Shiva the sociotechnical system that is patriarchal capitalism is thoroughly value-laden, and science/technology is thus not immune from normative critique at any level (theory, organisation, application, etc.).

What is of particular interest in comparing Shiva and Mumford's philosophies is their recurrent use of ecology and ecological metaphors in critiquing the dominant mechanistic sociotechnical system and in validating alternative systems. Both Shiva and Mumford portray the world as being an organic system of interconnected and varied parts, with stability and continued existence guaranteed through the system's diversity. By characterising the world mechanically, science legitimates the exploitation and transformation of the material world in a way which threatens nature's 'dynamic equilibrium', and thereby threatens life (Mumford 1970: 127). Both advocate the rejection of the reductionist ideology or 'myth of the machine' as Mumford describes it, in favour of a return to older, ecologically sound systems or 'biotechnics'. In these systems work was not directed to the accumulation of capital, but was merely a part of the overall cultural life of the community, and operated within sustainable parameters of both production and consumption. Mumford viewed such systems as on the verge of extinction as global society was progressively restructured along mechanical lines to serve the capitalist megatechnics, but felt that their legacies offered humanity a variety of alternative patterns of life upon which we could draw for inspiration (Mumford 1970: 159). Shiva terms these traditional systems ethno-sciences, and points to the success that their occasional revival has had (e.g. regarding breast-feeding, organic farming), whilst at the same time warning that the Western development project threatens to eradicate the remaining non-Western biotechnics.[9]

In summary then, it can be seen that on many of the key points of their different philosophies Shiva and Mumford are in relative agreement. In particular, both attach great significance to the influence of the ideological in bringing about transformations in the both the natural and social world. Each argue that, in essence, there is no meaningful distinction between thought and action. To view the world mechanically is to treat it mechanically. Thus, science cannot claim that the negative ramifications of the use of its creations are due to their misapplication or misappropriation, and that the political or economic sphere must bear responsibility. Science and technology are part of the political and economic sphere and technology which disrupts natural processes by treating nature or humanity mechanically has been designed to do exactly that. Whilst Shiva and Mumford disagree over the likely consequences of economic, scientific and technological development, both

[9]It should be noted that Mumford and Shiva characterise the consequences of a failure to arrest the growth of capitalist technics and its accompanying mechanistic scientific ideology in somewhat different ways. For Mumford, the main danger lies in the impact that a truly global megatechnics would have on the quality of human life. He argues that humanity faces deprivation by material surfeit, and that if technology is allowed to develop unchecked we face the possible scenario of a life in which all human needs are satisfied artificially and all human development has been arrested. Shiva, by contrast, argues that the development of capitalist technics and its transformations of the natural world through the use of technology, threatens to end life itself, rather than the quality of life. The ecological ramifications of scientific exploitation threaten to directly affect those whose patterns of life are still modeled on the cycles of nature rather than those of the market.

portray this development as out of control. Not in that it operates under its own dynamic, but in that it is in the control of an unaccountable elite all of whom are under the sway of a highly destructive mechanistic ideology. And given that technology has been designed to further the interests of this elite, it cannot be 'turned' from its purpose and put to more egalitarian ends. And even if it could, due to the fact that the principles of its operation are derived from the mechanistic paradigm, its operation will inevitably do harm to nature.

However, the greatest and most significant similarity between Mumford and Shiva's philosophical positions concerns their critique of the ideology of modern science/technology and its implications. This ideology serves, for both thinkers, as a means by which to preserve and justify the existence and operations of the sociotechnical system. Although Shiva describes this ideology as reductionist, and Mumford describes it as mechanistic or mechanical, their characterisations of it are relatively interchangeable. Mumford, like Shiva, sees the scientific revolution as the starting point for the mechanistic worldview, and points to its ideological and practical utility to the development of modern capitalism. Both argue that the mechanistic/reductionist ideology is founded upon the premise that reality is essentially a mechanical system, with the greater whole understandable through the study of its uniform parts (Mumford 1970: 33, 68). Both consider this mechanical model to be fallacious and destructive and both reject the model in favour of a holistic, life-ensuring alternative. In terms of the analysis of technology, the role of ideology as a rationalization for the operations of a pre-existing sociotechnical system is fundamental to Shiva's thought in that it underpins her analyses of technology as metaphysics, epistemology and artefact. Each level, for Shiva, represents a different way in which the rulers of the technological system seek to naturalise and operationalize that ideology. At the metaphysical level, technology is the attempt to present the world in ways amenable to capitalist-patriarchal exploitation and manipulation. At the epistemological level, technology represents the hegemony of a calculative mode of reasoning that devalues and discounts all forms of knowledge outside itself. And at the artefactual level, technology represents the attempt to reorder the world such that it makes actual the ideological metaphysical depiction of reality.

5 Technology as Metaphysics

According to Shiva, modern science has constructed a reductionist and mechanistic metaphysical picture of the world. She states that, "the ontological… assumptions of reductionism are based on uniformity, perceiving all systems as comprising the same basic constituents, discrete, and atomistic, and assuming all basic processes to be mechanical" (Shiva 1993a: 23). In other words,, the metaphysical picture of modern science represents all processes and entities as reducible to certain basic components and presents those components as possessing a degree of uniformity and homogeneity. These basic components are held to interact in a fairly linear, casual fashion.

Fundamental to this depiction of the world, for Shiva, is the metaphor of the machine which functions as a conceptual blueprint for the understanding all natural processes. This mechanical conception, Shiva claims, "was based on the assumption of manipulability and divisibility" (Shiva 1993a: 23). In this way nature and its processes are depicted as an assembly of individual parts, rather than a whole. And accordingly, on this mechanical conception, the key to grasping the essence of any natural process is to isolate the parts involved. This stands in contrast to organic metaphors for the nature of reality, "in which concepts of order and power were based on interdependence and reciprocity" (Shiva 1993a: 23).

For Shiva the purpose of this technological metaphysics is decidedly practical. The metaphysical worldview serves to conceptually reorder the world in a manner conducive to the interests of the patriarchal-capitalist system of which it is a part. By focusing on the properties of individual components, science legitimates the uncoupling of issues concerning the manipulation of those components from those of the wellbeing of the system of which they are a part. It further serves to attribute 'reality', or at least significance, to only those aspects of nature which have utility value to the sociotechnical system. And in this way technological metaphysics prepares the way for the commercial exploitation of nature by representing it in such a way that it invites such treatment.

6 Technology as Epistemology

For Shiva this reductionist metaphysical picture has two distinct functions; the oppression and exploitation of nature, and the oppression and exploitation of women. Both functions serve a capitalist-patriarchal power nexus that Shiva argues has achieved dominance in the modern world. The reductionist metaphysics of modern science stem from the reductionist ideology of this capitalist-patriarchal power nexus. By portraying women and all values associated with them as inferior to those that advance the interests of the western elite, the elite devalues the position of women within society. Their lowered status enables them to be exploited in a way that serves the economic interests of that elite (Shiva 1990). By devaluing women, they are able to view and treat women as resources for the capitalist system to exploit. Shiva states that,

> Through reductionist science, capital goes where it has never been before. The fragmentation of reductionism opens up areas for exploitation and invasion. Technological development under capitalist patriarchy proceeds steadily from what it has already transformed and used up… towards that which has still not been consumed. It is in this sense that the seed and women's bodies as sites of regenerative power are, in the eyes of capitalist patriarchy, among the last colonies. (Shiva 1993c: 129)

The superimposition by capitalist patriarchy of its technological metaphysics over the natural world also serves an epistemological function. The insistence that the mechanical worldview of the modern science is the only worldview with purchase upon the true nature of reality facilitates the devaluing and dismissal of alternative worldviews less conducive to the extensive agenda of capitalist patriarchy.

Accordingly, the epistemological claims of those embedded within the western scientific tradition have greater truth value than those outside that tradition. The propagation of a reductionist metaphysical system in tandem with an insistence in that system's monopoly on the truth enables the experts of the western scientific tradition to act in effect as the gatekeepers of epistemological certainty on matters concerning the understanding and treatment of the natural world (Shiva 1993b: 10–12).

This ideologically-motivated creation of an epistemological hierarchy enables the encroachment of reductionist science into fields of human activity in which there already exist long-standing traditions of theory and praxis by creating an "arbitrary barrier between 'knowledge' (the specialist) and 'ignorance' (the non-specialist)" which "operates effectively to exclude from the scientific domain consideration of certain vital questions relating to the subject matter of science, or certain forms of non-specialist knowledge" (Shiva 1993d: 22). Taking the application of western reductionist science to Third World agriculture as an example, Shiva points out that it is not the case that reductionist science arrives in a field in which there is a dearth of relevant knowledge. Those involved there have centuries of practical and theoretical expertise in agriculture appropriate to their specific ecological conditions. If their practice appears 'backwards' owing to its lack of technological sophistication, this is a reflection of the unwillingness of the western technologized mind to recognize skill and artifice outside the confines of its own mechanical parameters. The seeds that Third World farmers utilize are not 'natural' in the sense of naturally occurring in their present state. They represent technological expertise, albeit of a non-reductionist variety, and are themselves technological artefacts.[10] "They consist of improved and selected material, embodying the experience, inventiveness and hard work of farmers, past and present; and the evolutionary material processes they have undergone serve ecological and social needs" (Shiva 1993c: 134).

The representation of seeds in particular, and Third World agriculture, as existing in an 'state of nature' allows seeds to be treated as a raw material to be developed by western science/technology, and severs the connections between the nature of the seed and the knowledge of the farmers. As an 'unimproved' natural object, the seed invites the improvement that reductionist technological agriculture can offer. It also negates the history of the seed as an artefact, and thereby as a living testament to the expertise of non-reductionist, non-western, agriculturalists. The seed becomes an atemporal component of the mechanical natural model, and the Third World farmer's knowledge is invalidated. Their relation to the seed is now that of the scientifically 'ignorant', and their interactions to it mediated by the technically 'learned'. For Shiva it is one of the epistemological premises of reductionism that, "'experts' and 'specialists' are the only legitimate knowledge-seekers and knowledge-justifiers" (Shiva 1988: 235). And the expertise of the technological expert is held beyond the reach of the farmer, and thereby, beyond their question or input.

[10]The term 'technological' is here meant to suggest the Greek *techne*, rather than the mechanical technological device.

7 Technology as Artefact

Shiva's philosophical focus is largely on the nature and effects of modern technology and her critique of modern technoscience is not limited to its metaphysical representations or its exclusionary epistemological practices. Shiva also analyses modern technology, and its role in the deterioration of the environment, at the artefactual level, the level of technological devices and products. And the specific artefact on which Shiva focuses is that of the seed, or rather the seed as 'technologised' by reductionist technoscience.

Modern technology (in the form of technological devices and products) is for Shiva the consequence and ultimately the purpose of modern science. Reductionist science portrays nature as inert and open to exploitation. Technology is then created to carry out this project of exploitation. In other words, the purpose of science is to produce technology and the purpose of technology is to materially reorder the world to ensure that it manifests only those properties that accord with the capitalist-patriarchal system. Here we see the reasons for Shiva's rejection of instrumentalism. Namely that technology, of the contemporary Western variety, is thoroughly value-laden.

In describing Shiva's position as a technological determinist one I do not mean to suggest that Shiva holds that there are fixed laws of technological development but rather that technology operates as a determining factor in societal development in that it can limit, shape or fix certain patterns of social and natural relations (Swer 2014: 203 f.). The metaphysical power of the technological artefact, on Shiva's account, lies in its ability to make the metaphysics of science actual. Through the intervention of technology in nature the metaphysical system proposed by science is imposed on nature (and thereby on society) and ceases to be a theoretical construct. Nature becomes as science describes it, and to 'use' nature 'productively', societies must adapt appropriate patterns of social and economic behavior.

A further element of Shiva's technological determinism is the extent to which the values of the capitalist-patriarchal system inhere in the technological artefact. If the artefact is designed to reorder the world in a way amenable to capitalist-patriarchal exploitation, then the proper use of that artefact entails such material reordering. This deterministic element of contemporary technology is brought out most clearly in her analysis of the high yield variety seeds (HYVs) in the Green Revolution. The seed has now become a technological artefact, "*engineered* [my emphasis] and introduced on the basis of 'preferred' traits" (Shiva 1993a: 27). It is in itself a reordering of nature, that has been deliberately engineered to operate in a specific manner. And, if employed, it will continue to operate in that manner (in accordance of the values of those who produced it) regardless of the values or intentions of those who ultimately employ it. And thus, the question of values pertains not just to the epistemological and ethical dimensions of technological use as with Warren but, for Shiva, to the ontological level too.

Turning to Shiva's point about the role of the technological artefact in reconfiguring the social order at point of use, Shiva argues that the use of a technological device necessitates a wider sociotechnical framework as an enabling condition for the operation of that device. For Shiva the new, scientifically 'improved' seeds of reductionist agriculture, such as the high yield varieties (HYVs) introduced into India during the Green Revolution, differ significantly from the 'unimproved' seeds previously used in traditional agriculture. An intrinsic feature of the new seeds, on Shiva's account, is the imposition of control on a regenerative resource. Whereas traditional crops generated their own seeds, and thereby future crops, the hybrid crops do not produce efficacious ('true to type') seeds. The ability of the seed to renew itself as resource is thus constrained, and the farmer is now obliged to purchase new seeds rather than harvest their own.

And this increased reliance upon the market to supply the necessities of agricultural practice, as opposed to the self-reliance that preceded the technologization of agriculture, is reinforced by a second feature that Shiva argues is peculiar to the new seeds. Namely, that the seeds themselves are inert. "The commoditized seed… cannot *produce* by itself, to do so it needs the help of artificial, manufactured inputs" (Shiva 1993d: 30). For the new seed technology to function it requires a continuous supply of chemical inputs, in the form of fertilizer and pesticides, which must be purchased. The seeds also require increased water inputs. Many of the HYV crops were engineered to facilitate mechanical harvesting, and hinder traditional methods of harvesting by hand. Ease of harvesting then favours the acquisition of agricultural machinery which in turn require petrochemical inputs in order to function. Collectively the introduction of the new seeds created a demand for fertilisers, pesticides, water, seeds and energy that had not been present before, or at least not in such quantity. There external inputs had to purchased by the farmers from third parties, thereby altering the agricultural model from one of self-sufficiency to one dependent on the consumption of additional agricultural commodities. In addition to this market dependency, the supply of these inputs necessitates the development of suitable infrastructure; large-scale irrigation projects, transport networks, credit provision, etc. To make the technological seed function, its environment must be transformed in order to replicate the social conditions of the sociotechnical structure from which it originated.

Shiva's view of the social and material reordering necessitated by the operational requirements of new technology resembles Bruno Latour's analysis of the 'transferal' of Pasteur's laboratory (Latour 1983). Here we find the relocation of a natural entity, the seed on Shiva's account, into a scientific space. Under conditions utterly unlike those found in its typical environment it is coaxed into manifesting certain properties. The effort is then made to transfer the now scientifically understood entity from laboratory conditions into the external world and to compel it to reproduce the same properties that were produced in the laboratory. Shiva's point, like Latour's, is there is no real movement of the entity from *inside* the laboratory to *outside* the laboratory. Rather the successful functioning of the entity is contingent upon the extension of the laboratory conditions into the outside world. To paraphrase Latour, seed technology is like a train, it doesn't work off its rails. The laboratory must be expanded to encompass society and nature.

Shiva's claim about the restructuring powers of the technological artefact goes beyond the reordering of social relations and agricultural practice. For Shiva in the laboratory reality is altered in that elements of it are removed from their relational context and placed in isolation. Then these properties are observed through the lens of a patriarchal-capitalist value-system such that only properties of utility to commercial exploitation manifest themselves. So, firstly reality is misrepresented in practice through the focus on objects in isolation. Then, by viewing the object through a certain metaphysical representation of nature, only properties that accommodate and reinforce that representation are perceived. The significance of the technological artefact on Shiva's account is that it reorders the natural world so that it corresponds to the metaphysical picture of western science/technology. Technology as metaphysics serves an ideological function by representing the world as an aggregate of resources. Technology as artefact makes the representation actual by restructuring nature so that it accords with the reductionist scientific worldview. In the case of the technological seed, technology was inserted into the structure and operations of nature. Certain relations within nature were blocked through the use of technology, and technological substitutes were put in place of many of the components usually found in traditional agriculture. In this way, certain natural processes were isolated from their relational web, and through technological intervention compelled to manifest certain properties. Thus, rather than take nature into the laboratory, one blends the laboratory with nature, producing a restructured form of reality that conforms to the exploitative metaphysical model of patriarchal-capitalist science.

8 Technology and/as Violence

For Shiva, the consequences of the application of technology in the contexts that she analyses are always disruptive. Technology serves an ideological function in facilitating the extension of power by western capitalist-patriarchy and for Shiva the effects of the exercise of this power are always violent.

At the metaphysical level technology represents the imposition of a mechanical worldview over a relational web of life. Those aspects that have utility potential are isolated from their relations to other parts of the web, and those that do not are devalued. At the epistemological level technology negates pre-existing bodies of knowledge and technological accomplishments, and dichotomises society into the categories of expert and non-expert. Knowledge becomes the preserve of the technologists, to whose judgment all non-knowers must defer, even in relation to matters outside science's realm of 'fact'. The social effect is to rob those outside the charmed epistemological circle of their cognitive authority and render their traditional knowledge worthless.

And at the artefactual level, the conceptual reordering of reality by technological metaphysics is mirrored in the social and material reordering brought about through technological use. The development of the necessary infrastructure and supply chains for technology to function involves significant technological

transformation of the environment. It also reorients the practice of agriculture away from a focus on self-reliance and social maintenance to one focused on profit and the needs of the market. For Shiva this technological remodeling of social relations disrupts social existence. Access to technological inputs becomes an imperative, and this in turn brings about new relations of power within the agricultural communities, and between them and those who control access to those inputs. And the outcome of this alteration in political power has been conflict and violence between communities and the state over access to these inputs. It has, according to Shiva, "increased the commercialization of social relations" and increased ethnic, cultural and religious conflict (Shiva 1993a: 173).

And at the material level, technology as artefact violently intervenes in the natural processes upon which life is dependent. "The *object* of knowledge is violated when modern science, in a mindless effort to transform nature without a thought for the consequences, destroys the innate integrity of nature and thereby robs it of its regenerative capacity" (Shiva 1988: 233). The consequences of technological intervention in the agricultural process are to be found in increased desertification, loss of genetic diversity, increased pest-resistance, etc. And these ecological crises greatly exacerbate the social conflicts already resulting from the switch to a capital-intensive, high input mode of agriculture.

The effect of this violence is cumulative and falls most heavily on those who, for contingent cultural and historical reasons, find themselves excluded from access to the putative benefits of agricultural development and who are dependent on sustenance-focused modes of production: women, tribals, peasants. And for Shiva, given patriarchal attitudes towards the value of women's 'unproductive', i.e. non-profit oriented, labour, it is women who bear the brunt of this violence. Development, for them, has the effect of eroding their already unequal social standing. It has, according to Shiva, "destroyed women's productivity both by removing land, water and forests from their management and control, as well as through the ecological destruction of soil, water and vegetation systems so that nature's productivity and renewability were impaired" (Shiva 1988: 3). The technological development of agriculture has had the effect of increasing their labour, damaging their health and rendering their existence, and through them that of society, increasingly precarious. Shiva states that, "This poverty crisis touches women most severely, first because they are the poorest among the poor, and then because, with nature, they are the primary sustainers of society" (Shiva 1988: 5). Technology, at every level of analysis, is therefore a gender issue.

9 Conclusion

It is my argument that eco-feminism, or at least the variety of transformative eco-feminism espoused by Warren and Shiva, contains significant components of technological analysis that can be fruitfully understood as constituting a philosophy of technology. Ecofeminists argue that the capitalist-patriarchal elite in Western society impose a conceptual schema on nature and society that sanctions and furthers

their control. This schema tends to dichotomise the world and its contents into two opposing halves with one part always perceived as superior to its pair. By placing those values that advance the capitalist patriarchal world system higher in the hierarchy of dualisms, it is argued that those values are established as superior values. Conversely, those values that are placed in the lower half of the hierarchy are denigrated and devalued. And thus devalued, are open to exploitation in ways that serve the capitalist patriarchy. In this way values and structures associated with women or nature and which do not facilitate capitalist values of 'progress' and 'development' are judged to be either of less value or without value which in turn sanctions the consequent exploitation of women and nature.

Warren's ecofeminism takes an instrumentalist position on technology. Technology is perceived as a natural object, and thereby value-neutral. Ethical issues thus arise with regards to access to technology and decision-making regarding the application of technology. Shiva's philosophy of technology, I suggest, draws on the above features of ecofeminist philosophy in order to fashion a critique of the value-laden character of technology. Shiva takes a more determinist position and argues that modern technology is inherently political, from the level of scientific theory to level of the individual technological artefact. Through her analysis of the development and application of agricultural technology in the Third World, Shiva explores technology at several different levels; epistemological, metaphysical, systemic and artefactual. Each level, she argues, serves an ideological function in facilitating or enacting a project of technological colonisation and exploitation. Consequently, for Shiva, the issue of values must be explored at both the point of technological application and, contra Warren, the point of conception too.

Shiva argues that the technological imposition of reductionist metaphysics on nature inevitably results in the destruction of the natural processes that support life. Secondly, Shiva argues, women are usually those in closest contact to nature and its processes in that they are the ones who depend most upon the products of the natural environment for their livelihoods and sustenance (Shiva 2009). Thus, any impacts of the environmental degradation caused by technological intervention will be felt by women first. And given the inferior status of women within society, they will be the ones least able to bear the ramifications of the loss of their livelihoods. In this way the destruction of nature and the destruction of women is linked.

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