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Peck, Julia ORCID: 0000-0001-5134-2471 (2015) Photography's Time Lag: Challenging the Pastness and Passivity in the Representation of Climate Change and Other Environmental Disasters. In: Bridging Divides: Spaces of Scholarship and Practice in Environmental Communication The Conference on Communication and Environment, 11-14 June 2015, Boulder, Colorado, USA.

Official URL: <https://theieca.org/conference/2015-conference-communication-and-environment-boulder>

EPrint URI: <http://eprints.glos.ac.uk/id/eprint/3280>

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Published in *Bridging Divides: Spaces of Scholarship and Practice in Environmental Communication*. The Conference on Communication and Environment, and available online at:

<https://theieca.org/conference/2015-conference-com...>

We recommend you cite the published (post-print) version.

The URL for the published version is <https://theieca.org/conference/coce-2015-boulder/presentations/photography-s-time-lag-challenging-pastness-and-passivity>

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Photography's Time Lag: Challenging the Pastness and Passivity in the Representation of Climate Change and Other Environmental Disasters

Julia Peck

University of Roehampton, London ~ j.peck@roehampton.ac.uk

Abstract

This paper argues for a sustained ecological approach to be developed in relation to the photographic representation of climate change and other environmental disasters. Following Jane Bennett's thesis in *Vibrant Matter* (2010) that we need to find ways to acknowledge the agency of all factors that are relevant to understanding ecology, I wish to propose that photography can foster an understanding of the agency of the environment in which we live and produce thoughtful, reflective practice that challenges pristine notions of wilderness. As has already been extensively commented upon in relation to the photographic depiction of climate change and ecological disaster, photography is limited in its ability to help viewers to imagine future environmental impact because it represents the past and struggles to represent largely invisible phenomena, such as climate change, in a timely manner.

This paper argues that Richard Misrach and Kate Orff's project *Petrochemical America* (2012) signals some important strategies that other climate and environmental photographers could utilise. Their book systematically uses photography, and in the scenes of environmental degradation, human and social links are made to foster the understanding that we are looking at an image of ecology rather than nature ravaged. In addition to the titles of images, captions and overall contextualisation of the project, Kate Orff's team Scape produce a series of diagrams called Throughlines that situate the subject of petrochemical impact in the Mississippi River corridor. The cumulative impact of Misrach's photographic approach, combined with the effective and systematic linking of his images to other forms of relevant information, produces an understanding of environment as not only inextricably linked to human activity and habitation, but as an environment which also has agency in its influence on human living patterns.

Introduction

The past few years have seen an unprecedented increase in photography exhibitions engaging with the environment and environmental disasters. In London alone this has included Edward Burtynsky's exhibition *Oil* at the Photographers' Gallery (2012), the Prix Pictet exhibition *Consumption* at the V&A Museum (2013), William Ewing's exhibition *Landmark: The Fields of Photography* at Somerset House (2013), Sabastião Salgado's exhibition *Genesis* at the Natural History Museum (2013), and the Syngenta Photography Award exhibition *Scarcity Waste* at Somerset House (2015), amongst others. This has been matched by an explosion of publishing on art and ecology that features photography and the environment, notably *Art and Ecology Now* by Andrew Brown (2014) together with numerous artists' monographs. The role that the photographs are expected to perform, however, remains ambiguous, and there is frequently little direction to the viewer on how to practically respond to such material. The expectation that art and photography will contribute to positive change in society is frequently articulated (Miles, 2014, p. 2), especially when the practice of photography and other lens-based media is acknowledged to be carbon intensive and contributing to climate change (Hughes, 2014, loc. 228-252).

The photograph is a notoriously ambiguous object to pin an exact meaning to, although many theorists emphasize the importance of context for the generation of meaning (Walker, 1997: pp. 54-56; Wells, 2015, pp. 70-71). Accompanying information in the form of an introduction, artist's statement or individual captions for images are usually instructive for ascribing meaning, although the role in regard to future action or anticipated effect on the audience can still be undefined. Artworks in galleries or artist's monographs, of course, do acquire aesthetic meanings and situate the resulting images as 'art' or as products from the artist's vision and imagination. More specifically, writers such as Andrew Brown have assigned a lot of photography in his book *Art and Ecology Now* (2014) to the category of 'Re/View,' which is defined by the photographers' motive to:

... represent the world as they see it, in all its splendour and horror. They consciously adopt the role of witness, observing the processes of nature and the activities of humankind from a position of relative detachment in order to provide testimony or evidence of their effects. ... Like investigative reporters, they document, reflect and comment on the myriad changes, both global and local, that are affecting the environment in which we live and on which we depend. (Brown, 2014, p. 18)

Although Brown notes that many of the artists that he includes in his volume could have been inserted into a number of different categories (p. 15), the photograph for Brown has specific values: "... it is no coincidence that many of the artists ... [in 'Re/View'] use photography, considered by some to be the most objective of all the art forms and thus the most appropriate with which to document the external world truthfully and honestly" (p. 18). Whilst Brown acknowledges that the artworks included in this section include highly subjective responses to their subjects and situations, the role of 'documenting', 'witnessing' and 'testimony' stand in contrast to other sections of the book, notably, 'Re/Form,' 'Re/Act' and 'Re/Create,' where artists experiment with alternative models of living, imagining or engaging with the environment. The photograph in the context of art and ecology, then, is seen as a tool for witnessing the changes to our planet, environment and weather systems, but is less dynamic in proposing a vision for the future.

Julie Doyle has explored this issue in relation to photography and climate change from a more theoretical perspective (2009). Doyle notes that "photographs of melting glaciers function as powerful

and persuasive signs of the visible impacts of climate change upon the landscape” (p. 279) that have “persuasive force” (p. 280). Using Roland Barthes’ famous claim from *Camera Lucida* that what is seen in the photograph means “the thing has been there” (p. 80), Doyle demonstrates how the photographs of glacier retreat are essential to climate change campaigning because they prove that this phenomena, known to be hard to represent visually, is actually happening because it is demonstrated by the referential force of the photograph. This also explains the important documentary function of such imagery. In addition to that, however, Doyle, again using Barthes, notes the *pastness* of the photograph as the temporality of the image represents “what has been” (p. 280). Doyle claims that such realizations are “catastrophic in the context of climate change campaigning, which necessitated action to prevent climate change *before its effects could be seen*” (p. 280; emphasis in the original). Comparing before and after photographs of collapsing and retreating glaciers Doyle concludes that photographs

... say what is, but in doing so they render climate change as a past event, captured and contained by the photographic medium. They call upon the viewer to acknowledge the negative impact of climate change through visual evidence of a changed landscape, yet they do little to enable the viewer to do anything about this, given the apparent magnitude of glacial loss documented by the images. ... [The photographs] remain bound by their own temporal limitations.” (p. 293)

Doyle further claims that future scenarios need credible realities and “photography cannot visualize the future as a present threat” (p. 294). Doyle notes that these future impacts/realities and visions can be represented through other means; in the case of Greenpeace’s campaigning this tends to be through the presentation of visual data (p. 294).

The limitation of the photograph to represent only the past has been challenged by Eugenie Shinkle (2014). In the analysis of Pieter Hugo’s *Permanent Error* (2009-10) and Ian Teh’s projects *Tainted Landscapes* (2007-8) and *Traces* (2011), Shinkle proposes that photographs are able to “increasingly participate in generating, transforming and disseminating perceptions of technologically-produced environmental risk, posing environmental catastrophe as a globally shared social and political reality. Such work shapes the perception of global risk in the present by giving visible and palpable form to an unknowable future” (Shinkle, 2014: 29). Building her argument upon notions of risk society, as developed by Ulrich Beck (1992) and Anthony Giddens (1999), together with an understanding of how human perception can tell whether a landscape offers the potential for shelter and sustenance, Shinkle notes that photographs have affective abilities that extend beyond purely rational engagements with images. Potential future environments, as prompted or suggested by viewing these photographs, “are rendered both visible and palpable” (p. 36). The photographs, then, act

... not simply as documents of the present, but as apprehensions of the future. ... [T]he work of Teh and Hugo inscribes the possible consequences of our collective activity into the here and now of human living. Its intent is not to control or predict the future, but simply to confront us with the fact of its latency in the present – and thus, perhaps to equip us with the kind of emotional and political commitment that will allow us to meet its challenges with equanimity. (p. 37)

Significantly, the photographic bodies of work that Shinkle examines are visually compelling, documentary style photographs that utilise little by way of contextualising information. They are therefore less effective at demonstrating the connections to the social material relations that lead to the creation of such environments and are typical of much contemporary photography in that the

meanings of the images are left deliberately ambiguous. The ability to achieve Shinkle's interpretations ultimately rest upon viewers having both advanced knowledge of the production and dissemination of commodities and of a skilled ability at reading photography in an art context although, of course, there are many viewers who can undertake both of these activities. Shinkle's argument is compelling but her proposition ultimately rests upon the reading of the image in formally innovative ways. This is probably appropriate given that neither Teh nor Hugo are exclusively concerned with education but with creating images appropriate for the contemporary art context.

This paper, then, wishes to challenge both Brown's and Doyle's assessment of photography as being mainly or exclusively a vehicle for reflection and for witnessing the past. Whilst their observations and theoretical thrust have both weight and credibility, their statements and arguments overlook the photograph's continuing ability to speak to the present and the future. Shinkle's proposition then, of photographs giving "palpable form to an unknowable future" (2014: 29) is useful, but it can also be supported by observations from the realm of anthropology and memory studies. These kinds of studies of photographs, which emphasize the abiding role of photographs to speak to new viewers as new uses of photographs emerge, have in mind the undecidability of the meaning of the image, or the "clearing house" of the archive, where "meanings are up for grabs" (Sekula, 2003: 445 & 444). Moreover, as Elizabeth Edwards has so compellingly argued, photographs are able to undertake performative acts, some of which are not prescribed by the historical, social and material aspects of the image's production (2001: pp. 3-22). In contrast to Brown and Doyle, I would like to propose that photographs are intrinsically able to perform "vibrant" acts in both the present and the future. In contrast to Shinkle, my argument engages more considerably with the social and material aspects of industrialization and how this is represented through the realization of particular types of artwork. In this instance, by borrowing Jane Bennett's theoretical propositions from *Vibrant Matter* (2010), the photograph and its other accompanying materials can be said to become "vibrant" objects that have the potential to engage us, and other vibrant objects, in complex relationships. Moreover, in the project under scrutiny here, the artists seem to have begun to acknowledge not just the important social, historical and economic relationships that are contributing to pollution and environmental, social and ecological decline, they also seem to be tacitly noting that the various elements of the petrochemical industry are actants in themselves.

Jane Bennett's *Vibrant Matter*

Jane Bennett carefully argues, via philosophy and political theory, that objects are not inert but are vibrant, that is, that they can form "lively powers of material formations" (2010, p. vii). In many cultural practices we see matter as inert, so we see the world as open to exploitation, as something that we can act upon. Indeed, she claims "[t]he figure of an intrinsically inanimate matter may be one of the impediments to the emergence of more ecological and more materially sustainable modes of production and consumption" (p. ix). Her point, then, is to "encourage more intelligent, and sustainable engagements with lively matter and lively things" (p. viii). Bennett draws upon Spinoza who proposed that all substances are made of the same matter (p. xi) and that each thing strives to persist in its being, including objects (this is called *conatus*). This is in contrast to some notions of deep ecology as Bennett acknowledges that there is no "smooth harmony of parts nor a diversity unified by a common spirit"; instead there are a series of relationships that are "turbulent" (p. xi). Bennett is not attempting to deny materialism, but to complicate the existing picture surrounding materialism, arguing that "... American materialism, which requires buying ever-increasing numbers of products purchased in ever-shorter cycles, is *antimateriality*. The sheer volume of commodities, and the hyperconsumptive necessity of junking them to make room for new ones, conceals the vitality of matter" (p. 5). Further, Bennett sees structural ways of understanding humans in context, or

understanding agency against a socio-political backdrop, limits our understanding of assemblages because the “structures, surroundings and context make a difference to outcomes, but they are not quite vibrant matter” (p. 29) that is, they do not have agentic impact within materialist analyses. Humans, for Bennett, work in a heterogeneous assemblage where agency becomes “distributed across an ontologically heterogeneous field” (p. 23). Moreover, “such a vital materialism would run parallel to a historical materialism focussed more exclusively on economic and social structures of human power” (p. 62). Thinking about how such ideas have the potential to influence politics, or even a polity, Bennett argues, “all material bodies are potential members of the public” which potentially enables human actants to “discern more fully the extent of their power over me... [and] how ... these nonhumans [might] contribute to its solution” (p. 103).

Using Bruno Latour’s examination of science studies and John Dewey’s theories of democracy, Bennett develops a theory of action that therefore includes actants (including humans and material objects) and contexts. Bruno Latour, particularly his work *Pandora’s Hope* (1999) becomes important to Bennett’s thesis here. Bennett notes that Latour distributes “agentic capacity ... to the ‘event’” (p. 103) because there is surprise in action. “There are events. I never *act*; I am always slightly surprised by what I do. That which acts through me is also surprised by what I do, by the chance to mutate, to change, and to bifurcate” (Latour as cited in Bennett, 2010, p. 103). Dewey, on the other hand, enables Bennett to note how a “political system ... has much in common with a dynamic natural ecosystem” (p. 103). Such a theory “paves the way for a theory of action that more explicitly attends to how ... [material bodies] participate in conjoint action, and more clearly discerns instances of harm to the (affective) bodies of animals, vegetables, minerals, and their ecocultures” (p. 103). However, “[t]he political goal of a vital materialism is not the perfect equality of actants, but a polity with more channels of communication between members” (p. 104).

If human culture is inextricably enmeshed with vibrant, nonhuman agencies, and if human intentionality can be agentic only if accompanied by a vast entourage of nonhumans, then it seems that the appropriate unit of analysis for democratic theory is neither the individual human nor an exclusively human collective but the (ontologically heterogeneous) “public” coalescing around a problem. We need not only to invent or reinvoke concepts like conatus, actant, assemblage, small agency, operator, disruption, and the like but also to devise new procedures, technologies, and regimes of perception that enable us to consult nonhumans more closely, or to listen and respond more carefully to their outbreaks, objections, testimonies, and propositions. For these offerings are profoundly important to the health of the political ecologies to which we belong. (p. 108)

Bennett’s argument is, on one level, attempting to alter debates surrounding notions of ‘deep ecology’. Environmentalism, for Bennett, still positions the human as the apex of a hierarchical relationship between human, animal and environment. Although Bennett draws upon other existing ‘deep ecology’ theories, notably Felix Guattari’s *The Three Ecologies* (2000), Bennett notes that environmentalism as it stands will find it difficult to comprehend elements of the ecosystem as members. Bennett certainly believes that environmentalism needs to “engage more strategically with a trenchant materiality that is us as it vies with us in agentic assemblages” (p. 111). Indeed, vital materiality “has the potential to draw attention to the “complex entanglements of humans and nonhumans” (p. 112).

For the purposes of this paper I am selecting a specific body of work to discuss, one that not only relates to notions of documentary, art and campaigning but is also formally and conceptually innovative, exploring new ways of developing the presentation of information about the environment in relation to photographs. I will develop an analysis of the artwork that proposes that the photographs

and their accompanying materials are not necessarily forever linked to, and of, the past, but have material effects in the present and are likely to have material effects into the future. The artwork in question is Richard Misrach and Kate Orff's book and exhibition *Petrochemical America* (2012). Implicit in the project is an understanding of the material agents deriving from the petrochemical industry, material agents from ecosystems in the region known as the River Road Corridor and how humans engage with these complex networks of relationships. I am not arguing that Misrach and Orff work knowingly with a "vibrant matter" framework, but that their work can be read as producing vibrant materialities that produces an understanding as ecology as agentic assemblages that include human and other actants.

Petrochemical America

Petrochemical America, published in 2012, is a book of photographs and 'Throughlines' by Richard Misrach and Kate Orff. The project has also been exhibited at the Aperture Foundation, New York, the David Brower Center, Berkeley, California and Pomona College Museum of Art between 2012 and 2014. The focus of this paper, however, will be the book version of the work.

The project focuses on a geographic area that stretches one hundred and fifty miles along the Mississippi River corridor from Baton Rouge to New Orleans, an area know colloquially as the 'River Road' or 'Cancer Alley'. The book is split into two sections. The first section, 'Cancer Alley', contains landscape photographs produced by Misrach in 1998 and 2010. In 1998 Misrach was commissioned by the High Museum in Atlanta for their *Picturing the South Series*, which resulted in a series of photographs depicting the Mississippi and its surrounds. The series includes photos of the plantations, other indicators of the history of slavery, as well as images of agriculture, urban and suburban living and images depicting petrochemical processing and distribution. In 2010, the High Museum invited Misrach to revisit the series, prompting further research and photography. The 2010 opportunity also prompted Misrach to explore environmental solutions, which resulted in a collaborative encounter with Kate Orff, landscape architect and associate professor at Columbia University.

Orff's contribution, the 'Ecological Atlas' occupies the second section of the book and comprises a series of texts, diagrams and designs, called Throughlines. These graphics and texts incorporate Misrach's photographs, together with drawings and statistical data providing information about the consumption of oil in the States, together with oil's related products and the relationship of the consumption of oil to a wider global and environmental context. This far-reaching section outlines the impact of oil on the environment from its extraction, processing and distribution, to the uses and effects of oil-related products and the influences these activities have on the complex yet fragile communities and ecologies in the Mississippi Delta. Texts that acknowledge the global impact of oil inform the reader about outsourced labour in the developing world and other areas of devastating pollution (pp. 166-7). Brief mention is made of climate change on some of these pages, although the focus of the book is more on erosion and toxic pollutants. This part of the book is both visually and informationally rich, demonstrating the interconnecting influences of the petrochemical industry on many aspects of American life and beyond. Finally, in a separate supplement to the book, a 'Glossary of Terms and Solutions for a Post-Petrochemical Culture', Orff addresses what communities and individuals can do to bring about a post-petrochemical environment.

In contrast to many monographs depicting climate change or environmental disasters, the book contains quite a lot of written material, although the book is still clearly visual in its emphasis. Many of Misrach's photographs in the first section of the book are accompanied with extended captions that inform the reader of the history of the site depicted or the cause of environmental damage. Attention is

also paid to the social aspects of history and the people whose lives have been materially important to the region at all levels of society. The different companies and activities that have wrought damage on environmental locations and human lives, often in the form of pollution or physical displacement, are accounted for. The Mississippi, which periodically floods, pervades the book providing a focal point and a narrative device for the organization of the complex material. Whilst the captions focus on human, social and environmental information, the images are mainly free of people, although their presence in the form of housing, industry, heritage sites and human impact are evident throughout. The photographs are melancholic in tone, partly because of the human absence, partly because the material they depict is morally troubling and indicative of humanity's lack of care for different types of ecologies.

Looking more closely at specific examples it is clear that Misrach visualises devastated or declining landscapes, as is typical for much landscape photography that is concerned with environmental issues. For example, *Cypress Swamp, Alligator Bayou, Prairieville, Louisiana, 1998* (p. 45) depicts a group of trees decaying in a luxuriously soft light (possibly taken at dawn). The trees are reflected in the water and two birds are perched atop the tree in the foreground, providing a sense of scale for the viewer. Even for those with little knowledge of cypress swamps there is a pervading sense of a loss of grandeur, whilst there is also an obvious visual aesthetic at work; indeed, one can even enjoy such an image for its aesthetic accomplishment. The extended caption informs the reader about the location of the swamp and its importance to Native American sustenance, the history of the decline of the site including clear cutting timber and pollution. Finally the caption notes the failed attempts to revive the Bayou as a site for conservation and ecotourism (p. 44).

The petrochemical industry processes, manufactures and distributes fertilizers to the agriculture sector and connections between the different types of production and consumption are both suggested and explicitly made throughout the book. *Sugar Cane and Refinery, Mississippi River Corridor, Louisiana, 1998* (p. 51) depicts an access pathway through a sugar cane field, with a refinery in the background. Smoke trails from some of the stacks are visible through a mist that is both suggestive of morning haze and significant pollution. There is no caption for this image, but the information provided elsewhere in the book connects different kinds of refinement (whether oil or sugar refinery) to notions of lifestyle, consumption, soil erosion, pollution, obesity etc. The close physical cohabitation of space in relation to crops and petrol is explicitly explored later in the book, drawing attention to the importance of the maintenance and health of the landscape as a means of supporting life (pp. 150-5).

The difficulty of keeping water supplies safe in an environment that is so prominently associated with industrial pollution is addressed in an image depicting the flooding of a waste chemical site. The caption for *Hazardous Waste Containment Site, Dow Chemical Corporation, Mississippi River, Plaquemine, Louisiana 1998* (p. 81), informs us that:

Dow Corporation is the largest petrochemical company in Louisiana: it began its operations in the state in 1956. It has eighteen separate production sites on 1,400 acres of former sugarcane fields. Dow produces "feeders," products that are sent elsewhere for conversion to retail products that include chloride, vinyl chloride, chlorinated polyethylene, and methocel, which is used to thicken and give a predictable texture to many fast food milkshakes. Between 1958 and 1973 Dow buried forty-six thousand tons of toxic waste in unlined pits that now cover more than thirty underground acres. The company attempts to pump the waste back to the surface before it reaches the drinking water aquifer for the city of Plaquemine. These efforts notwithstanding, every time the Mississippi River rises it floods the waste site, potentially

carrying toxins into the river and polluting the water supply as it makes its way down to New Orleans. (p. 80)

Building links between modern food consumption, toxic waste and long-term water pollution is clearly the aim here. The accompanying image, which includes some ominous floating debris in the foreground, depicts a landscape in full flood complete with atmospheric mist. The danger of the site is also visually indicated with warning signs on the chain link fence, prompting reflection about the inability of petrochemical companies to take their responsibilities to the environment and to people, both local and further afield, with any due seriousness.

Although Misrach eschews the regular inclusion of people in his images (he is, mainly, a landscape photographer), the proximity of human dwellings is frequently visually evident in the book. *Trailer Home and Natural Gas Tanks, Good Hope Street, Norco, Louisiana* (p. 71) alludes to the economic position of many of those living in close proximity to these industrial sites, and peering through the fence and fringe of trees, clues are provided about the scale of the industrial complex lurking in the background. Captions earlier in the book have dwelt upon the substandard state of roads and local amenities, the intensity of local noise pollution, and the lack of quality of life for those living in Louisiana (p. 2), and as a reader I imagine that the same applies to this image, but here the question of material comfort is in much greater question. The dog sitting quietly on the porch leaves little doubt that this dwelling is still occupied.

These themes of pollution, social decay and wider social responsibility are substantially developed in Kate Orff's section, the *Ecological Atlas*. A thorough ecological grounding is provided by way of a discussion of the importance of oil to the modernization of America (p. 119) before looking at why oil formed in the region (pp. 120-1). The Throughline looks backwards at the deep time of the geological eras of the Mississippi River and its surrounds and the text accompanying the Throughline outlines the reason for oil's existence in the area, together with the release of carbon and its connection to rising earth temperatures. Ominously the paragraph ends with the statement that "[t]his unexpected transformation of the atmosphere in the past two hundred years presents altogether new societal and environmental challenges relative to the geological timescale of oil's origins" (p. 121). Although not particularly obvious in this Throughline, Misrach's image of the Mississippi coincides with 'The Age of Oil' and the development of new extraction techniques such as offshore drilling and seafloor pipelines.

Kate Orff extends the discussion around the importance of oil's products into a diagram illustrating the profusion and occurrence of oil's products along the River Road Corridor (pp. 128-129). This Petrochemical Landscape, identified by chemicals and recognizable brand logos, has penetrated thoroughly and systematically into the region. The accompanying text reflects on the use and importance of some of these products in "medical equipment, cars, computers, bombs, cosmetics, building materials, inks, and cleaning agents" (p. 129). However, Orff also acknowledges "American consumers benefit from the myriad of products made possible by petrochemistry, while pollution and waste affect only the poorest communities" (p. 129).

Misrach's *Cypress Swamp, Alligator Bayou, Prairieville, Louisiana, 1998* makes a reappearance in part of Orff's *Requiem for a Bayou* (pp. 170-1). Making explicit the Bayou's once rich array of fauna through diagrammatic graphics, the biodiversity of the region is visually represented. The human involvement, which involves both food and economic cultures, some of which, like fishing, are traditional to the area, are juxtaposed with recent interventions that are resulting in substantial pollution and alterations of the biodiversity of the region (particularly through invasive species). The

erosion of the bayou is also dwelt upon. Orff finishes this section with a reminder to readers that “Regional aquatic systems and human livelihoods are under threat” (p. 171).

One of the most significant Throughlines uses a Misrach photograph from 2010: *New Housing Construction, Paulina, Louisiana*. In Orff’s Throughline the image becomes an opportunity to make connections between oil-dependent lifestyles and the increasing consumption of petrochemical goods. *Bigger, Further, Filled with More Stuff* (pp. 194–5) becomes a symbol of suburban lifestyles, detached living, long commutes and general sense of abundance. Various petrochemical products surround the house drawing attention to its construction, and likely use. Further diagrams illustrate the increase in house sizes and the increase in motor fuel per capita between 1900 and 2010 (from 1940 the increase of 356 gallons per capita is evident). The accompanying paragraph narrates the change in housing in the States away from “row houses” to “suburban subdivisions” (p. 195). Orff notes that building materials “have the potential to produce harmful vapors” and that “[t]he environmental damage and deleterious health they induce over their product life cycles has not been factored into our choices” (p. 195). Orff completes this Throughline by stating that “[t]he dream of home ownership, the natural abundance of land and seemingly limitless natural resources, all part of American’s nation-building story, have led to an unsustainable excess of material consumption” (p. 195).

Although I have spent considerable time illustrating and describing the project, the detail of such a project does seem to be materially important, even though the aesthetics of the photographs, and of the Throughlines are also clearly significant. Firstly, many of these examples address material actions of large petrochemical corporations and their impact on local communities. Secondly, this impact is addressed in relation to the historical social formations within the region, acknowledging Native American, Afro-American and more recent economic factors, such as attractive tax policies and the widespread poverty of the region. The oil-rich nature of the landscape is also acknowledged as a factor in its development and use today. However, what is of interest, in a project that makes these explicit social, historical, economic and material links obvious, is that although these changes have been driven by human action and intention, the actants in the picture are many and varied. Looking back at *Requiem for a Bayou*, for example, it is clear that the long-standing biodiversity of the region was both instrumental to human settlement, and to the formation of oil. Indeed, making connections to the rich marine life illustrated in oil’s formation, and the resulting petrochemical waste that now pollutes the environment in *Requiem for a Bayou*, as a reader the importance of marine life in starting and then changing life as we know it, becomes clearer. Whilst there is an implied narrative here, Orff and Misrach do not propose that these changes are in any way inevitable or natural, but the actants in the assemblage are multiple – humans are part of the larger ecological picture, but so are various other actants including marine life, plastic bottles, carrier bags and housing materials.

Looking further at *New Housing Construction as Bigger, Further, Filled with More Stuff*, one can read the products in the home, whether for construction or for food consumption, as actants in a complex network of materials, even though it has a distinctly human emphasis. Orff’s text spends more time ascribing acting power to the products in the home than to human choices, partly because these consumer choices seem to be made without weighing up the environmental impact of their being. Importantly, in this social and economic environment, the landscape is neither victim nor background as the products ultimately stem from the environment itself, albeit in a highly processed form that required considerable ingenuity to bring them about. The complexity of the project also acknowledges the importance of these products to modern lifestyles and the benefit they have brought – there is no call for a return to a simpler life as these actants form part of the complex network of our lifestyles.

The strength of Misrach and Orff's project, then, lies in several different features and how this has been structurally brought together in the space of the book. The social material reality of the petrochemical industry is outlined and this includes information on economics, profit and taxation policies. The aspects of poverty, exploitation and history are acknowledged even though some of this history and contemporary existence is only alluded to visually with an emphasis placed on text. The biodiversity of the region is acknowledged; some of the visual stress here falls within traditional representations of damaged and scarred landscapes, but Orff's Throughlines look more closely at complex ecosystems. The complex and dynamic actants in these ecosystems are positioned as agents within a complex field of interactions. The agentic capacities of pollutants, plastics, lifestyles, shopping habits, houses, building materials, cars and commuting is also acknowledged. The human transformation of the environment is represented, but the action of the complex agentic materials is also pictured – illnesses, obesity and the decline of social networks are all included as part of the picture. The various ecosystems, which include humans, also include land, plants, animals and microorganisms. The long-term existence, impact and contribution to the larger ecosystem of these are noted.

The book's direct engagement with climate change is less developed, although many readers will be acutely aware of the relationship between oil and the release of carbon dioxide, and the changing weather patterns of the planet (Klein, 2014). Orff's 'Ecological Atlas' notes the unpredictable way that global weather and landscapes are likely to change (p. 119) and that the "world's poor – not American consumers – are the most vulnerable to climate change's negative consequences" (p. 157). Although the full impact of climate change is not visualized within a global picture, this does enable Orff to emphasise the purpose of future action away from the dependence on fossil fuels. The deplorable state of these landscapes, communities and ecologies, then, is not seen as a collectively irreversible problem (although it is likely that some of these landscapes are beyond repair to what they once were) but instead helplessness is replaced with a proposal for collective and individual action.

Finally, it is important to acknowledge that the photographs, the Throughlines, the book and the practices that led to the project's existence are also represented (pp. 212-3). At the end of the book, Orff's team diagrammatically image the equipment used in the making of the book, and their dependence in many different ways on petrochemical products (especially for travel and various materials). Yet this is not just an exercise in self-reflexivity, important though that is; it is also an exercise in acknowledging their own agentic capacity and the agentic capacity of their tools and resources. Such an exercise enables them to visualize their engagement with the petrochemical industry as users and consumers but also as producers of new material products that emerge from a petrochemical society. No wonder that any solution, which is proposed in the form of the 'Glossary of Terms & Solutions for a Post-Petrochemical Culture', will be complex. Whilst there is insufficient space here to fully engage with the proposals outlined in the companion booklet, it is important to acknowledge that the new society proposed by this booklet does not point toward a simpler life, but one that uses resources more wisely and emphasizes various forms of collective and individual action, some of which might happen at national and international levels. The booklet expressly rejects "the premise of a linear, mechanistic narrative of endless growth based on extracted hydrocarbons and distributed waste in favor of looped and living paradigms centred on human energy and renewable resources" (p. 24).

The success of the book, then, is to suggest that all the elements of the ecosystem are actants and that the book itself is an actant; this prompts the viewer to reflect on the role of photography as an actant in our ecosystem. Bennett's theory would suggest that all material objects take part in our ecosystems including photographs. It is clear that the production and distribution of images (whether

through books, magazines, exhibitions or the internet) have profound ecological consequences in terms of the consumption of energy and other resources. But to suggest that all photographs have only negative impact on our ecosystems is to overlook the material and affective responses that they register (Shinkle, 2041). Projects such as Misrach's and Orff's, which attempt to promote positive action on numerous levels, could surely have material effects beyond a melancholic mourning for what was in the past. Indeed, part of the book's strength is that the material effects of the project are articulated in practical ways, as well as demonstrating its interconnectedness to the very industry and broader society that it expressly critiques. This society is not just drawn in terms of pollutants and ecologies but is also drawn in social material terms, demonstrating links to the very social material structures of American society. The book's strength, in contrast to other photographic representations of ecological disaster, is to bring together social materiality with conative materialities in ways that are visually exciting and informationally rich.

Conclusion

Bennett's argument would have us see all photographic objects, regardless of their context and where and how they are distributed, as vibrant matter with unpredictable but with lively results. Where I think *Petrochemical America* is important is that the project itself demonstrates the vibrant materiality of the petrochemical industry. Some of the effects of this industry are unwanted, especially by local populations who live in a highly polluted and socially fragile environment, and by international communities who will suffer the impacts of climate change. Yet these pollutants or actants are not simply shown to be 'rubbish' or something that is undesirable, but also active and forceful in our lives creating dynamic changes. The effects of these actants are also shown to be affecting wider communities, especially when links to climate change or the long history of ecology of the River Road Corridor are made. The less desirable aspects of the petrochemical industry raises questions about the role of technology and risk in our society. But Bennett notably finishes her book with musing on how notions of frugality may be less helpful for imagining our future. The point is not to phase out or ban technologies, but to assess their impacts, to see the kinds of technological changes that we might make as having real material effects and affects. The technological objects, vibrant as they are, will have forceful and not entirely predictable effects in our lives. Assessing technology, though, in terms of its vibrant materiality remains important to Bennett:

If I live not as a human subject who confronts natural and cultural objects but as one of the many conative actants swarming and competing with each other, then frugality is too simple a maxim. Sometimes ecohealth will require individuals and collectives to back off or ramp down their activeness, and sometimes it will call for grander, more dramatic and violent expenditures of human energy. ... I believe that encounters with lively matter can chasten my fantasies of human mastery, highlight the common materiality of all that is, expose a wider distribution of agency, and reshape the self and its interests. (2010, p. 122)

Bennett also importantly addresses the question of blame and responsibility: if matter makes vibrant assemblages with unpredictable outcomes can we hold "individuals responsible for their actions or hold officials accountable to the public?" (p. 37). Bennett's answer is not entirely reassuring:

The notion of a confederacy of agency does attenuate the blame game, but it does not thereby abandon the project of identifying (what Arendt called) the sources of harmful effects. To the contrary, such a notion broadens the range of places to look for sources. Look to long-term strings of events: to selfish intentions, to energy policy offering lucrative opportunities for

energy trading while generating a tragedy of the commons, and to a psychic resistance to acknowledging a link between American energy use. ... In each item on the list, humans and their intentions participate, but they are not the sole or always the most profound actant in the assemblage. (p. 37)

Ultimately, as Bennett notes, we need to ask about our ethical responsibilities within an assemblage. More worrying, however, is the question of how humans, all too often unaware of the complexity of the assemblage in which they live and take part, with its many invisible powers and matter impinging upon them, can become aware of the full range of acting materials around them. This is where *Petrochemical America* seems so important; the full import of human, social, economic, material and pollutant actants are being visualised within their complex ecologies and assemblages. Becoming aware of how material and technological environments impact upon human notions of lifestyle and wellbeing seem to be a step in the direction of being able to better measure the consequences, and perhaps even predict in the future, the outcome of complex assemblages that include a full range of actants.

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