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Edited by Frank Uekötter

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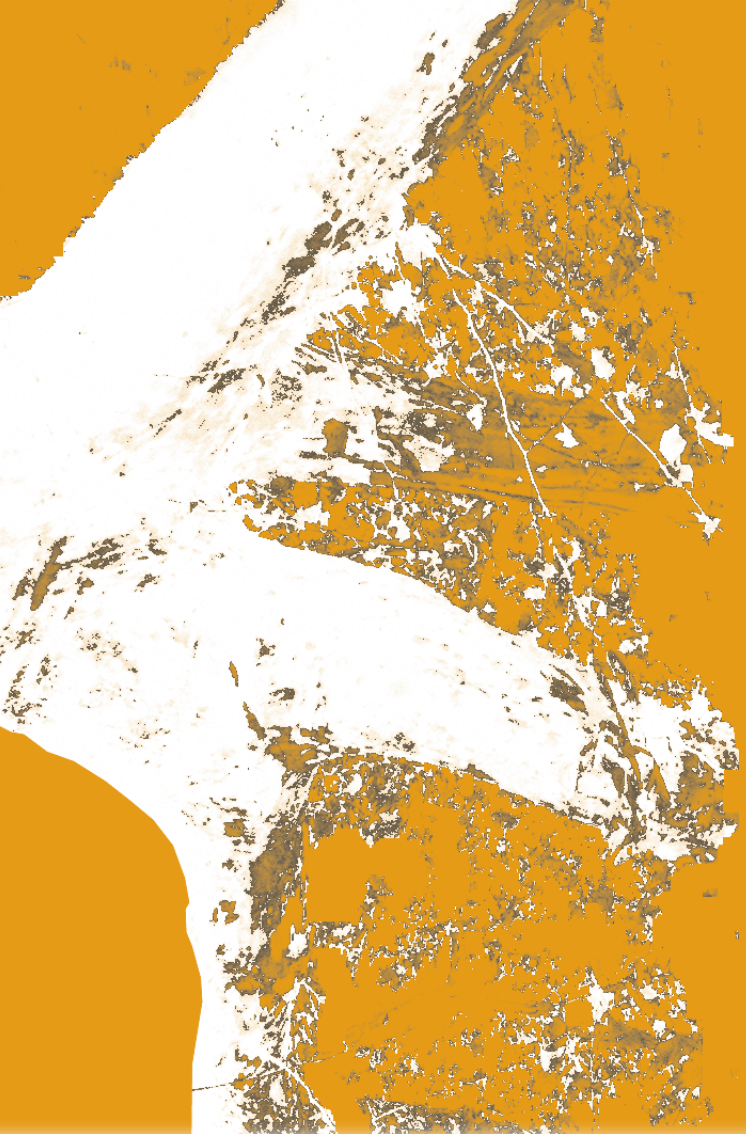


introduction

Environment and Memory: Some Introductory Remarks

Frank Uekötter

> We no longer know where we are going or where we came from. We once had a clear vision of the future and its purposes, whether it be a restoration, unlimited progress, or some form of revolution that told us what we had to retain from the past in order to prepare for the future. This spontaneous anticipation of the future disappeared along with the natural perception of the past.[1]
> – Pierre Nora

In the 1970s, the identity of France was in serious doubt. The country no longer had a colonial empire. The independence of Algeria in particular was a serious blow, all the more so since it was preceded by an ugly decolonization war that raged for eight years. Charles de Gaulle, the towering figure of the Fifth Republic, had resigned as president in 1969 and died in 1970. European integration raised questions about national identity, the "trente glorieuses" came to an end, and the collapse of socialist utopias did not help matters; in his book

[1] P. Nora, "General Introduction", in *Rethinking France: Les Lieux de Mémoire*, Vol. 1, *The State*, P. Nora, D.P. Jordan (eds), University of Chicago Press, Chicago and London 2001, p. xviii.

Postwar, Tony Judt wrote that "the nineteen seventies were the most dispiriting decade of the twentieth century".[2] And all this came on top of the traumatic defeat of France by Nazi Germany in 1940. Against this background, a director at the École des hautes études en sciences sociales, Pierre Nora, set out to comb through the relics and search for what he called *lieux de mémoire*. In a time of doubts and uncertainties, Nora banked on enigmatic "sites of memory" that still possessed an afterglow of France's national grandeur: events, places, names, or anything else "where memory crystallizes and secretes itself".[3]

As it stands, environmentalism is facing a similar crisis in the early twenty-first century. Just like France in the 1970s, environmentalism is still around, but uncertainties abound as to what it is and where it is going. All over the West, economic and social problems have pushed environmental issues to the sidelines. The disastrous Copenhagen Summit of 2009 has shown the fragility of the global environmental consensus. Recent protest movements such as ATTAC and Occupy see environmental issues as part of a broad spectrum of grievances, if they recognize them at all. Events such as Earth Day 1970 and the Rio Earth Summit of 1992 are a fading memory, and so are the spectacular achievements of the 1970s and 1980s. Two American authors wrote about an impending "death of environmentalism", and they were not even afraid of it.[4]

Of course, it is a gamble to compare the current state of environmentalism with 1970s France. Diagnosing a crisis inevitably includes a good dose of subjective judgment, and that is all the more true for the lingering crisis of environmentalism. There is not even a consensus on whether there is really something in need of discussion: the environmental movement has survived so many obituaries over time that some activists have become disaffected with crisis

[2] T. Judt, *Postwar: A History of Europe Since 1945*, Penguin, New York 2005, p. 477.

[3] P. Nora, "Between Memory and History: *Les Lieux de Mémoire*", in *Representations*, 26, 1989, pp. 7-24; 7. See also id., "General Introduction" cit., pp. vi-xxii.

[4] T. Nordhaus, M. Shellenberger, *Break through: Why We Can't Leave Saving the Planet to Environmentalists*, Mariner Books, Boston 2009.

talk. There is surely no consensus on the underlying causes, which may hint at an even more fundamental problem: in trying to grasp the ongoing transformation of environmentalism, we are approaching the limits of our vocabulary. We are not just lacking a consensus about the crisis but also words to speak about it.

It is even more risky to evoke the context that prompted Pierra Nora to embark on his memory project. We all know what followed, after all: Nora's *lieux de mémoire* became one of the most popular endeavors of French historiography, and a society on the brink of national amnesia became a society with an overabundance of memory. In the end, Pierre Nora's collection grew to seven volumes that looked into Frenchness in all its dimensions.[5] The concept inspired projects in other countries, and we nowadays have volumes on the collective memory of Germany,[6] the Netherlands,[7] Italy,[8] Austria,[9] and Luxemburg.[10] German scholars were particularly enthusiastic, as the volume on German sites of memory inspired follow-up projects on East Germany, Roman and Greek antiquity, and Christianity. The most recent installment is looking into European sites of memory.[11]

All these volumes assembled dozens of authors in an effort to map realms of memory as comprehensively as possible. A special

[5] P. Nora, *Les lieux de mémoire*, 7 Vols., Gallimard, Paris 1984-92.

[6] E. François, H. Schulze (eds), *Deutsche Erinnerungsorte*, 3 Vols., Beck, Munich 2001.

[7] J. Bank et al. (eds), *Plaatsen van Herinnering*, 4 Vols., Bakker, Amsterdam 2005-2007.

[8] M. Isnenghi (ed.), *I Luoghi della Memoria*, 3 Vols., Laterza, Rome 1996-1997.

[9] E. Brix, E. Bruckmüller, H. Stekl (eds), *Memoria Austriae I-III*, Verlag für Geschichte und Politik, Vienna 2004-2005.

[10] S. Kmec et al. (eds), *Lieux de mémoire au Luxembourg: Usages du passé et construction nationale*, Éditions de Saint Paul, Luxembourg 2008.

[11] M. Sabrow (ed.), *Erinnerungsorte der DDR*, Beck, Munich 2009; E. Stein-Hölkeskamp, K.-J. Hölkeskamp (eds), *Erinnerungsorte der Antike: Die römische Welt*, Beck, Munich 2006 and id., *Die griechische Welt: Erinnerungsorte der Antike*, Beck, Munich 2010; C. Markschies, H. Wolf (eds), *Erinnerungsorte des Christentums*, Beck, Munich 2010; P. den Boer et al. (eds), *Europäische Erinnerungsorte*, 3 Vols., Oldenbourg, Munich 2012.

issue with seven articles and one poll among scholars might look somewhat tepid in comparison, but caution has its virtues as well. A multi-volume project inevitably imposes a canon, putting the project above challenges. Revealingly, none of the volumes has inspired a counter-project that can stand on a par. But then, a canon tends to muffle the debate that these projects should stimulate: An inquiry into collective memory is a discursive project if ever there was one. In any case, the Rachel Carson Center's "Environment and Memory" project that inspired this special issue prefers a piecemeal, open-ended approach that allows for reflection and adjustments along the way. After all, when it comes to environmentalism and collective memory, we do well to be cautious.

This volume is the result of an exceptionally bumpy production process, and the reasons deserve careful scrutiny. An obvious source of complication is the article format. Papers on sites of memory are by tradition more reminiscent of essays than of standard journal articles: they are sweeping in their chronological scope and embrace experimental styles, they juggle with different perspectives, keep an eye on groups with distinct readings and their change over time – and all that within the word limits of classic journal articles. That makes them open to charges of superficiality, and the only legitimate defense is that brevity and essayistic brilliance have merits, too.

A second complication arises from the status of outreach within academic scholarship. Publications about sites of memory usually aim for a broad audience beyond the ivory tower. In fact, it was one of the chief attractions of Pierre Nora's inaugural project that he enlisted some of the leading historians of France. However, outreach still carries the air of a second-rate activity, at a distance from the core tasks of scholarly research, and frequently delegated to underlings with special pedagogical training. The recent surge of interest in memory studies within academia has probably dispersed that suspicion to a certain extent, but has not purged the stigma entirely.

However, the biggest difficulty is the complicated relationship between environmentalism and its history. Memory studies seek to lead environmental history into an exchange with the current environmental movement, and that brings scholars into the midst of a messy relationship. Furthermore, it seems that the link between environmentalism and environmental history has grown more complicated in recent years, and as it stands, environmentalism has both too little and too much memory. Historical scholars are usually quick to point out that there is no escape from the pall of history, but that usually does not keep people from trying.

Things were still easy for the first generation of environmental historians, most of whom were self-identified environmentalists. Memory was an issue from the movement's inception: Roderick Nash's *Wilderness and the American Mind*, originally published in 1967, was nothing short of an inquiry into the collective environmental memory of a nation.[12] The endeavor obviously struck a nerve. In 1981, the *Los Angeles Times* listed Nash's voluminous treatise among the 100 most influential books published in the United States over the previous quarter century, and *Outside Magazine* included it in a survey of "books that changed our world".[13] In such a reading, environmental history was the story of (mostly) men who started a legacy that environmentalists should honor.

Hagiographic approaches have lost much of their appeal since the early days, though last year's anniversary of Rachel Carson's *Silent Spring* served as a reminder that it is still around.[14] Partisan fervor is usually not a good way to earn academic credentials, and the celebration of grandiose deeds from earlier generations faded into the background as environmental history found its place in the

[12] R. Nash, *Wilderness and the American Mind*, Yale University Press, New Haven and London 1967.

[13] http://yalepress.yale.edu/book.asp?isbn=9780300091229 (accessed 22 June 2013).

[14] C. Mauch, "Saint Rachel", in "Rachel Carson's *Silent Spring*: Encounters and Legacies", L. Culver, C. Mauch, K. Ritson (eds), *RCC Perspectives*, 2012, 7, pp. 49-52.

common history curriculum. There was remarkably little backlash: few scholars sought to debunk heroism with muckraking critiques. What took the place of environmentalist sympathies was not so much critical distance as indifference.

Neither did the environmental movement show excessive interest in hero worship. As such, the environmental movement never gained the hallmarks of a charismatic movement in the Weberian sense. We can see that in the interesting fact that a number of international icons were deeply unpopular within their home countries; Germany's Petra Kelly, France's Jacques-Yves Cousteau, and Brazil's José Lutzenberger may serve as examples.[15] Among the 22 scholars who offered suggestions for the green collective memory of the world in the poll included in this volume, only one proposed an individual.

While environmental historians have become disenchanted with environmentalism, environmentalists have been negligent about their past. Environmentalism's overwhelming concern with the present and the future has found a reflection in a vocabulary that is seemingly devoid of history: ecology, wilderness, Gaia, peace with nature, sustainability, biodiversity, climate change, no-risk. Even the Anthropocene, originally a historical argument about assigning geological epochs, is currently being hijacked to nourish a discourse about the future. For many environmentalists, history is a distraction at best and a burden at worst.

But is the environmental debate really taking place outside of history? The articles in this volume suggest, on the contrary, that the environmental discourse is full of history; it's just that we don't

[15] S. Richter, *Die Aktivistin: Das Leben der Petra Kelly*, DVA, Munich 2010; M. Bess, *The Light-Green Society: Ecology and Technological Modernity in France, 1960-2000*, University of Chicago Press, Chicago and London 2003, p. 72; K. Niebauer, *Ökologische Krise und Umweltbewegung auf der Akteursebene: Ideenwelt, Handlungsstrategie und Selbstverständnis von José A. Lutzenberger (1968 bis 1992)*, Master's thesis, Free University of Berlin, 2012.

recognize it. People enjoy their time on Germany's North Sea coast and worship the Wadden Sea National Park but they fail to note that their holiday destination is a product of human history. They invoke "the groundnut scheme" or "Chernobyl" in ongoing debates as if these words needed no further elaboration. Germans talk about a disastrous "GAU" on issues ranging from fashion to papal speeches while the origins of the concept in debates over nuclear safety are falling into oblivion.

Historical background matters. Karena Kalmbach's discussion of Chernobyl shows that what anti-nuclear activists perceive as a one-word indictment is actually more ambiguous, and not just with a view to the notorious proponents of nuclear power who perceive the memory of Chernobyl as a cause of "radiophobia". In the French context, the event is not so much about nuclear power as about professional elitism. While people have heaped scorn on the folly of the groundnut scheme, Stefan Esselborn notes that biofuel investors are currently establishing similar jatropha plantations in Tanzania without paying the least attention to lessons from history. Timothy LeCain can provide people with some ideas as they stand on the viewing stand of the Berkeley Pit and look into a gaping hole. And we think differently about the pipelines that connect Russia and Germany when we follow Jeannette Prochnow and recognize the Cold War roots of this iron entanglement. Why have we forgotten about the rationale of détente that made the construction of pipelines such an attractive idea in the seventies?

Once we recognize these historical contexts, we can learn a lot from memories of environmental conflict. Anna-Katharina Wöbse's discussion of the conflict over the Knechtsand sandbank – once a bombing practice site, now a nature reserve – looks almost like a blueprint for conservation struggles: divergent views from locals and tourists, the advantages and disadvantages of remoteness, the unifying power of a public campaign and the painful disintegration after victory, and the perennial bickering about the right nature, the right cause, and the right path towards change. Germans will be more careful when talking about a "GAU" in everyday speech after reading Joachim Radkau's essay. As he makes clear, the concept suggests

an absolute certainty about judgment, and that certainty fell apart in dramatic fashion in the nuclear debate of the sixties.

Environmental historians can gain a lot of inspiration from memory studies. And the exchange is probably not a one-way street. Going through these papers, we can recognize the significance of the material for students of environmental memories. In this special issue, matter matters, in many different forms: in the shifting sands of the Knechtsand dunes; in the landscape that the groundnut scheme left behind; in the steel grid that connects Russia and Germany; in the toxic sludge of Montana and the radioactive isotopes of the Ukraine. Memory implies a profoundly substantial dimension, and the following articles show that these material memories are neither static nor irrelevant.

In the wake of the cultural turn, memory studies are having a hard time coming to terms with the material. But environmental memories reveal that a focus on discourses would be exceedingly shallow: we would lose crucial dimensions in our inquiries if we saw the non-human world as a mere backdrop. There is substance in memory; the environment provides a commentary on human recollection in all sorts of modes: ironic, heroic, tragic. The snow geese that died in the Berkeley Pit lacked the power to speak, but they surely made a statement.

Material memories are not beyond history: They are subject to the familiar entanglements that characterize modern societies. Memory scholars have long recognized the significance of actor groups; ignoring the social context of commemoration ultimately leads to a vague, people-less narrative hovering above the terrain in a strangely disconnected and ultimately implausible way. In fact, we can take a cue from these essays to speak more about corporate interests in memory studies. It is no coincidence that this issue on environment and memory is full of industrial heavyweights: Anaconda Copper, Unilever, Gazprom, EDF, RWE. We can see them engaged in all-out efforts to define environmental memories in order to protect controversial energy deals. And we can see them fail: the concept of

a "worst-case scenario" would have been a great trump card for the nuclear complex if it had not been debunked by the complexity of a hazardous technology.

Understanding the environment as memory is a provocative approach, and we can see some of the authors wrestling with the methodological and theoretical implications. But there are also potential gains. Taking stock of material memories makes for a good response to the charges of elite bias that many projects on sites of memory have drawn. Sites of memory such as Marcel Proust's *A la recherche du temps perdu* or the epic *Nibelungenlied* obviously target an educated audience. But when it comes to the environment, people become involved irrespective of whether they have heard of madeleine cakes or Siegfried. All they need to do is to open a gas faucet or to look into an abandoned pit. Complicity in material memories is a matter of daily use as much as awareness.

Of course, matter does not make sense as such; but then, what does nowadays? According to Nora, the rise of *lieux de mémoire* correlates with the disappearance of *milieux de mémoire*, and with these milieus go the certainties about reading the world: Interpretations that were once a given became destabilized and become subject to reflection and debate, never able to settle into a new milieu. The great master narratives were gone, but fragments remained – leftovers that still possessed an afterglow of a bygone fame. The concept of sites of memory was one of the more rewarding ways to take stock of them.

It is comforting to evoke this situation, as it provides us with a quantum of solace as we reflect on the lingering crisis of environmentalism. It is not that environmentalism is alone in its sense of disorientation – the opposite is true: It is going through an experience long familiar to the other side. The struggle between opposing worldviews has given way to struggles over specific events and places. This is liberating in some respects: The certainty about the past and the future that Nora evokes so nostalgically in the introductory quote to this essay surely brought a stifling intellectual mustiness

with it. Nowadays we disagree over icons, anniversaries, and stories.

In his 2013 address as president of the American Historical Association, William Cronon urged historians to polish their storytelling skills.[16] Among the numerous issues at stake in his call to arms, this volume highlights one that holds particular relevance for environmental historians. Looking at the Berkeley Pit, the Chernobyl sarcophagus, or the eroding *Knechtsand* bank, it is hard to avoid a feeling that memories of environmental crisis *do not make sense*. Events evoke a diffuse feeling of remorse that future generations will have to live with this legacy, and little else.

Faced with a similar challenge, Pierre Nora opted for melancholia, giving his collection, in Hue-Tam Ho Tai's words, "a strong autumnal quality".[17] Environmentalism is surely lacking that brash air of youth nowadays that powered it in the seventies and eighties, and yet a diffuse longing for the past is usually less than helpful when dealing with a crisis. And who knows: maybe scholars will one day be amazed that we were standing on the verge of a new green boom in our time and failed to recognize it because we were thinking with terms and concepts from a bygone era. Inquiries into the collective memory allow affirmative as well as critical readings: Learning more about our historical imagination can free us from blinders that we previously failed to recognize as such.

In sum, there are good reasons to proceed with caution, far more so than we recognized when we started the Environment and Memory project four years ago. The essays in this volume are a first step, an initial exploration that raises more questions than it answers. The door is open for deeper explorations into our collective environmental memory, both by the present authors and others, as the present

[16] W. Cronon, "Storytelling", in *American Historical Review*, 118, 2013, pp. 1-19.

[17] H.T. Ho Tai, "Remembered Realms: Pierre Nora and French National Memory", in *American Historical Review*, 106, 2001, p. 909.

essays, for all their merits, have barely scratched the surface of the topic. Environment and Memory is one of those rare projects where scholarly and political rationales converge: Given the prevalence of bits of memory all around us, there is probably no way to talk about environmental issues nowadays *without* evoking memories. The question is whether we take up that challenge.

An Impure Nature: Memory and the Neo-Materialist Flip at America's Biggest Toxic Superfund Site[1]

Timothy James LeCain

In an earlier age, ornithologists had called them *hyperborea*, Latin for "beyond the realm of the North Wind", a haunting name that elegantly evoked the icy white mystery of their Arctic breeding grounds. Those of a more prosaic turn of mind simply called them snow geese, and indeed, when immense flocks of the birds took wing, the whirl of their brilliant white wings and bodies recalled a blizzard of swirling snowflakes.

Late one November night in 1995, a flock of more than 300 of the birds slipped west over the sharp peaks of the northern

Rocky Mountains and found themselves trapped by stormy weather in Montana's Summit Valley, a small high-mountain bowl that is home to the mining city of Butte and its immense flooded open-pit copper mine, the Berkeley Pit. The flock of snow geese circled the tight confines of the dark valley several times, no doubt searching for a marsh or pond where they could land and recover from the long miles already flown. At some point, the circling flock made the fateful decision that the Berkeley Pit "lake" offered an acceptable if somewhat unusual refuge. Of course, there was no way that the geese could have know that the acidic pit water carried deadly levels of arsenic, lead, cadmium, and other toxic heavy metals. Within days, the raucous calls of the geese faded into a cold November silence. When humans later discovered them, they found 342 of the dead birds floating in the lake, their brilliant white plumage stained the rust red of acid mine water.

Ever since the death of the Berkeley Pit snow geese, humans have struggled with how best to understand and remember the tragedy. Butte has several memorials that honor the miners who worked and often died in the copper mines. But there are no memorials to the geese or any of the countless other non-human actors whose historical orbits were bent by the powerful material pull of the pit. This is scarcely surprising, since humans tend to assume that their own stories are the most important and that they alone possess the capacity to have genuine memories of the past. Indeed, when humans have thought about the bizarre deaths of the Butte snow geese, they have been quick to see the tragedy as symbolic of their own concerns. For many, the beautiful white snow geese seemed an apt symbol

[1] Some sections of this essay first appeared in "The Ontology of Absence: Uniting Materialist and Ecological Interpretations at an Abandoned Open-Pit Copper Mine", in *Ruin Memories,* B.J. Olsen, Þ. Pétursdóttir (eds), Routledge, London 2013.

The conceptualization and part of the writing were completed while I was a Senior Fellow at the Rachel Carson Center for Environment and Society in Munich, Germany. I want to acknowledge the invaluable support of the RCC directors, Christof Mauch and Helmuth Trischler, and the research assistance of the superb staff.

of a pure and unsullied nature done in by the corrupting artifice of humankind. One writer suggested the story was symbolic of an "apocryphal struggle" between a malevolent corporate "snake" and the innocent wild geese that died in "its pool of poison".[2] Yet while we humans find such stories emotionally satisfying, they keep our focus squarely on human memories and ideas rather than those of the snow geese themselves. When the pure, unsullied nature of the snow geese is opposed to the messy artificiality of humans, the geese are reduced to little more than empty signifiers for human concerns, stripped of any historical agency or memories of their own.

One of the goals of this essay is to suggest some ways we might begin to think about snow geese and other animals and things as participants in the creation of sites of memory. To do so, we must move beyond the pervasive modernist belief that culture, whether human or nonhuman, is distinctly separated from the material world. I argue that phenomena that we typically believe are solely a product of our brains – things like culture and memory – are better thought of as creations and embodiments of the material world. Close kin to the idea that humans and their cultures are separated from the material world is the belief that they are also detached from a material past. To be sure, historians routinely assert that the human past influences the human present. But because they believe that humans are largely or entirely distinct from their material environment, sociocultural phenomena are their preferred vehicles of temporal transmission. The idea that matter itself – or "nature", as some prefer to call it – might carry the past into the future and drive the patterns of historical change and continuity as much as (or more than) social and cultural factors has received little attention. The idea that matter and the sociocultural are inextricably intertwined has received even less.

This human denial of the power of matter has deep cultural and historical roots that will not be easily overcome. However, in recent years scholars working in an array of different fields have begun to radically rethink the role of the material world in human and non-

[2] M. Levine, "As the Snake Did Away With the Geese", in *Outside*, 21, 1996.

human history. Rather than being yet another one of the dizzying series of recent academic "turns", this new materialist thinking seeks to flip the conventional view of the relationship between humans and matter on its head. This "neo-materialist flip", as I call it, suggests that humans are best understood not as the master manipulators of a separate and passive material world, but rather as the products of matter: that the material world creates us and our diverse cultures every bit as much as we create it. Indeed, recent scientific and humanistic insights strongly suggest that it no longer makes sense to draw a clear conceptual line between humans and matter, but that we should instead focus more attention on the many ways that humans and their cultures are *made of and from* matter and cannot logically exist in isolation from it.

Another and closely related goal of this essay is to challenge the anthropocentrism that we typically bring to our encounters with sites of memory. If some humans experienced the ruins of the Berkeley Pit as a symbol of a fallen natural purity, the snow geese encountered the pit in their own ways. When the culture and practice of the geese intersected with the materiality of the pit, at first it seemed to create a place of rest and refuge rather than decay and death. Nonetheless, geese and humans were then, and still are now, joined in their shared bodily encounters with the material reality of the pit water and its power to dissolve and carry elements that are toxic to both. Whatever the sociocultural meanings geese and humans bring to the pit, these material realities persisted, irretrievably sullying the pure categories by which we divide past and present, culture and matter, and human and non-human.

To understand the material power of a place like the Berkeley Pit, both for humans and for geese, we must begin by briefly discussing some key ideas that reside at the intersection of neo-materialist and ecological interpretations of matter. From these we can begin to perceive and understand the many ways in which the pure categories of the modernist worldview have begun to crumble, giving rise to an environment in which the "neo-materialist flip" can reveal how matter plays a dynamic role in creating culture and memories for both human and non-human actors alike.

History and Matter

As practitioners of a quintessentially humanistic discipline, historians have occasionally flirted with the role of matter in analyzing the past but have only rarely made it a focus of their predominantly anthropocentric narratives. During the last decades of the previous century, the emphasis on social constructivist theories and discursive analytical methodologies further marginalized the role of material factors. Recently, however, a small but growing number of historians have begun to join with other humanistic and scientific thinkers to reexamine materialism. Some have even proclaimed the arrival of a "new materialism", although many of the varied ideas coalescing under the neo-materialist banner have been developing for at least several decades in an array of disciplines.

Of course, the arrival of a supposedly *new* materialism suggests the consignment of some earlier materialisms to the past. Most famously, Marx and Engels turned Hegel's Geist-haunted idealism on its head to argue that social infrastructure was a product of material substructures. However, by the emerging standards of today's materialist thinking, their conception of the material world was far too narrow, as was their insistence on keeping human beings squarely at the center of a narrative of dialectical progress and mastery of nature.[3]

If we are to survey the intellectual giants of the nineteenth century, we should focus not on Marx but on Darwin, a figure that many new materialists find inspiring. Darwin's confident evolutionary materialism, along with the roughly contemporaneous geological discoveries of deep time, threatened to shake the European faith in human exceptionalism to its core. With Darwin, humans became just another animal. With deep time, all of human history became just a drop in a vast ocean of time.[4] As I will argue, the neo-materialist challenge to anthropocentrism and chronocentrism are a logical culmination of both.

[3] J.R. Mcneill, J.A. Pádua, M. Rangarajan, *Environmental History: As if Nature Existed*, Oxford University Press, New Delhi 2010, p. 4.

[4] E. Russell, *Evolutionary History: Uniting History and Biology to Understand Life on Earth*, Cambridge University Press, Cambridge and New York 2011.

Paradoxically, the threat posed by Darwin and geology to human exceptionalism led not to the rejection of anthropocentrism among historians but to its restoration in other more durable forms. As Andrew Shryock and Daniel Lord Smail argue in their perceptive introduction to the emerging new field of "deep history", historians isolated themselves from these tectonic intellectual shifts by adopting the analysis of written documents as their defining method.[5] Human "history" was thus seen as beginning roughly 5,000 years ago. The millennia of earlier human existence – not to mention the non-human – was conveniently relegated to the category of "prehistory" and left to the work of archaeologists, paleontologists, and others in disciplines comfortable with using increasingly scientific methods to analyze non-written evidence. More importantly for my argument here, the historians' obsession with written evidence easily lent itself to a reactionary human exceptionalism and resurgent anthropocentrism. As the Darwinian revolution took hold, other disciplines embraced the idea that humans were a part of nature. Cultural systems could be equated with natural systems, and human history seemed poised to meld seamlessly with natural history. Historians, however, offered a convenient and powerful point of demarcation between what they saw as true human history and mere prehistory, between civilization and nature. Writing, and the emergence of the complex urban societies that made it possible, marked the moment when humans *left* nature and began its systematic exploitation. In this view, animals and earlier "brutish" humans were in harmony with nature; now, on the other hand, humans were engaged with nature in a never-ending war. Victory was the key to progress.[6]

In more recent years, many scholars in the history of technology and environmental history have begun to challenge such views, albeit haltingly. From their beginnings, both were distinct from most other historical fields because of their insistence on the importance of the material world, whether that matter was predominantly natu-

[5] A. Shryock, D.L. Smail, T.K. Earle, *Deep History: The Architecture of Past and Present*, University of California Press, Berkeley 2011.

[6] Ibid.

ral or technological. One of the most important early spurs to current neo-materialist thinking emerged from the sociology of science and technology with the influential Actor Network Theory (ANT) developed in the 1980s by John Law, Michael Callon, Bruno Latour, and others.[7] Particularly as articulated in the ever-imaginative work of Latour, ANT includes all manner of potential non-human "actants" in its complex webs of networks. As these actants influence each other in complex networks they become "hybrids" – compound entities that challenge our conventional concepts of things or organisms as discrete, clearly bounded, and thus materially distinct from one another. Further, in its emphasis on the emergent nature of networks, ANT has many affinities with the ontological philosophies of Gilles Deleuze and Pierre-Félix Guattari, to which I will return shortly.

Despite (or perhaps because of) its potential to radically alter our understanding of the role of matter in history, the influence of ANT among historians has until recently been largely confined to scholars of science and technology. Even environmental historians, whose emphasis on the importance of the natural material world suggests obvious affinities, have been slow to explore the possibilities offered by ANT.[8] In part, this reluctance may stem from the desire of many environmental historians to examine *individual* agency of non-human actors rather than an agency that emerges solely from a network. As geographers Owain Jones and Paul Cloke have recently pointed out, since agency emerges from the interactions of actors within a network, ANT stops short of an explicit recognition of the agency of isolated non-human actors or actants. Indeed, the theory tends to view attempts to discuss the agency of non-humans as a reassertion

[7] J. Law, J. Hassard, *Actor Network Theory and After*, Blackwell/Sociological Review, Oxford and Malden, MA 1999; J. Law, *After Method: Mess in Social Science Research,* Routledge, London and New York 2004; B. Latour, *Science in Action: How to Follow Scientists and Engineers through Society*, Harvard University Press, Cambridge, MA 1987; id., *Reassembling the Social: An Introduction to Actor-Network-Theory*, Oxford University Press, Oxford and New York 2007.

[8] For an important recent exception see Paul S. Sutter, "Nature's Agents of Agents of Empire? Entomological Workers and Environmental Change During the Construction of the Panama Canal", in *Isis*, 98, 2007, pp. 724-754.

of the very human-nature dualisms that the concept of hybridity was in part designed to avoid. Further, Jones and Cloak rightly complain that "much of the illustration and application of this hybridity seems to have been biased towards technological rather than organic non-human entities – a maneuver which somehow makes it easier to deny the specific non-human contribution to hybrid agency."[9]

Jones and Cloke seek to go beyond the limits of ANT, arguing that scholars need to understand the precise nature of the contributions made by non-human agents like trees. Trees and other non-human actors, they argue, may have agency in four distinct ways. First, through "routine action", in which a tree grows and pursues its organic processes. Second, through "transformative action", when a tree acts autonomously, for example in self-seeding a farmer's field. Third, through "purposive action", a concept that generally demands intentionality and is thus typically limited to humans. However, the authors argue that trees have a kind of embedded purposive agency in their genetic blueprints that provide goals and some limited adaptive means of achieving them. Fourth, through "non-reflexive action" derived from socioecological interactions in which trees "have a capacity to engender affective and emotional responses from the humans who dwell amongst them".[10]

The work of Jones and Cloke, as well as that of other scholars in a variety of other fields, suggests how ANT and other materialist approaches might find fertile common ground with environmental history. Some of the most interesting recent work in environmental history has revolved around new ways of thinking about bodies and environments that challenge modernist beliefs in a clear division between human and material nature. Linda Nash, for example, argues that the idea of a bounded human body distinct from the material world was a key illusion of modernism, with its dreams of human liberation from and mastery over nature.[11]

[9] O. Jones, P. Cloke, "Non-Human Agencies: Trees in Place and Time", in *Material Agency: Towards a Non-Anthropocentric Approach*, Springer, New York 2008, pp. 79-96, 81.

[10] Ibid., p. 87

[11] L. Nash, *Inescapable Ecologies: A History of Environment, Disease, and Knowl-*

Meanwhile, others working in the subfield of envirotechnical analysis have undermined the belief that human technology is categorically distinct from the natural world, challenging the idea that technology is the very archetype of the "un-natural".[12] Recent work expanding the concept of technology to include animals and other organisms has potentially radical materialist implications as well. If, as several scholars have convincingly argued, a cow or silkworm is deliberately bred by humans to serve a specific technological purpose,[13] where precisely is the line between the technological and the natural? The influential American historian Edmund Russell argues that humans are engaged in a process of evolutionary history in which the cultural and political literally become embedded in the DNA of other organisms, a type of early "genetic engineering".[14] Yet, if human culture and technology become part of nature, it no longer makes sense to argue that there is some sort of dialectical dance between distinct cultural and material spheres; rather, we must strive to understand both how culture is a material thing and how matter itself is culture.

Given these affinities and others, it is surprising that the neo-materialist movement has made so little use of the valuable insights offered by environmental historians. In part, this may be because much neo-materialist work remains highly abstract. Many of its self-identified advocates are political theorists, ethicists, and philosophers whose main goal is to develop new ways of thinking in the present. From a historian's perspective, though, if the intriguing neo-materialist theo-

edge, University of California Press, Berkeley 2006; G. Mitman, "In Search of Health: Landscape and Disease in American Environmental History", in *Environmental History*, 10, 2005, pp. 184-210; G. Mitman, *Breathing Space: How Allergies Shape Our Lives and Landscapes*, Yale University Press, New Haven 2007; C.B. Valencius, *The Health of the Country: How American Settlers Understood Themselves and Their Land*, Basic Books, New York 2002.

[12] T.J. LeCain, *Mass Destruction: The Men and Giant Mines that Wired America and Scarred the Planet*, Rutgers University Press, New Brunswick 2009; S.B. Pritchard, *Confluence the Nature of Technology and the Remaking of the Rhône*, Harvard University Press, Cambridge, Mass. 2011.

[13] P. Scranton, S.R. Schrepfer, *Industrializing Organisms: Introducing Evolutionary History*, Routledge, New York 2004.

[14] Russell, *Evolutionary History* cit.

retical insights are to have real value, they must be fused with the kind of detailed micro-level studies of the past that historians of science, technology, and the environment are skilled at producing.

But what then defines this neo-materialism (to the extent that it is a coherent body of thought)? Definitions will surely vary, but it seems safe to say that all new materialists, either explicitly or implicitly, are seeking new ways to better recognize and analyze the role of the non-human material world. One of the earliest uses of the phrase "new materialism" appears to have been in Manuel De Landa's 1997 book, *A Thousand Years of Nonlinear History,* although he does not clearly define the term. Instead, he attempts to explain history in a way that decenters humans in favor of complex materialist explanations that challenge conventional social constructivist views.[15] De Landa argues for both a realist and a materialist view of the past. Humans are best seen not as the architects of their destinies, he insists, but rather as one material expression of a natural world that spontaneously generates new forms and trajectories. What humans mistakenly and arrogantly view as their creations – economics, language, technology – are rather the product of complex non-linear assemblages of which humans are only one component, and perhaps not necessarily the most important one.

De Landa's historicizing efforts notwithstanding, neo-materialism is still dominated by philosophical or ethical thinking. Many have found inspiration in the phenomenological philosophies of Husserl, Merleau-Ponty, and even a reconsidered Heidegger. The ideas of the French philosophers Gilles Deleuze and Félix Guattari have also been particularly influential among many recent materialist thinkers. In works like *A Thousand Plateaus*, Deleuze and Guattari develop a sophisticated realist ontology to explain how things in and of themselves exist independently of the human mind. Crucially, however, the pair insist that this separate material world does not exist fully formed and defined as a kind of pre-existing stage onto which humans emerge and play out their histories. Rather, their matter is a lively and dynamic

[15] M. De Landa, *A Thousand Years of Nonlinear History*, Zone Books, New York 1997.

one, a materiality that emerges from the interactions of diverse actors or agents, humans only one among them. Thus Deleuze and Guattari offer a philosophical grounding for key neo-materialist concepts such as the creative power of matter, the distributive nature of agency, and the rejection of anthropocentrism.[16]

The works of Deleuze and Guattari, Husserl, and Merleau-Ponty all figure heavily in what is thus far the most coherent expression of a neo-materialist approach: the 2010 collection of essays entitled *The New Materialisms*. In their introduction, Diana Coole and Samantha Frost assert that human beings "inhabit an ineluctably material world" but that this essential materiality has been marginalized in recent decades by "the dominant constructivist orientation to social analysis". While observing that this "new materialism" need not be antithetical to constructivist methods, Coole and Frost call for a more vibrant role for matter in its interaction with humans and their social systems. Theirs is a matter that is "active, self-creative, productive, unpredictable", a matter that "becomes" rather than simply "is".[17]

As promising as Coole's and Frost's introduction is, however, the actual essays in the volume often fail to live up to it. Few take on the challenge of explaining "just what it means to exist as a material individual with biological needs for survival yet inhabiting a world of natural and artificial objects" possessing varying levels of agentic efficacy.[18] Given that many of the authors are political philosophers or ethicists, it is perhaps not surprising that many content themselves with mining the work of various earlier thinkers for promising veins of materialist thinking. Still, it is rather ironic that matter in and of itself makes far fewer appearances here than one might expect, and human ideas about matter far more.

While at times suffering from the same tendency to probe ideas rather than reality, Jane Bennett's influential 2009 work *Vibrant Matter* does a better job of injecting at least some matter into her

[16] G. Deleuze, F. Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, University of Minnesota Press, Minneapolis 1987.

[17] D.H. Coole, S. Frost, *New Materialisms: Ontology, Agency, and Politics*, Duke University Press, Durham, NC 2010.

[18] Ibid., p. 28

materialism. Under the banner of what she calls "vital materialism", Bennett strives to strip away both anthropocentrism and biocentrism in order to conceptualize an environment that is much more than a merely passive or sometimes recalcitrant stage for human action. Bennett rightly argues that it is illogical to conceive of humans solely as acting within and influencing a separate environment. Humans affect nature, but the nonhuman also affects culture.

But the case for matter as active needs also to readjust the status of human actants: not by denying humanity's awesome, awful powers, but by presenting these powers as evidence of our own constitutions as vital materiality. In other words, human power itself is a kind of thing-power.[19]

As with the Coole and Frost volume, though, Bennett is ultimately more successful at raising material questions than she is at answering them. In sum, neo-materialist approaches are already generating many interesting questions and insights. But shorn of their philosophical goals, it is not yet clear what value they may have for historical analysis. However, by bringing the ontological and ethical strengths of neo-materialism together with the analytical strengths of materialist-oriented environmental history, we can begin to develop a more broadly applicable and useful materialist approach for understanding both the past and present. Although it is too soon to offer any definitive list of the principles and methods that might constitute this ecologically grounded neo-materialism, I would hazard at least four that seem particularly important at this juncture.

First, we should recognize that the technological and natural are so closely linked that they are in fact best analyzed as one holistic unit: our material environment. Humans and their machines, houses, cars, and factories do not inhabit, destroy, or impinge upon a separate *natural* environment; rather, these human-associated artifacts fuse with non-human nature to constitute the unitary material environment in which we live.

Second, the ecological approach of environmental history helps

[19] J. Bennett, *Vibrant Matter: A Political Ecology of Things*, Duke University Press, Durham, NC 2010.

us to better capture the dynamic, agentic, and emergent capacity of the material environment – properties that are well recognized in ecological science and theory. The neo-materialists, for example, rightly challenge our conventional biocentrism and ask us to think more seriously about the creative role of rocks and minerals. However, these material entities are best understood within the context of a broader local and global biogeochemical cycle. The same is even more obvious when we consider the independent ecological power of biotic organisms and systems.

Third, a combined ecological and neo-materialist approach should squarely challenge the traditional categorical separations between the sociocultural and the material, focusing instead on the ways in which the social is not only a product of the material but contiguous with the material. Here we might adopt a methodology of "materialist deconstruction": the conscious effort to identify and historicize ways in which matter has influenced or constituted what many historians assume are exclusively sociocultural phenomena. The point is not to replace social or discursive explanations with materialist ones, but rather to ask how the historical process emerges from the interaction of all forms of matter, human and non-human.

Fourth, one of the most radical insights to emerge from fusing new materialist and environmental history approaches may be the end – or at least the decline – of anthropocentrism. If we are to take the new materialist ontological theories seriously, it is clear that we humans are not nearly so important or powerful as we like to think. Humans must be understood to a significant extent as products of matter, not its Olympian masters. On a practical level, reframing historical research in ways that avoid anthropocentrism opens up a vast new arena of research and brings the methods of history into the sciences. As the Polish historian and anthropologist Ewa Domanska rightly notes, we can begin to "de-centre human beings and focus on nonhumans as subjects of research (often quite apart from their relationships with humans)".[20] More broadly, my concept of the "neo-

[20] E. Domanska, "Beyond Anthropocentrism in Historical Studies", in *Historein*, 10, 2012, pp. 118-130.

materialist flip" challenges anthropocentrism by arguing that even when focusing on human subjects, scholars must give far greater attention to the ways in which the sociocultural *emerges from and is embedded in* the material world.

Of course, regardless of their philosophical or ethical appeal, the utility of these approaches for historians must lie in their practical ability to reveal important new insights into past and present. In the second half of this essay, I attempt to suggest at least some of their rich possibilities with an analysis of the overwhelming material reality that is the Berkeley Pit.

The Berkeley Pit

Butte, Montana, has witnessed more than its share of outsized American dreams. Today a city of about 34,000, a century ago Butte was a raw-boned copper mining boomtown of at least twice that size, one of the biggest cities west of the Mississippi. The citizens of Butte hailed from nearly every corner of the planet, an ancestry that lives on in the neighborhoods named for their Irish, Cornish, Chinese, and other cosmopolitan inhabitants. With its diversity and extraordinary industrial wealth it seemed to belong not so much to the southwestern corner of an isolated agricultural state like Montana, but rather to a much grander geography, what some today might call a "world city" but that was captured then with the title of "Butte, America". Most men came to Butte because there were well-paying jobs to be found in the underground mines and the smelters and mills above. Others (men and women) came to make their meals, clean their shirts, bind their wounds, and teach their children, but the copper mines remained the economic heart of the city for most of the twentieth century. Over it all presided the mighty Anaconda Copper Mining Company, one of the largest international corporations of its day. Over the course of a century of mining, humans would extract some $25 billion in copper, gold, silver, and other minerals, in the process driving more than 10,000 miles of tunnels as deep as a mile beneath the earth.

By the 1950s, however, the copper ore was not as rich as before.

Remaining reserves were still vast, but the cost of extracting them with conventional underground methods exceeded their value. In 1955, Anaconda began excavation of the open-pit mine that would become the Berkeley Pit. Prior to this, skilful underground miners had carefully extracted only the desired copper ore and left the worthless waste rock behind, a technique that minimized waste but that was inherently slow and expensive. With the Berkeley Pit, Anaconda was able to replace highly paid underground miners with a much smaller number of workers who operated gigantic shovels and trucks. Instead of carefully excavating only the valuable ore, the company now used these imprecise but powerful machines to extract everything. The big dump trucks, with their eight-foot-tall tires, carried the shattered rock to a massive concentrating mill where it was pulverized. The tiny amount of copper was then separated from the vast bulk of waste.[21]

As I have argued elsewhere, the Berkeley Pit and other similar places were humans used large-scale technologies to extract desirable material resources like ore, timber, and fish are best understood as a form of "mass destruction". The technology of mass destruction, which constitutes the material foundation of better-known systems of modern mass production and consumption, has greatly accelerated the pace at which matter is extracted and prepared for subsequent use in mass production processes. Further, precisely because the mass destruction techniques used at the Berkeley Pit and elsewhere were so efficient, they were essential to creating the modern throwaway culture in which things have become so cheap that they can be painlessly disposed of in favor of whatever is momentarily new and exciting. Indeed, the contemporary consumer-driven economy at the heart of the modernist world depends on this continual cycle of adoption, disposal, and replacement to survive. Infinite careless consumption rests on the illusion of infinite painless extraction.[22]

During the first decades of the pit's operation, Anaconda worked mightily to preserve the modernist illusion of painless economic growth and progress through painless infinite extraction. The inher-

[21] LeCain, *Mass Destruction* cit.
[22] Ibid.

ent destructiveness of the Berkeley Pit was portrayed as a virtue by shifting the emphasis away from the material place and things in and of themselves – Butte, the copper ore, the pit – and towards the new consumer items they made possible. In the summer of 1957, for example, the company published an advertisement in a popular mass-circulation magazine. Beneath a picture of the two-year-old Berkeley Pit, the ad suggested that this summer Americans should "plan also to see America the Bountiful". In Butte they could witness how Anaconda extracts "the seemingly inexhaustible mineral wealth of a 32-square-mile area whose output increases year after year".[23] In the modernist imagination, engineers, managers, and the other architects of industry are stereotyped as sober, hyper-rational positivists who see the world as it is and exploit it accordingly. However, as David Noble and others have demonstrated, western science and engineering have long been driven by an irrational spirit of human transcendence over nature that had its origins in medieval Christian attempts to recreate the lost Eden.[24] In its secularized form, this is precisely the spirit that informed the Anaconda's promise to somehow extract a seemingly infinite amount of ore from a decidedly finite material space.

In other advertisements, Anaconda elided the actual material landscape of extraction all together and focused solely on evoking the many consumer uses of the copper. One 1950 ad, playing on the copper used in the famous American Liberty Bell, argued that copper's role in carrying electricity and information in telephones, telegraphs, televisions, and radios was helping to make "freedom ring" around the Cold War world. During the Korean War, other ads reminded consumers how much copper could be found in the fixtures for three bathrooms (enough to make a jet plane engine) and in the motors for 210 home workshops (enough to make a 105-mm howitzer). Others simply reported how much copper could be found in a house, refrigerator, or television.[25] As several environmental histo-

[23] Ibid., p. 188.

[24] D.F. Noble, *The Religion of Technology: The Divinity of Man and the Spirit of Invention*, A.A. Knopf, New York 1997.

[25] LeCain, *Mass Destruction* cit., pp. 188-204.

rians have convincingly argued, mass production and distribution technologies had the effect of distancing humans from the material sources of their consumer items.[26] It became increasingly difficult for humans to imagine the original sources of the shrink-wrapped steaks, canned green beans, and copper-coiled refrigerators in their homes – even though the matter in question was still there (albeit in altered form) to be seen, touched, and tasted.

In this light, the Anaconda advertisements at least had the virtue of making *some* connections between consumer products and the copper within them, even if the origins of the copper in destructive open-pit mines was usually left unmentioned. Visitors to the pit today, however, face precisely the opposite problem. After passing through a short tunnel incongruously designed to evoke an Old West gold mine, visitors emerge onto a wooden platform perched on one side of the pit wall. Here the pit itself is an inescapable reality, a twisting oval hole in the ground almost one-and-a-half miles wide and 1,800 feet deep. In 1982, the corporate successor to Anaconda ceased all mining at Butte, thus bringing an abrupt end to the promise of infinite copper a mere 30 years after the pit had opened. When the giant underground pumps ceased their work, the ground water in Butte began to rise back to its pre-mining level, steadily flooding the pit. Visitors today see not just the towering walls of the pit but also a thousand-foot-deep lake. Roughly the pH of battery acid, the water of "Berkeley Lake" is a complex brew of arsenic, cadmium, and other heavy metals leached from thousands of miles of underground passages.

Yet while the visitor today is viscerally confronted with the topographical void of the pit and its growing body of water, much of the copper which sparked the pit's construction is of course gone, spread around the nation and the globe in countless miles of wire, houses, cars, and refrigerators. Just as it is difficult to imagine back from a refrigerator to the pit, so too is it difficult to imagine forward from the

[26] W. Cronon, *Nature's Metropolis: Chicago and the Great West*, W.W. Norton, New York 1991; A. Vileisis, *Kitchen Literacy: How We Lost Knowledge of Where Food Comes From and Why We Need to Get It Back*, Island Press/Shearwater Books, Washington 2008.

pit to a refrigerator. As a result, the visitor is predominantly left only with the experience of human and ecological ruin, which, if it at least challenges the modernist promise of painless infinite extraction, also tends to reinforce the supposed distance between the worlds of matter and of consumer culture. More could be done to educate visitors about the copper that was once in the Berkeley Pit, to tie them to the persistent materiality of the copper as it was distributed around the planet. However, any effort to merely *link* the material world of the pit with the human world of consumption inherently reifies the very dichotomies that drove the creation of the pit. By adopting an analytical stance that unites materialist and ecological interpretations, however, historians can turn the Berkeley Pit towards the deeper purpose of dissolving such modernist categories all together.

As Deleuze and Guattari argue, the present is best understood as but one of thousands of plateaus, a temporary and contingent arrangement of material actors whose existences emerge in ever shifting patterns of mutual encounters and interactions. History is thus a phenomenon of bumps and jogs, the illusion of a steady flow from a vanished past to a substantial present, a quirk of the human mind that we have mistaken for reality. Yet the material consequences of earlier moments, of earlier historical plateaus, persist into the present, carrying elements from the past into the now, where they may interact with new actors.

Humans tend to believe that memories of the past dwell somewhere in the tangle of neurons and synapses in their skulls, or perhaps simply in a ghostly spirit that resides there and yet is somehow distinct. But this too may be, in part, an illusion, an evolutionarily useful means of creating the sense of an "I" that wishes to endure, to survive, to reproduce. It is also a form of chronocentrism, the human belief that the present moment is entirely new and unhinged from the past. In reality, the past is persistent, not just in memory or culture, but also in the materiality of things literally *present*. "The stones, iron, and concrete used in the massive construction of some past and present empires", the archaeologist Bjørnar Olsen reminds us, "are not only burdening the *brains* of their inhabitants; they left a thick and sticky heritage of materials that to some ex-

tent, at least, explains their continuous, effective history".[27]

Yet, as already noted, to visit the Berkeley Pit today is to be confronted not only with the material remains of the past but rather with their material absence. The millions of tons of waste rock and ore that had once been a part of the Butte hill are now gone – or so it seems. In reality, most of the rock that had once been in the pit is piled nearby or perched above in the massive Yankee Doodle Tailings Pond. Further, in the process of blasting and grinding up the once relatively solid rock, humans created a powerful, new, and stubbornly persistent material reality. As ground and surface water percolate through the ruins of the pit and its waste piles, it leaches out the heavy metals that had previously been safely locked away. To keep this contaminated water from flooding the basements of thousands of Butte homes and polluting the nearby Clark Fork River, the water must be continually pumped and processed in a treatment plant that removes some five hundred to a thousand tons of toxic sludge every day. In a startling example of the ecological persistence of the material past, this treatment process will have to continue for many centuries to come before enough of the heavy metals are washed out to make the water safe for most organic life.[28]

In this sense, the material absence that is the pit is partially an illusion. Much of the rock that once filled the pit remains as a powerful ecological force that will endure on a geological time scale. And yet, the overwhelming material negativity of the pit itself – the topographical depression created by the absence of the rock that once was there – is a powerful force in its own right. As Bjørnar Olsen notes in his perceptive defense of the enduring power of matter, in the modernist age the pace at which material things are created, consumed, and abandoned has grown ever faster and the "processes of destruction have immensely intensified".[29] However, as the Berkeley Pit makes clear, the processes of modern destruction occur not only

[27] B. Olsen, *In Defense of Things: Archaeology and the Ontology of Objects*, AltaMira Press, Lanham, MD 2010, p. 162.

[28] LeCain, *Mass Destruction* cit., pp. 202-204.

[29] Olsen, *In Defense of Things* cit., pp. 168-169.

at the end of product lifecycles, but also at their material beginnings. Ruination, in this sense, is more than just the consequence of the abandonment of previously useful and valued things. Rather, ruination is inherent as well in the *creation* of those things. In this broader ecological and materialist frame, the Berkeley Pit was a type of ruin from its beginnings, not just after it was shutdown and abandoned. That humans were the predominant agents of this form of ruination – rather than the rust or other forms of decay we typically think of – should not obscure the essential material nature of the process.

One of the human memories of the Berkeley Pit today, then, emerges from our encounter with the void, with the nothingness that remains after the transformative destruction of one form of matter into others. Finally, though, if we are to fully embrace the "flat ontology" of Deleuze, Guattari, De Landa, and others, in thinking about sites of memory we must also consider other non-human actors. In the dark mirror of the pit lake we may, as we always do, see reflections of ourselves most clearly. But look closer into the rusty red water and we begin to see other actors, other memories: creatures, elements, and even the water itself whose molecules render it a uniquely powerful carrier of material things past, present, and future.

Hyperborea

The night the snow geese arrived in Butte, the older birds may have searched in vain for familiar landmarks, while the youngest had little choice but to follow their more experienced flock mates. Centuries ago, the ancestors of perhaps some of these very geese might well have landed on the flat plain below, where the Summit Valley's high groundwater once oozed out to create a wetland. The steel pistons of steam-powered pumps had long since sucked the water out and dried up these swamps, ultimately pushing the groundwater level more than a mile below the surface. When the pumps were stopped, the water found a new resting spot as it began to seep into the rocky bowl of the pit. For the disoriented snow geese that stumbled into the valley that November night, the "lake" formed by these earthy waters offered the only refuge in sight.

The previous spring, all of these geese (but for the newborns) had flown the opposite direction, north beyond the Arctic Circle, where they had nested along the tundra shoreline of far northern Alaska and Canada. Precisely which northern redoubt the Butte snow geese had summered at is impossible to know: perhaps the Yukon-Kuskokwim Delta or Baffin Island in northern Canada. They might have even come from as far away as Ostrov Vrangelya (Wrangel Island), a rocky outcrop in the Siberian Arctic set aside as a nature preserve by the Russian government. If possible, geese always return to their birthplaces to breed. There they sometimes form immense colonies of thousands of birds. Snow geese mate for life, and here among the multitudes the couples somehow find each other and begin the serious business of reproducing the next generation.

Regardless of where the Butte geese had summered, we know that with the approach of winter the elder geese and their young offspring had left the Arctic waters and ponds, formed their flock at a staging area, and headed south. Snow geese and other migratory waterfowl of North America follow four great aerial highways during their biannual journeys north and south. Both the Pacific and Central Flyways have thin tendrils that skirt over the sharp spine of the Continental Divide near Butte. The flock that landed at the pit could have been following either.[30]

The geese came to southwestern Montana driven not by an irresistible instinctive urge to migrate, nor even by an innate dislike of cold weather. With their dense winter layers of down, snow geese can survive in surprisingly frigid conditions, and many would forgo the strenuous flight south were it not that the grasses, seeds, roots, and grains they fed upon begin to decline with the first hints of autumn frost. Hunger, or its specter, drove them south more than cold. The decision precisely when to head south was apparently intuitive, as was a very rough sense of the direction reckoned by the positions of sun and stars. But the precise path that they would follow is something they had learned only from older geese. As one wildlife

[30] R.M. Wilson, *Seeking Refuge: Birds and Landscapes of the Pacific Flyway,* University of Washington Press, Seattle 2010.

biologist observes of geese, ducks, and other migratory wildfowl, "A duck raised in isolation knows *how* to migrate, but not specifically *where*. Among these birds, and unlike almost all others, the details are bound up in tradition, passed on by older generations".[31]

We also cannot say with certainty where the Berkeley Pit geese were headed, but there is a reasonably good chance that they were aiming for the Central Valley of California, where some 60 percent of migratory wildfowl winter. Regardless of their ultimate destination, the geese who had made the journey before would have led the way, each taking the point at the head of undulating V-shaped formations until they tired and dropped back for another to take their place. Ornithologists believe the geese find their way by following a chain of familiar landmarks – wetlands, mountains, and rivers, of course, but perhaps also towns, highways, wheat fields, and even open-pit mines.

In all this, geese clearly possess a striking level of sociocultural continuity. The oldest may live for ten years or more, with an average life span of eight years. As already mentioned, couples form mating bonds that persist throughout their lives. These cultural continuities both endure and evolve as the landscape around them changes. Over the past century and a half, many of the wetlands the geese once depended upon have been drained and replaced with millions of acres of industrial farms. But rather than being a disaster, this proved an opportunity: geese and other waterfowl quickly learned to eat what the farmers left behind after harvests. Fortified by such energy-rich rice and wheat, the snow geese also found protection in the refuges humans had either left behind or created. After collapsing in the early twentieth century, snow geese populations have since exploded.[32] The birds have done far more than just unthinkingly "adapt" to this rapidly changing landscape; they have incorporated this environment into their culture and practice, becoming in some sense new animals as the material landscape that sustains them – and in part creates them – continually shifts.

[31] Ibid., p. 31.

[32] M. Johnson, "The Snow Goose Population Problem, Part I", in *North Dakota Outdoors,* 59, 1997, pp. 14-18.

In this, geese and humans may well be united. As the influential philosopher of cognition Andy Clark provocatively argues, what we typically think of as the human mind resides not just in our brains, nor even in our bodies, but is rather to a significant degree extensive with the material world around it. For example, Clark argues that human cognitive abilities can be distributed in a network of external props and aids like computers, files, texts, and maps, aspects of our material surroundings without which some fundamental part of what we consider to be our intelligence would be removed. Humans thus have an "extended phenotype" of the mind, he writes, in which "the relation between the biological organism and the wideware is as important and intimate as that of the spider and the web".[33]

If Clark and other advocates of the "extended mind" theory of cognition are correct, then the consequences are profound. In keeping with the ontological theories of Deleuze, Guattari, Latour, and others, sociocultural phenomena must be understood as contiguous with, rather than distinct from, our material surroundings. "We must abandon the image of ourselves as essentially disembodied reasoning engines", Clark argues. "And we must do so not simply by insisting that the mental is fully determined by the physical, but by accepting that we are beings whose neural profiles are profoundly geared so as to press maximal benefit from the opportunities afforded by bodily structure, action and environmental surroundings".[34]

Among all the animals on the earth, we humans have evolved brains that appear to be the most adept at incorporating various aspects of the material world into our cognitive processes, and thus our very identity. Humans are, Clark insists, "natural-born cyborgs".[35] However, as his analogy to a spider and its web hints, Clark's theory also suggests that other animals may also be entities that emerge out of the interactions between brain, body, and matter. He offers a telling example in the

[33] A. Clark, "Where Brain, Body and World Collide", in *Material Agency*, L. Malafouris, C. Knappett (eds), Springer, New York 2008, p. 15.

[34] Ibid., p. 14

[35] Id., *Natural-born Cyborgs: Minds, Technologies, and the Future of Human Intelligence,* Oxford University Press, Oxford and New York 2003.

bluefish tuna, a fish whose body in isolation is far too weak (by a factor of seven) to swim, accelerate, and turn as fast as it actually does. Recent research by a pair of fluid dynamicists revealed that these tuna "exploit additional sources of propulsion and control in their watery environments" by creating and taking advantage of vortices and pressure gradients. "The real swimming machine", Clark concludes, "is thus the fish *in its proper context*: the fish plus the surrounding structures and vortices tha[t] it actively creates and then maximally exploits".[36]

In this light, we can begin to see the meeting between the snow geese and the Berkeley Pit in a new way, as a creative ontological event during which the materiality of the pit melded with extensive sociocultural materiality of the geese. We cannot know, of course, what passed through the minds of the tired birds as they circled the Summit Valley that night. Perhaps some of the more experienced geese tried to lead the flock back up to the sky, to head south where they remembered more familiar resting places from past journeys. Yet the geese had survived and thrived in a changing environment over the past century precisely because they could learn and adapt. Their understanding, intelligence, and perhaps even the neurons of their brains, had subtly shifted to encompass a new reality, a new plateau of existence. Like humans whose brains are different as they incorporate the aid of scribbled paper notes or printed books, so too did the extensive brains and bodies of the geese become different as their material environment shifted. Their ancestors had learned to compensate for vanished wetlands and take advantage of new foods from farmers' fields. Why not then incorporate this new type of lake into their practice and culture? Perhaps it might eventually become an enduring part of the flock's materially embedded culture, a memory and reality to be passed down each year to subsequent generations of young geese.

For the snow geese, the void that was the Berkeley Pit was thus an opportunity, a topographical thing that they seamlessly blended into their mental and cultural understanding of the world. Some humans might wish that the geese had been more rigid in the categories with

[36] Id., "Where Brain, Body and World Collide" cit. p. 13.

which they classified the world, less capable of accepting what we insist are patently unnatural or impure things. But as the Chinese Taoist philosopher Lao-Tzu observed centuries ago, "the *snow goose need not bathe* to make itself white". The geese had never been pure or "natural" in the categorical sense that some modern humans understood them. They had always been animals whose existence emerged from the messy materiality of their environments. When their environment changed, they changed, becoming in some very real sense new creatures embarked on new plateaus of existence. In other words, they were very much like humans.

Unfortunately, snow geese are also like humans in that their biochemical metabolism is ill-prepared to handle high levels of heavy metals. The geese may have never been ontologically pure, but they still needed water that was chemically pure. Paradoxically, water cleans precisely because it is so easily dirtied. Thus as the water slowly scours the shattered rock of the Berkeley Pit, the arsenic, lead, and cadmium it dissolves are mobilized as powerful actors in their own right. So it is that the material memory of a few decades of open-pit copper mining will persist as humans, geese, and countless other organisms encounter its poisonous waters for many centuries to come.

Conclusion

As Bruno Latour observed nearly twenty years ago now, the evidence that the pure modernist categories of existence are false is everywhere. Humans have never lived in anything but an impure nature, Latour reminds us – one in which culture and matter are seamlessly melded.[37] Yet most historians and other humanists have only just begun to grapple with the tremendous methodological and analytical consequences and promises that might emerge from looking at the past and present freed from conventional modernist dichotomies. Humans are, at least in part, attracted to ruined places

[37] B. Latour, *We Have Never Been Modern,* Harvard University Press, Cambridge, MA 1993.

like Butte's Berkeley Pit precisely because they so powerfully violate these dichotomies, hopelessly entangling past and present, matter and culture, technology and nature. Thousands of tourists visit the Berkeley Pit every year where they can walk out onto a wooden viewing stand and look down into the dark pit waters and up at the towering rock walls. Perhaps they sense in such places the fragility of the modernist belief that humans are special animals, that we alone may *use* nature but are not *of* nature. If so, the prospect must be unsettling, as few tourists seem to linger long to ponder the pit. Most quickly hurry to their cars and head back out on the highway, perhaps more eager than ever to show that they are still in control of their own destinations, that they can leave the dangerous memories of the pit behind and escape to more pleasant places.

But the ruins of the Berkeley Pit are not so easily forgotten. In creating the pit, humans changed not just some separate place "out there" – what we like to call our environment. Rather, we changed ourselves, as well as the snow geese and many other material entities that have and will yet come into contact with it. In the decades and centuries to come, the memory of the 342 snow geese that died in the pit that stormy November night in 1995 may well fade from human memories. But the power of the pit itself will nonetheless endure, a type of material memory that will continue to help create humans and their cultures, just as it helped create the snow geese and theirs. Perhaps that is the most important insight that we can take today from this strange site of memory: that we can no more escape the powerful material pull of the pit than could those snow geese. That we too are creatures from afar, wheeling across a trackless night sky, uncertain of the way forward, unable to find a path back. Should we trust the strange dark waters below or move on in hopes of finding a more familiar refuge?

GAU: Nuclear Reactors and the "Maximum Credible Accident"[1]

Joachim Radkau

The German word "GAU" – popularly used to refer to a disaster or "worst-case scenario", particularly in reference to nuclear power plants – marks off a semantic space in which German anti-nuclear journalism has situated the nightmare of a nuclear catastrophe since the mid-1970s. A close examination of the term reveals that it is in fact ambiguous, oscillating between support of nuclear energy and criticism of it,

and its history can be recounted in a series of remarkable anecdotes. This essay will trace the history of the nuclear risk discourse and policy in West Germany from the first use of GAU in the 1960s through the present, arguing that it encapsulates and mirrors important strands in the debate over nuclear power in Germany.

Following the term's history, we can see how different layers of experience accumulated over time, shaping the meaning of the term and the mindset of proponents and opponents more generally. The word GAU evokes a whole range of memories nowadays, and these memories continue to shape the debate over nuclear power. In brief, this history falls into three chapters: a debate among nuclear insiders that started in the late 1950s; a public discourse that arose as part of the anti-nuclear protest in the 1970s; and a broad popular usage of the term that has moved beyond nuclear issues. While these three strands of use related to each other, they followed different rationales and trajectories.

Although this article focuses on Germany, it does not intend to suggest that either the history of the term GAU or German nuclear history in general can be understood in isolation, without considering the international context. Nuclear history is both national and transnational, with the United States playing a pivotal role in the Western context. In fact, the word GAU, which is an abbreviation for "größter anzunehmender Unfall", was originally a translation of the American term *maximum credible accident (MCA)*. However, that term has never achieved anything approaching the popularity of its German equivalent. As the term moved from expert circles towards a broader public, new meanings were added and existing ones challenged, and the distinct context of the German anti-nuclear meaning left its mark on the word and the popular understanding of it.

We can see this change already at work in the abbreviation: the use of GAU was not considered correct within the nuclear community, which preferred the longer version. The sound of the word may

[1] This essay was translated from German by Brenda Black, including all German-language sources unless otherwise specified.

have played a role. Unlike MCA, one can actually pronounce GAU as a word. Furthermore, the word came to have echoes of the word "Grauen" (dread or horror) – however, it seems unwise to read too much into the word by itself. For instance, nothing remains of the archaic term "Gau" as the designation of a district (still seen in the name of the "Rheingau" region), which gained unpleasant associations through its reference to the administrative units of the Nazi regime.

In collective memory, the word GAU has come to be associated with Chernobyl, an event that was unrivaled in its international impact until the recent Fukushima disaster. As Karena Kalmbach discusses the events at Chernobyl and its aftermath in a separate essay, this article will concentrate on the preceding decades, decades that framed the reception of the Soviet nuclear disaster. In fact, one might see Chernobyl as an endpoint, for the meaning of GAU has not changed much over the last quarter-century. However, meanings and reference points changed tremendously in the years and decades before, and they mirror the accumulation of experiences and the learning curves of the experts and the general public. As nuclear power moved from a 1950s vision to a large technological system, the meaning of GAU became increasingly contested, and the circle of those who used the words grew from a handful of experts to the broad public. In the end, the GAU would emerge as one of the focal points of the nuclear debate.

The "maximum credible accident" was originally intended to designate a "design basis accident" (German: *Auslegungsstörfall*): that is, the maximum breakdown or technological failure that the reactors were designed to be able to withstand – in theory at least. In the interest of getting approval for the construction and operation of nuclear facilities, this was equated with the greatest possible accident that was conceivable under realistic conditions. But "anzunehmend" ("presumable" or "supposed", but also "expected") as used in the German term is at least as ambiguous as "credible" (which may mean "believable" as well as "likely") in its English counterpart. Wouldn't it be possible to "expect" more serious accidents, ones the reactor is not able to withstand? The concept of the GAU, which had actually been developed in order to assuage people's fears, took

on an alarming life of its own in the imagination of the media, who invented an additional term, the Super-GAU. In contrast to the GAU, which still allowed for the possibility of being brought under control, the Super-GAU suggested both a catastrophe which could no longer be contained and an escalation of an already horrific accident situation.

David Okrent, a mechanical engineering instructor at UCLA and a member of the US Advisory Committee on Reactor Safeguards (ACRS) in the 1960s, has published what continues to be the most knowledgeable and detailed insider description of the early discussions by US experts on reactor safety. In it he traces the history of the term "MCA" back to the internal documents of the Atomic Energy Commission (AEC) in 1959.[2] In the documents of the German Atomic Commission (Deutsche Atomkommission, DAtK) the word appears for the first time in the same year as well – here still in its English form.[3] Even Okrent cannot provide an explanation of the exact origins of the term. But the silence in the records suggests that the concept of an MCA was not the result of either safety-related experiments or theoretical discussions by the experts. And why, indeed, should this have been the case? In 1959 no one had had much experience operating nuclear reactors in a civilian context. Shippingport, the first non-military nuclear plant in the United States, first began to operate in 1957; furthermore, it was a small reactor in comparison with later units. "MCA" was evidently created in order to provide the formal reassurance needed for authorization of reactors, a useful fiction analogous to the definition of compressive strength for steel girders and similar components of large-scale engineering projects: When such an object can withstand a certain maximum level of pressure, one can assume that it will also hold out under lesser amounts of pressure, at least when the

[2] D. Okrent, *Nuclear Reactor Safety: On the History of the Regulatory Process*, University of Wisconsin Press, Madison 1981, p. 32.

[3] J. Radkau, *Aufstieg und Krise der deutschen Atomwirtschaft 1945-1975: Verdrängte Alternativen in der Kerntechnik und der Ursprung der nuklearen Kontroverse*, Rowohlt, Reinbek 1983, p. 359.

pressure is exerted in the same manner. It is, of course, not possible to address the risks of highly complex technology such as a nuclear reactor using such a simplistically linear causal approach, and this was in principle clear from the very beginning. If a railroad bridge can withstand the weight of 60 train cars, it won't collapse under the weight of 30; for nuclear reactors, however, the maximum risk is difficult to determine precisely, and even if effective measures are put in place to prevent this, it is by no means certain that all other risks are thereby brought under control. For there are many different kinds of risks and these can't simply be ranked according to size as though they were qualitatively the same.

The situation was not entirely new in all respects, however. Even steel girders which have withstood a stress test may lose strength over the course of decades as a result of material fatigue. Bridges may be destroyed by flood waves or gale-force winds, as happened to the railroad bridge over the Firth of Tay in during the famous storm in December 1879. Material fatigue and external events are engineering risk factors that are among the most complex and difficult to predict; the recent proposal to extend the operating life of the nuclear plants in Germany, as well as the disaster at Fukushima, have made this a more hotly-debated topic than ever before. The concept of the GAU, as formulated by nuclear engineers, made no allowance for such risks.

However, these conceptual issues were not discussed in a vacuum. Nuclear power became a multi-billion-dollar industry where safety issues determined the fate of huge investments. Recent stock-market trends of companies operating nuclear power plants demonstrate the significance of these financial considerations. When this article was finalized in August 2013, RWE shares stood at less than half of what they were worth on the eve of the Japanese disaster, and E.ON shares had fallen by more than 40 percent. However, the early debates over nuclear safety took place before these investments were even on the horizon, and that gave experts a chance to talk about these issues with remarkable candor.

In June 1959 Clifford Beck, the leader of the Hazards Evaluation Branch of the AEC, stated the problem bluntly in his presentation

"Safety Factors to Be Considered in Reactor Siting" during a nuclear conference in Rome: "It is inherently impossible to give an objective definition or specification for 'credible accidents' and thus the attempt to identify these for a given reactor entails some sense of futility and frustration, and further, it is never entirely assured that all potential accidents have been examined".[4] What conclusions does he draw from this? For one, a requirement for a massive containment system that would hopefully remain intact even in the worst possible situation and that would also offer a visually impressive and "intuitively attractive" safeguard against horrendous eventualities. At the same time, he formulates the axiom that nuclear facilities should be constructed far away from highly populated areas.[5]

This last requirement posed problems for the densely populated countries of Europe. In the USA, it did not develop into an official dogma regarding reactor safety; even so, it increasingly became an unofficial rule that influenced policy in West Germany as well. This was made clear in remarks by even such an unlikely person as Heinrich Mandel, later referred to in the media as the "high priest" of atomic energy because of his leading role in nuclear development at the energy company RWE (Rheinisch-Westfälische Elektrizitätswerk). In 1966 he used this argument before the West German Ministry of Education and Research in order to thwart plans by the chemical industry to create company-owned nuclear plants in "Hoechst, Leverkusen, or Ludwigshafen".[6] The plans for a project by the chemical company BASF in Ludwigshafen were already well underway when the RWE, which itself was planning the construction of the Biblis Nuclear Power Plant in the immediate vicinity, helped convince the federal government to prohibit the BASF project. The heads of the chemical industry complained about the "barbarian brutality of the RWE".[7]

Up to that time nobody had been forced by the government in

[4] Quoted in Okrent, *Nuclear Reactor Safety* cit., p. 33.

[5] Ibid., p. 32 ff.

[6] Radkau, *Aufstieg und Krise* cit., p. 373.

[7] W. Abelshauser, "Die BASF seit der Neugründung von 1952", in *Die BASF: Eine Unternehmensgeschichte*, W. Abelshauser (ed.), C.H. Beck, Munich 2002, p. 514.

Bonn to take such concrete measures in response to the "residual risk" of a "design basis accident" as in the confrontation involving the Ludwigshafen project.[8] The origin of the GAU as a significant – if surprising – site of memory might be located here. The hidden irony of history is that in a certain sense it was none other than Mandel, the "atomic high priest" and advocate of the light water reactor technology, who thus popularized the concept of the Super-GAU – a concept that would later become a beacon of the largest anti-nuclear movement in the world. However, that movement was still beyond the horizon: the GAU had already had a turbulent career by the late 1960s, but it was still strictly a word for insiders.

The nuclear safety advisor of the West German Nuclear Ministry was skeptical about the MCA concept from the very beginning: it was, he argued, "something that cannot be observed in conventional safety practices". The DAtK working group noted as early as 1958 that it is necessary to distinguish between the "maximum controllable" and the "maximum conceivable" accident: ultimately a very straightforward logical argument, but one which was later invoked only by opponents of nuclear energy, however. K.E. Zimen of the Hahn-Meitner Institute in Berlin explained to the West German Nuclear Ministry in 1961 that:

> by nature a "credible" maximum accident is not an objectively defined measure, but instead is dependent on subjective factors. Only the "greatest possible" accident (equivalent to the instantaneous release of all fission products into the atmosphere in the form of a radioactive cloud above the destroyed building) can be formulated in an objective manner [...] Therefore it is only natural that the safety reports of different nuclear energy facilities show very different "philosophies" in their definition of the credible maximum accident.[9]

For if one were to insist upon using the only truly precise definition of the greatest possible accident, there would be scarcely any location within the "inhabited regions of the globe" where a reactor might be built.

[8] Radkau, *Aufstieg und Krise* cit., p. 379 ff.
[9] Quoted in ibid., p. 358 f.

No insurance company would have been able to offer reasonable conditions for coverage of such a maximum disaster. Therefore, government guarantees were a must for the development of nuclear power. These guarantees took much of the pressure out of safety discussions, and that had enormous repercussions for the design of nuclear reactors. If the nuclear industry had been required to bear full responsibility for the risk, inevitably the only types of reactor to have become generally established would have been those which had a lower maximum risk factor due to their construction and mode of operation. This was not the case for what became the most common type of nuclear power plant: the light water reactor. Since light water reactors need to be turned off for reloading fuel, and since that process is laborious and time-consuming, builders sought to maximize the amount of fissile material that reactors could process before needing to be reloaded. As a result, even the "residual risk" presented by these reactors is particularly horrific. During the early days of nuclear energy other types of reactors were considered such as the pebble-bed reactor (in German *Kugelhaufenreaktor*), in which the fissile material is enclosed in graphite balls that constantly cycle through the reactor. This type of reactor never made it past the prototype stage, however. This new kind of reactor, which departed from the existing path of technological development and brought different kinds of risks with it, didn't have any powerful community behind it that might have been able to bring it to technological perfection and make it marketable. The light water reactor, which became widely-used throughout the world, profited from the fact that its cooling system built upon existing steam power plants and that the facilities it needed for enriching uranium were already available in military complexes. Private-sector industries would not in their wildest dreams have considered constructing such expensive facilities using their own funds. At the same time, the light water reactors gave a new, civilian purpose to the costly remnants of the nuclear arms race and lent them an illusion of economic rationality. For the nuclear states this also offered a possibility to disguise some of their military expenditures.

The term "maximum credible accident" could be manipulated to

serve various purposes. Around 1960 members of the West German nuclear industry even tried to use the GAU as an excuse for getting a special license under certain circumstances: The tolerance dose of 0.5 rem of radiation per year set by the Euratom (European Atomic Energy Community) standards, should, they argued, be increased to 50 times as much in the case of a GAU! Karl Wirtz, the technological director of the Nuclear Research Center in Karlsruhe was forced to go head-to-head with some of the more persistent combatants.[10] In the early 1960s a concrete definition of an MCA or GAU became established on both sides of the Atlantic, a definition that satisfied not only the law books but the engineers as well: the GAU was specified as a malfunction in the primary cooling system leading to overheating of the reactor, and emergency cooling systems were instituted in order to take over in case of a disturbance in function.

Since then, however, the question hangs in the air: how much can such an emergency cooling system be relied upon when it is only put to the test rarely and in extreme cases, under circumstances where it is likely that escalating chain reactions could heat reactor cores to such a degree that they would cause the cooling water to evaporate instantaneously? Fukushima has given this question new, burning relevance. There were doubts about the efficacy of this backup system from the very beginning, not least among experts who had a clear understanding about what actually takes place within reactors. The international boom in nuclear energy at the end of the 1960s made this an urgent and hotly debated issue, in particular since light water reactors, which used enriched rather than natural uranium (thus leading to a higher density of radioactive material), were becoming more and more common. But precisely because of the new awareness of the stakes involved, it became increasingly difficult to draw conclusions about the practical implications of these risks.

An expert of the German Institute for Reactor Safety warned in 1969 that "there was a very real knowledge gap regarding the effec-

[10] Ibid., p. 358 f.

tiveness of emergency cooling systems [...] for all light water reactors around the world." In response, the West German government initiated research projects, as did other nations such as the USA. However, for all the results, these projects had a significant drawback: they were inevitably restricted to tests using modeling and computer simulations. The huge costs in combination with the potentially disastrous consequences of an ill-fated simulation ruled out realistic large-scale experiments – a fundamental dilemma of nuclear technology and other high-risk technologies!

But even with these limitations, research produced results that were not exactly reassuring.[11] At precisely the time when light water reactors began to enjoy worldwide success, behind the scenes a "revolution in light water reactor safety" (David Okrent) was taking place. Researchers increasingly recognized that a nuclear meltdown and the accompanying damage to the containment system were very far from being implausible or unlikely possibilities.[12] But billions of dollars had already been invested in the technology, and people either could not or would not abandon this technological path. When the discussions of nuclear risks came to a standstill among the relevant experts, they migrated into the view of the general public. There was a certain logic to this: there were very good reasons why the nuclear energy conflict began to reach a wider audience during this time, even though there had been no concrete nuclear catastrophe that would have caused widespread panic. This point is important, as the history of nuclear power is littered with speculations about irrational psychoses that drove the masses into opposition: the case of radiophobia that Karena Kalmbach chronicles in her article thus stands in a long tradition. But safety was a matter of concern in expert circles before the public took notice, and on the whole, the history of the anti-nuclear movement is a history of enlightenment, not of mass psychosis. It was primarily insider information, not the wild speculations of hysterical laypeople,

[11] Ibid., p. 370; for an extensive discussion of research in the USA see Okrent, *Nuclear Reactor Safety* cit., p. 294-305.

[12] Okrent, *Nuclear Reactor Safety* cit., p. 296.

which led to the protests against nuclear energy and the focus on the "Super-GAU."[13]

The first comprehensive collection of arguments by the West German opponents of nuclear energy was Holger Strohm's 470-page book *Friedlich in die Katastrophe* ("Peacefully towards Disaster") which appeared in October 1973,[14] and its page count grew with each successive volume until it competed with the Bible in size. It drew on anti-nuclear publications from the USA, which even then were remarkable for their scope and richness of knowledge. Strohm was the founder of the German branch of Friends of the Earth, the first international environmental NGO which had been started by the charismatic David Bower, who had left the (at the time) nuclear-friendly Sierra Club in protest of their policy. The Friends of the Earth's famously paradoxical motto "Think globally – act locally!" was particularly suited to the issue of nuclear energy, more than for many other battlegrounds of environmentalism.[15] The first edition of Strohm's book, however, makes no mention of the MCA, nor was the Germanization GAU as yet a familiar term. These terms still belonged to the vocabulary of the supporters of nuclear energy; not until several years later did the term GAU develop a life of its own in the German popular media.

Opponents of nuclear energy debated whether it was smart to focus too much on the risk of a nuclear catastrophe. First, the prospect was a somewhat nebulous risk in the days before Three Mile Island and Chernobyl – a matter of speculation rather than experience. Second, from a critical perspective, the GAU competed with other issues, most notably the essentially unsolvable issue of a permanent storage facility for nuclear waste that could withstand the passage

[13] J. Radkau, "Die Kernkraft-Kontroverse im Spiegel der Literatur. Phasen und Dimensionen einer neuen Aufklärung", in *Das Ende des Atomzeitalters? Eine sachlich-kritische Dokumentation*, A. Hermann, R. Schumacher (eds), Moos & Partner, Munich 1987, p. 308 ff.

[14] H. Strohm, *Friedlich in die Katastrophe: Eine Dokumentation über Kernkraftwerke*, Verlag Association, Hamburg 1973.

[15] J. Radkau, *Die Ära der Ökologie: Eine Weltgeschichte*, C.H. Beck, Munich 2011, p. 611f.

of millennia. Over the decades the nuclear protest movement has in fact alternated between these two targets. When a Super-GAU in fact took place in the form of the disaster at Chernobyl in 1986, it shocked even many long-standing members of the anti-nuclear camps, who in the course of their campaigns against nuclear armament had directed their efforts primarily against the proliferation potential inherent to nuclear technology, that is, the preparation of fissile material and the knowledge of how to use this to produce atomic weapons. Since the 1990s, the most popular protests went along with nuclear waste transports to the Gorleben interim storage facility in Lower Saxony. Thus, when the disaster at Fukushima occurred in 2011, the disposal of radioactive waste had long since become the primary target of the opposition movement, both in Germany and in other countries. How "credible" a catastrophe is held to be is highly dependent on unforeseeable events.

While GAU and Super-GAU continue to be provocative words in the German media, the safety discussion – to the extent that it ever treated the GAU concept seriously – has long since abandoned this approach. Although Ludwig Merz was one of the leading figures of the West German Reactor Safety Commission in the 1960s, his growing awareness of the dangers of nuclear reactors later led him to become a proponent of constructing reactors underground, a position that isolated him from the nuclear community. He confessed to the present author in 1981 that the "unfortunate GAU" was in truth merely a fiction used for the official authorization process and not a philosophy about nuclear safety – even though it had been misused to serve this purpose.[16] The inertia that led to continuing use of the GAU fiction in authorization procedures, he stated, was observed with a sense of unease even in the Nuclear Research Center in Karlsruhe.[17]

On 29 March 1979, the day after the accident at the Three Mile

[16] See similar comments in Id., "Sicherheitsphilosophien in der Geschichte der bundesdeutschen Atomwirtschaft", in *S + F (Sicherheit und Frieden)*, 6, 3, 1988, p. 113.

[17] Compare the remarks by D. Smidt in *Sechstes Deutsches Atomrechts-Symposium*, R. Lukes (ed.), Heymanns, Cologne 1980, p. 40, 41, 46.

Island reactor, the West German Parliament set up the study commission "Future Nuclear Energy Policy." It was succeeded by a whole row of other committees and continues to be held up as an example even today. It succeeded in establishing a consensus between the supporters and critics of nuclear energy, or at least as much of a consensus as was possible in a situation where the conflict had escalated nearly to the point of civil war between the opposing parties. It was agreed that probabilistic calculations regarding the frequency or infrequency of a Super-GAU could not be relied upon and that therefore it was not proper to trivialize the extreme consequences of a maximum accident by pointing to the extreme unlikelihood of such an occurrence.[18] The insurance industry, too, which normally based its calculations on the probability of a given event, could not rely upon this in the case of nuclear reactors.

A landmark in the nuclear discussion was the book *Normal Accidents*, published in 1984 by the Yale sociologist Charles Perrow, who had acted as an advisor to the commission established by President Carter to investigate the accident at the Three Mile Island power plant near Harrisburg. Using a combination of historical empirical evidence and organizational sociology, Perrow argued the thesis that unexpected, unforeseeable accidents are a normal part of highly complex technological systems.[19] According to him the fixation on calculating the degree of risk according to some specific imaginary maximum accident was a fundamentally wrong way of approaching the issue. Rather, if such complex technological systems are used at all, it is essential to focus on safety precautions that allow for coping with unforeseen events.

Not long after Perrow's book had become known around the world, Chernobyl presented a dramatic illustration of his thesis. The nuclear disaster in the Ukraine inspired visions rather than new theories, as in the Super-GAU song composed by Wolfgang Mahn:

Oohoho Tschernobyl

[18] *Zukünftige Kernenergie-Politik: Kriterien – Möglichkeiten – Empfehlungen.* Report of the Study Commission of the German Parliament, Bonn 1980, p. 32.

[19] C. Perrow, *Normal Accidents: Living With High-Risk Technologies*, Basic Books, New York 1984.

Das letzte Signal vor dem Overkill
Heh, heh, stoppt die AKW's!
("Oohoho Chernobyl
The last signal before overkill
Hey hey stop the nuclear plants!")

The song captured the mood in the days after Chernobyl, talking about radiation detection crews checking on the dosage in milk and lettuce, and about the fear instilled in children. But in the end, the song was skeptical about whether the Germans had learned their lesson: "The chancellor and the party leaders are turning to the atom again / And leave the sun, wind, and water unused all around us." Mahn suggested that they were probably trying to outdo the Roman Emperor Nero, who only torched a single city.

Around this time, the GAU entered common parlance, a sure sign that a term has achieved a fixed place in collective memory. The context of the nuclear debate was fading over time, as everything had already been said about the sense of the concept, or lack thereof. In fact, we can argue that the technical debate had already come full circle *before* the first protests: from obscure beginnings to brief popularity to decline and disbelief. Only the legal requirements kept the term in use among a disaffected nuclear community.

But while the term was out of fashion in nuclear circles, it thrived in popular culture. GAUs were now detected in all areas of life. When France was about to vote down the draft constitution of the European Union in 2005, the German weekly *Der Spiegel* spoke about an impending "Polit-Gau".[20] One year later, *Der Spiegel* spoke of a "Medien-Gau" when the Regensburg speech of Pope Benedict XVI provoked irritation and outrage across the Muslim world.[21] In fact, it no longer takes a real disaster or someone getting hurt to evoke the good old GAU. For instance, the yellow press nowadays brandishes an otherwise unspectacular wardrobe malfunction as a "Fashion-GAU".

As the GAU becomes a somewhat noncommittal moniker for

[20] R. Leick, "Ein Fußtritt für Europa?" in *Der Spiegel*, 21, 2005, p. 110.
[21] A. Smoltczyk, "Kulturkampf: Der Fehlbare", in *Der Spiegel*, 47, 2006, p. 122.

something vaguely dramatic, one thing seems to stick to the concept: a purported certainty as to what is right. But is that a good way to think about nuclear safety? At an international symposium on reactor safety at Monte Verità near Ascona in Italy in 1999, which the author of this article took part in, one of the presenters explained that the complexity of the issue of nuclear safety – namely that dangers always seem to lurk precisely where one least expects them – can best be illustrated using an Indian legend. It is a suitable parable for concluding our discussion of the history of nuclear policy and risk-taking: A maharaja once had a beautiful daughter, and of course many suitors sought to win her hand. Therefore stringent selection criteria were necessary. The maharaja announced throughout the land that he would present each of the suitors with two closed doors. Behind one of them was his daughter, and a hungry tiger lay in wait behind the other one. Only three suitors still had the courage to try for her hand anyway. The first was an optimist, who trusted his luck and opened one of the doors without pondering very long. Wrong choice. He was ripped apart by the tiger. The second wanted to be smarter and spent a long time puzzling over which door might be the correct one. But this didn't help him any, for he, too, chose the wrong door and was killed by the tiger. The third one wanted to be even smarter, embraced the concept of the worst-case scenario, and learned how to tame tigers in a matter of a few moments. This turned out to have been unnecessary, for when he opened the door the princess waited behind it. She embraced him – and drove a dagger into his heart from behind.

Environment, Memory, and the Groundnut Scheme: Britain's Largest Colonial Agricultural Development Project and Its Global Legacy

Stefan Esselborn

In the early spring of 1946, a man looked out of the window of an airplane flying over Tanganyika, the mainland part of today's United Republic of Tanzania. Since it was still the rainy season, the landscape stretched out below him would have been colored in a "rich, dark green", giving an impression of abundance and fertility.[1] But instead of fields and towns, he saw what must have seemed to him like endless stretches of empty bush. Tanganyika was known as one of the poor-

est territories of Africa, and neither German nor British colonizers had deemed it worthwhile to invest more than a bare minimum in infrastructure.[2] Whole regions were still completely cut off from any form of communications and were reachable only by foot. Tsetse flies carrying the deadly sleeping sickness made huge swathes of land uninhabitable for humans or domestic animals. While the airplane was droning onwards, an idea began to take shape in the passenger's mind. He started to wonder (if one accepts Alan Wood's dramatic rendering of the events) "whether this waste land could not grow oil crops, to the benefit of the margarine ration of the British housewife and the legitimate profits of the United Africa Company".[3]

The passenger in question was Frank Samuel, Managing Director of the United Africa Company (UAC). His flight over Tanganyika was part of a tour around the continent, looking for new sources of edible oil to supply UAC's "parent", the gigantic Unilever Corporation, which at the time provided three quarters of Western Europe's margarine and two thirds of the soap used in the British Empire. Once Samuel had returned to London, he approached the British Minister of Food with a plan: The British state should start growing *Arachis hypogea,* commonly known as peanuts or groundnuts, on a vast scale on "empty" land in Tanganyika.[4] Things developed very quickly from there on. Within a matter of months, a scientific reconnaissance team was sent out to explore the feasibility of the scheme,

[1] This is the assumption of the agronomist A. Wild, *Soils, Land and Food: Managing the Land during the Twenty-First Century,* Cambridge University Press, Cambridge 2003, p. 141.

[2] The preeminent work on the history of colonial Tanganyika (by one of the first scholars to acknowledge the central role of nature in African history) is still J. Iliffe, *A Modern History of Tanganyika*, Cambridge University Press, Cambridge 1979.

[3] A. Wood, *The Groundnut Affair*, The Bodley Head, London 1950, p. 27.

[4] See D.J. Morgan, *Developing British Colonial Resources*, Vol. II of *The Official History of Colonial Development*, Humanities Press, London 1980, pp. 226-228 for a summary of Samuel's proposal. Samuel himself built his plan on a proposal solicited from Tanganyika's Director of Agriculture, R.W.R. Miller, which he enlarged and modified substantially.

headed by John Wakefield, an agronomist with 18 years of experience in Tanganyika. Having spent nine short weeks in East Africa, the so-called "Wakefield Mission" presented their final report in a paper dated September 1946. They had enlarged Samuel's already vast design to encompass a total of 3.21 million acres (1.2 million ha), an area roughly equivalent to the US state of Connecticut, or a third of the surface of the Netherlands. This huge area, mainly located in three different sites in the Central, Western, and Southern provinces of Tanganyika, was to be cleared of bush and converted into 107 gigantic peanut fields of 30,000 acres (about 11,000 ha) each. Through one momentous injection of state capital, modern machinery, and human willpower, the hostile environment of Tanganyika was to be turned into a peanut monoculture. From 1950 onwards, the plans estimated a production of 600,000 to 800,000 tons of peanuts per year, offsetting the initial expenditure in two to three years.[5] Out of haste as much as out of unwarranted confidence, the idea of a pilot project was deliberately waived, based on the argument that in such a novel undertaking nothing valuable could be learned with such a pedestrian approach.[6] The official green light of the Cabinet was given in January 1947; in February, the first ships carrying men and machinery started landing in Tanganyika. It turned out be the prelude to one of the most infamous disasters in colonial agricultural development. Only four years later, in the early months of 1951, the scheme's operators conceded defeat and withdrew from East Africa.

[5] "A Plan for the Mechanized Production of Groundnuts in East and Central Africa", Command Paper (Cmd.) 7030, H.M. Stationary Office (H.M.S.O.), London 1947. Annual savings to the Treasury were estimated at £10 million, compared to a required total capital expenditure of £24 million. 27 of the 107 units were to be located in Kenya and North Rhodesia; before any work had been begun there, these plans were abandoned in 1949 because of the difficulties in Tanganyika (Overseas Food Corporation, *Annual Report and Statement of Accounts, 1949/50*, H.M.S.O., London 1950, p. 1).

[6] As the Labour MP Ian Mikardo put it in 1950, "one can learn nothing very valuable about farming 100,000 acres by digging up a single cabbage patch"; House of Commons Debate (HC Deb), 18 July 1950, Hansard's vol. 477, col. 2099; see also Wakefield's response to a fellow agronomist deploring the lack of a pilot project in "Nature" ("Letters to the Editors", in *Nature*, 165, 1950, p. 234).

The gigantic sum of nearly £36 million (the equivalent of roughly £900 million in 2011 prices) had to be written off. In spite of all these expenses, less than seven percent of the envisaged area had been cleared. Moreover, almost nine-tenths of it proved so unsuitable for crops that by 1955 it was no longer cultivated. As a supreme statistical humiliation, more peanuts were actually bought and imported to East Africa as seeds than the scheme ever produced.[7]

Agricultural projects rarely make newspaper headlines, but the groundnut scheme did. Unlike the vast majority of projects in the history of agricultural development, it could not be easily ignored by all but a handful of its contemporaries. Not only were thousands of human beings on different continents and in very different social positions directly affected by it, but because of its ambition and wide publicity, the project gained international notoriety and was widely discussed by many others. These discussions were sometimes heated, since they touched on a variety of contentious fields: the economic role of the state, colonial policy and race, the "development" of "backward" societies, the mechanization and industrialization of agriculture, and in the most general way even the relation between "Man" and "Nature" in the second half of the twentieth century. Tracing shifting perceptions on these issues in connection to the groundnut scheme is not only interesting in its own right; it will also help to answer some of the most puzzling questions surrounding the Scheme, which cannot be answered by looking exclusively at technical and economic factors:[8] Why were so many mistakes made

[7] Cf. Cmd. 7030 cit.; "The Future of the Overseas Food Corporation", Cmd. 8125, H.M.S.O., London 1951; Overseas Food Corporation, "Annual Report and Statement of Accounts for the year ended March 1951", H.M.S.O., London 1951; Matteo Rizzo, "What Was Left of the Groundnut Scheme? Development Disaster and Labour Market in Southern Tanganyika 1946–1952", in *Journal of Agrarian Change*, 6, 2, 2006, p. 208.

[8] Andrew Coulson, "Agricultural Policies in Mainland Tanzania", in *Review of African Political Economy* 10, 1977, pp. 75-76, has a bullet-point style list of the Scheme's seven main technical flaws. The best systematic overview is given by J.S. Hogendorn, K.M. Scott, "The East African Groundnut Scheme: Lessons of a Large-Scale Agricultural Failure", in *African Economic History*, 10, 1981, pp. 81-115.

that seemed easily avoidable even to contemporaries? Why was such a flawed project undertaken in the first place?

Given that at least some aspects of the groundnut scheme are still widely remembered and referred to today, this focus on perceptions can be combined with a diachronic perspective. For the framework of the French nation state, Pierre Nora has invented the analytical concept of "lieux de mémoire" ("sites of memory"), which has since been adapted for a variety of contexts.[9] As Indra Sengupta and others have pointed out, there are at least two aspects of the concept that merit special attention when thinking about a colonial "site" like the groundnut scheme.[10] Firstly, in the colonial context sets of narratives tend to be more visibly fragmented and ambiguous, subverting Nora's focus on the consensus-building "national" dimension of memory. Secondly, questions of space and place take on a new relevance, not least because of their centrality to colonialism itself.[11] Although the groundnut scheme was physically located in the Tanganyikan hinterland, it was targeted just as much at British political debates and global expert discourses, and was often more concerned with Western representations of East Africa than with the actual situation on the ground. Yet it would be a mistake to see the Scheme exclusively as a web of discourses. Certain characteristics of the Tanganyikan landscape as a complex ecosystem – including vegetation, soils, precipitation patterns – clearly played a major role

[9] P. Nora, *Les lieux de mémoire* (3 vols.), Paris 1984-1992; cf. also Id., "Between Memory and History: Les Lieux de Mémoire", in *Representations*, 26, 1989, pp. 7-24; for an overview over the field of cultural memory studies see A. Nünning, A. Erll (eds), *Cultural Memory Studies: An International and Interdisciplinary Handbook*, de Gruyter, Berlin 2008.

[10] I. Sengupta (ed.), *Memory, History, and Colonialism: Engaging with Pierre Nora in Colonial and Postcolonial Contexts*, Bulletin Supplement, 1, German Historical Institute London, London 2009.

[11] According to Nora, *lieux de mémoire* have a symbolic function as well as a material dimension (Nora, *Memory and History* cit., pp. 18-24). However, I agree with Monica Juneja that his primary interest seems to be the symbolic, while the spatial dimension remains largely unexplored (Id., "Architectural Memory between Representation and Practice: Rethinking Pierre Nora's *Les lieux de mémoire",* in Sengupta (ed.), *Memory, History and Colonialism* cit., pp. 16-17).

in the unfolding of the drama (or possibly farce) that the project became. All of those who came into contact with the Scheme interacted with the social and ecological landscape of East Africa in some form – but their perceptions of it varied widely, and so too, consequently, did the sense they made of the Scheme.

In this essay, I will address separately three layers of context, representing the three main perspectives on the groundnut scheme, hopefully without losing sight of the interconnections: British imperial policy, colonial (agricultural) development, and the history of Tanganyika – or more precisely, the history of the three regions where the project took place. From the perspective of a historian working at a European university, the third perspective, while possibly the most fascinating, was certainly the most challenging. For a number of reasons that are themselves historical, the views and perspectives of ordinary Tanzanians are much harder to trace than those of British Members of Parliament, or of internationally renowned scientists. Nevertheless, this perspective seemed too important to be ignored. As it was not possible to conduct field research in Tanzania in the framework of preparing this article, I am all the more indebted to those who have.[12]

From Housewives' Hope to Political Quagmire: Great Britain's "Oleaginous Iliad"

The final parliamentary white paper endorsing the "groundnut scheme" had acknowledged that the plan "clearly involve[d] considerable risks", since no agricultural operation on a comparable scale had ever been tried before in such "remote and undeveloped areas".[13] Moreover, direct intervention of the state on such a massive scale

[12] In researching the present article, different types of sources have been used, among them official reports and accounts by the OFC itself or various other bodies, parliamentary debates and newspaper articles, scientific articles and monographs, as well as some published memories. The "local" perspective had to be reconstructed from colonial sources or the secondary literature (see below).

[13] Cmd. 7030 cit., p. 4.

was contrary to traditional British colonial doctrine as well as practice, and only a few years earlier the same proposal would probably not have been seriously considered. In 1946, however, the situation was different. A conjuncture of political, climatic, and demographic factors had resulted in a worldwide shortage of fats and edible oil. In Britain – a country that was still recovering from the ravages of the Second World War – this "oil crisis" was widely perceived as the harbinger of a neo-Malthusian "World Food Shortage", with potentially devastating effects on a global scale. A substantial and immediate increase in worldwide agricultural production seemed essential, not only for already meager metropolitan fat rations, but for the stability of the British Empire as a whole.[14] The Wakefield mission therefore concluded that an extraordinary situation required extraordinary measures: "Nothing but the most highly mechanised methods, on a vast scale never previously envisaged, will result in any appreciable amelioration of the presently disastrous food situation".[15]

In addition, the design of the project was meant to make a political point. Clement Attlee's newly elected Labour government subscribed to a Fabian vision of colonial development, which advocated a more proactive role for the state in the colonies, in the production of primary materials as well as in the provision of social benefits to colonial populations.[16] By proxy of the publicly owned Overseas Food Company (OFC), which was supposed to be in charge of the groundnut scheme, the British state would not only ease the plight of the British working class, but also invest massively in an African

[14] By early 1946, the British government had already called a series of urgent ministerial meetings to discuss the dangerous depletion of edible oil stocks in Britain, which had to cover 90 percent of her demands through imports; cf. Cmd. 6785 "The World Food Shortage"; D.J. Morgan, *Changes in British Aid Policy, 1951-70*, Vol. IV of *The Official History of Colonial Development*, Macmillan, London 1980, pp. 177-200.

[15] Cmd. 7030 cit., p. 18.

[16] P. Kelemen, "Planning for Africa: The British Labour Party's Colonial Development Policy, 1920-1964", in *Journal of Agrarian Change,* 7, 1, 2007, pp. 76-98.

region where the market had so far failed to do so.[17] Even though the procurement of foodstuffs for the metropolis was clearly the most important consideration – after all, the entire harvest was to be consumed in Britain –, the white paper carefully pointed out all the benefits of the modern social policy it would bestow on Africans: new streets and railroads, better healthcare, technical training and skilled jobs, higher living standards, and even "proper" trade unions.[18] In the eyes of the *New York Times,* the scheme amounted to an "extension of socialism to the British colonies".[19]

Although a project of this scale had never been undertaken in Africa, the groundnut scheme seemed very much in keeping with the general mood of postwar development planning, and could point to famous precedents. "In its breadth of vision and the technical resourcefulness with which it plans to impose man's will upon nature, it invites comparison with the Tennessee Valley Authority and with the far-reaching development schemes of the Soviet governments", *The Times* pointed out.[20] Even more immediately present were the experiences and emotions of the Second World War, when the devastating impact of large-scale operations using central planning and

[17] The haste had been so great that the scheme was started by the UAC as a managing agency. The OFC was set up in the meantime, officially created by the Overseas Resources Development Bill in February 1948, and took control of the management on 1 April 1948. The fact that the whole scheme was put under the supervision of the Ministry of Food, and not the Colonial Office, not only affirms the primacy of British interests in the venture but must also be read as a deliberate attempt to break with previous administrative traditions. Like the Tanganyikan government, the Colonial Office was deliberately bypassed because it was judged too conservative and "too slow to move"; cf. Wood, *The Groundnut Affair* cit., p. 49f.

[18] Most of these benefits never materialized, and when the African workers took the rhetoric seriously enough to try a strike in 1947, it was suppressed by force (Wood, *The Groundnut Affair* cit., p. 81f.). In fact, the focus on Britain was so dominant that in retrospect the groundnut scheme can be seen as a late "Triumph of the [Joseph] Chamberlain view" of the late nineteenth century, perceiving the colonies merely as a source of raw materials to be exploited by the metropolis (M.A. Havinden, D. Meredith, *Colonialism and Development: Britain and Its Tropical Colonies, 1850-1960*, Routledge, London/New York 1993, p. 307.

[19] "Nut Farming", *The New York Times*, 6 February 1947.

[20] "A Plan for East Africa", *The Times (London)*, 6 February 1947, p. 5.

heavy machinery had been amply proven on the battlefield. John Strachey, the Minister of Food who became the political "face" of the groundnut scheme, never tired of pointing out that what he called "Operation Groundnuts" was to be a peace-time equivalent of Britain's biggest military campaigns. In the House of Commons, he read from his diary as a participant in the Allied landing operations in North Africa, when he had allegedly already asked himself: "What could not be done if an expedition of this scope could be fitted out, not in order, as this one is, to decide who should have the right to develop Africa, but in order to actually develop Africa?"[21] The "swords-to-ploughshares" motto was to be taken literally. Since the enormous number of tractors needed proved hard to procure, hundreds of Sherman tanks were to be refitted into agricultural machines.[22] Support for such a noble cause was not confined to the political left: Blowing Strachey's trumpet, the conservative Member of Parliament Charles Ponsonby declared his party's support for the great "battle of mechanised science against the forces of nature" in which the scheme was about to engage.[23] Following these grandiose descriptions, mobilization efforts for the project were a roaring success. Strachey repeatedly boasted that more than 100,000 volunteers had tried to sign up for the projected maximum of 1,250 jobs for "Europeans".[24]

The enthusiasm was to be short-lived. From the very beginning, the groundnut scheme had been presented to the British public as a numbers game, with one set of spectacular statistical promises following the next. But virtually the only targets that were ever easily reached (and surpassed) were those for expenditure. After the first year, Parliament – unlike some critical voices in the press – was still prepared to accept the astonishing conclusions of the first official review of progress in

[21] HC Deb, 6 November 1947, vol. 443, col. 2034.

[22] The refitting was done by Vickers, earning the vehicles the name "Shervicks"; Hogendorn, Scott, "Groundnut Scheme" cit., p. 96.; "East African Groundnuts Scheme Review of Progress to the end of November, 1947", Cmd. 7314, H.M.S.O., London 1947, p. 5.

[23] HC Deb, 29 July 1947, vol. 441, col. 355.

[24] HC Deb, 12 July 1948, vol. 453 col. 877; Wood, *The Groundnut Affair* cit., p. 44.

late 1947, which could find "no more reason now than there was a year ago" to doubt the feasibility of the project – even though only five percent of the clearing scheduled for 1947 had been done, while the expenditure for the year had doubled.[25] In the second year, when 600,000 acres of peanuts should have been planted according to the original plan, not even 50,000 acres were cleared, and perhaps as little as 13,000 acres of this actually represented properly cleared and rooted former bush.[26] Problems of transport into the virtually roadless Tanganyikan hinterland had been badly underestimated; especially the hopelessly congested port at Dar-es-Salam in particular became a theater of "rampant disorganization".[27] While the workers in East Africa vainly chased illusionary clearing targets, the first yields per acre also turned out to be substantially lower than projected, casting doubts on the agricultural as well as the economic foundations of the scheme and "knock[ing] the bottom out of all forecasts", as one member of Parliament remarked.[28] Caught in the web of overblown expectations they themselves had created, Strachey and the OFC management started to focus less on sorting out the chaos reigning in East Africa than on keeping the lid on the full extent of the problems – at least until after the general elections in February 1950.[29] By then, the groundnut scheme had already turned into a highly politicized "scandal". Strachey and Leslie Plummer, the OFC's head, had become a liability for Labour and were removed from their posts soon afterwards.[30] When finally an independent working party was sent out in the summer of

[25] Cmd. 7314 cit., p. 9.

[26] The rest was either not yet cleared of roots, one of the most difficult and time-consuming operations, or former grassland which could simply be ploughed; Wood, *The Groundnut Affair* cit, p. 155f.

[27] Hogendorn, Scott, "Groundnut Scheme" cit., pp. 90-92.

[28] Crookshank (HC Deb 14 March 1949, vol. 462, col. 1751), commenting on the UAC reporting an average yield of 540 lb per acre for 1948, instead of the 750 lb that Cmd. 7030 based its calculations on.

[29] Wood, *The Groundnut Affair* cit., p. 199f., reports that the scheme's employees in Tanganyika were complaining about "political sunflower", i.e. the planting of this crop with the main goal of increasing sown acreages.

[30] Strachey landed softly, however, and, in an ironic twist that was not lost on contemporary observers, took over the Ministry of Defense after the 1950 elections.

1950 to look into the situation at Kongwa, the first site to have been developed, it could only certify the demise of the scheme in its original form, and recommend "that the project for the large-scale mechanized production of groundnuts should be abandoned".[31] In late 1950, the OFC admitted publicly that "the original aims of the scheme have proved incapable of fulfillment." Following the insight that "mechanical clearing can be done, but it cannot be done at an economic cost", the mechanized battalions were ordered to withdraw in early 1951.[32]

For a while, the scheme dominated the public perception of "colonial development" in the United Kingdom, admittedly a topic otherwise largely ignored by most Britons.[33] But while the design of the groundnut scheme did expose the Atlee government to some accusations of colonial exploitation by their political opponents (in itself a delicate matter for a party of the left),[34] the situation in Africa was at best a footnote in the reaction to the scheme in Europe. The at times vitriolic debate focused above all on economic policy and the waste of public funds. In the Conservative Party's manifesto for the 1950 election, the groundnut scheme served as a prime example of "socialist mismanagement". Free marketeers especially liked to blame the public character of the OFC for the failure, conveniently forgetting the role of the UAC. Struggling to explain away the fiasco, Labour politicians pointed to "a petty campaign against this scheme ever since it was launched", with the aim to "make East Africa a bogy

[31] S.H. Frankel, *The Economic Impact on Under-Developed Societies*, Harvard University Press, Cambridge 1953, p. 143.

[32] Cmd. 8125 cit., p. 10. The final decision to abandon the project was ultimately triggered by the fact that the OFC threatened to exceed the £55 million limit on total borrowing that was written into its founding law.

[33] A British poll conducted in mid-1949 found that 67 percent of respondents "knew something" about the groundnut scheme, making it "[a]lmost the only aspect of colonial development arousing any interest", whereas "over half were unable to recall one single colony by name" ("Public ignorance about colonies", *The Times (London),* 22 June 1949).

[34] The Conservative Party's accusations of "colonial exploitation" against Labour in the 1951 elections probably furthered the formation of an anti-colonial movement on Labour's left wing, and ultimately helped prepare the party's pro-independence turn in the mid-1950s; cf. Kelemen, "Planning For Africa" cit., p. 91.

with which to frighten the electors".[35] As late as 1960, Labour MPs still complained about "those ageing young Conservatives who went from meeting to meeting shouting 'Groundnuts' every time any Labour candidate tried to emphasise to the electorate the need for expanding the development of the underdeveloped areas" – unfairly profiting, as Labour saw it, from the complete ignorance of voters about the actual situation in East Africa.[36]

But as costly projects that achieved little were by no means restricted to one party, the damning verdict of "a new groundnut scheme" soon came to adorn expensive failures presided over by governments of all political colors – from the aborted development of the Blue Streak ballistic missile in the late 1950s, through the failed attempt to establish the DeLorean Motor Car Company in Northern Ireland in the late 1970s, to the introduction of the so called "Poll Tax" of the late 1980s, or the "Millennium Dome" built in Greenwich in 2000.[37] Largely stripped of its geographical and historical context, the groundnut scheme became shorthand for the waste of public money through large and overambitious projects, situated somewhere between tragedy and farce. Britain's "oleaginous Iliad", as the French geographer Pierre Gourou rather gleefully dubbed it in 1955,[38] was ultimately assigned a place in the nation's memory on a par with historical catastrophes like "Dunkirk and all our other triumphant failures which we cherish so much more dearly than successes."[39]

[35] Hynd and Woods, HC Deb 14 March 1949, vol. 462, cols. 1747-1866.

[36] HC Deb 27 April 1960, vol. 622, col. 323. The argument for the economic incompetence of Labour governments based on the groundnut scheme can be found in Parliamentary debates as late as 1992; cf. HC Deb 27 October 1992, vol. 212, cols. 850-852.

[37] HC Deb 27 April 1960, vol. 622, cols. 211-345; HC Deb 19 February 1991, vol. 186, cols. 222-223; HC Deb 24 June 1992, vol. 210, col. 299; "The Dome: A Chamber of Spending Horrors", *Sunday Business (London)*, 7 January 2001. A long list of further examples could be compiled, with entries as recently as May 2010 ("The Switch to Digital Radio is Folly", *The Guardian*, 24 May 2010).

[38] P. Gourou, "Le 'Plan des Arachides': Une expérience d'agriculture mécanisée en Afrique orientale", in *Cahiers d'Outre-Mer*, 30, 1955, pp. 105-118.

[39] R. Boston, "Video: It's Eldoradogate", *The Guardian*, 29 July 1993.

From Technocratic Dream to Developers' Nightmare: The Groundnut Scheme and the Expert Community

Labour Party politicians, however, were not the only ones to be embarrassed by the groundnut disaster. Although politics had undoubtedly played an important role in the conception of the scheme, some of Britain's most seasoned experts in African agricultural development had been a driving force as well – not least Wakefield himself and his mission. Worse, the project had initially been widely acclaimed by the large expert community associated with agricultural development.[40] After decades of battles against under-funding, over-caution, and the traditionalism of colonial administrations, the Malthusian urgency, massive funding, and military vim of the scheme must have looked like an immensely empowering prospect for many development planners.[41] Up to the 1940s, governments had expected to finance colonial development initiatives out of the budget of individual colonies, which were notoriously short on cash even before the world economic crisis of the 1930s. The feeling of finally being granted the means to make a real impact was reinforced by contemporary economic theory, which claimed that the only ingredient missing for growth and "development" in Africa and other parts of the non-western world was sufficient investment.[42]

The scheme's scientists had started by surveying and categorizing

[40] Cf. "British Colonial Development" in *Nature*, 160/4058, 9 August 1947, pp. 171-173.

[41] For a similar reaction among the colonial bureaucracy see P. Johnston, "The Groundnut Scheme: A Personal Memoir", in *Habitat International,* 7, 1-2, January 1983, p. 11: "All of us in the Tanganyika Administration serving in the Southern Province were 100% 'groundnutters'. Here was a development project on a vast scale which could bring funds to the oft forgotten 'Cinderella Province'."

[42] According to the Harrod-Domar model of economic growth, which was dominant in the late 1940s and 1950s, the main (or even sole) explanation of the absence of growth was a lack of investment, the so-called "investment gap"; cf. William Easterly, *The Elusive Quest for Growth: Economists' Adventures and Misadventures in the Tropics*, MIT Press, Cambridge, MA 2001, esp. pp. 25-46.

their "raw material". They divided the area into two blocks according to the two predominant types of soil they had found, "light sandy soils" and "red loams".[43] The former covered almost the entire site in question in the Western Province around Urambo as well as two-thirds of the southern site at Nachingwea, areas that predominantly carried so called "miombo" woodland, a dry, widely spaced forest-savannah common to southern Africa.[44] The loams, possessing a higher percentage of clay, were covered with denser *miombo* in the south and with Rhino-Bush, Acacias, or Star Grass on the dry plateau around the Kongwa.[45] The different types of vegetation were discussed solely as a marker, however, soon to be wiped off the earth by modern technology. At the whim of little more than a thousand (white) men and their machines, the equivalent of whole counties and provinces would be converted into a gigantic peanut monoculture, including drainage systems, anti-erosion barriers and terraces. Roads, wells, and new towns for workers and administration were planned. At the research stations, different scientific disciplines would work hand-in-hand. The *British Medical Journal* dreamt about using the project for "the application of preventive tropical medicine on a scale never before attempted in Africa." This meant not only building hospitals and health centers, but also eliminating "tribal medicine", seen as an impediment to modern health care, with the help of specialized anthropologists. Eradicating trypanosomiasis and its vector, the tsetse fly, would require careful environmental micromanagement; botanical experts were needed "to determine which species of trees must be cut and which must be allowed to remain."[46] In an almost Catonian *ceterum censeo*, a reader of the same journal warmly welcomed the chance to dispose of "vermin" like elephants

[43] Cmd. 7030 cit., pp. 40-44. The report described a third type of soil ("Chipya" soil), found only in Northern Rhodesia.

[44] For a description of this ecosystem and its use by humans see B. Campbell, *The Miombo in Transition: Woodlands and Welfare in Africa*, CIFOR, Bogor 1996.

[45] Cmd. 7030 cit., pp. 40-44.

[46] "Groundnuts in East Africa", in *BMJ*, 1, 4496, 1947, pp. 301-302.

and hippopotamuses in order to "starve out" the tsetse.[47]

This purely developmental perspective overrode all competing visions of the landscape, including imperial conceptions of "empty" lands as a hunting reserve.[48] As Alan Wood relates, C.P.J. Ionides, a former Army officer, elephant hunter, snake-enthusiast, and local game warden who opposed the clearing of a particular region near Nachingwea, which he claimed was "inhabited by thousands of elephants", was treated with disbelieving contempt by the Scheme's experts. That he "seemed to think that it was a pity to drive out animals in order to grow food for people in Europe" exposed him to the "great indignation" of the OFC's head, Leslie Plummer himself.[49] The scale of this brave new world was so overwhelming that even the comparatively minute part of it that was actually realized already made a lasting impression on visiting scientists. "One of America's foremost agricultural experts", overlooking no more than three of the scheme's 107 planned "mechanised units" from a small hill, confessed to "experiencing the greatest thrill of his life because there was spread before him the largest continuous area of mechanized arable land in the world".[50] Even scientists critical of the project expressed their satisfaction at seeing the primeval chaos of African bush replaced by "vast areas of good crops, well cultivated and clean", arranged in a visual order that looked "modern" and efficient.[51] In its neat and or-

[47] "The Game Must Be Destroyed", Correspondence, in *BMJ*, 1, 4498, 1947, p. 388.

[48] For the connection between imperial hunting and early conservationism in Africa see J. MacKenzie, *The Empire of Nature: Hunting, Conservation, and British Imperialism,* Manchester University Press, Manchester 1988; W. Beinart, *Environment and Empire*, Oxford University Press, Oxford 2009, pp. 58-75.

[49] Wood, *The Groundnut Affair* cit., p. 145. Ionides himself was appalled by the intrusion of what he later called "a gigantic British Government folly" into his domain: "Tractors with chains were clearing the bush. There were tented camps and rows upon rows of concrete block houses. Nachingwea seethed with humanity, including 2,000 Europeans. It was frightful"; C.J.P. Ionides, *A Hunter's Story*, W.H. Allen, London 1965, p. 113. On Ionides see M. Lane, *The Snake Man: Life of C.J.P. Ionides*, New ed., Hamish Hamilton, London 1988.

[50] Frankel, *Economic Impact* cit., p. 144.

[51] Quoted by Morgan, *Changes* cit., pp. 54f. The blind faith in "visual order"

derly look, the model town Urambo in the west, built from scratch to accommodate the scheme's workers, was said to resemble "a boy scouts camp, run by an extremely efficient scoutmaster".[52]

Nature, however, put up more of a fight than the "groundnutters" had imagined. Major-General Harrison, the scheme's "field commander" in Tanganyika, complained about "thorn bush about 15 feet high", of a density that "must be seen to be believed", interspersed with "enormous Baobabs, probably one of the most useless trees on the face of the earth". The soil beneath them was made up of a "solid mass of interlaced rubbery roots" that proved almost impossible to clear.[53] A large proportion of the scheme's tractors, bought second hand from all over the world, broke down in the demanding African conditions before even reaching the sites. Of those that did arrive at the peanut fields, up to 75 percent were out of action at times. The retrofitted tanks soon turned out to be ill-suited to this unforgiving environment and ultimately provided a "higher-cost alternative" for the Caterpillar bulldozers they were meant to replace.[54] New agricultural machinery ordered from North America kept running into stumps, roots, and jackal and aardvark holes. Because of its high clay and quartz content, the soil baked into a concrete-like mass during the dry season, which wore down standard ploughshares within only five hours. The window of opportunity for harvesting thus became very narrow, since "nothing short of pneumatic drills or dynamite could get the nuts out" of the soil which had not been harvested before the dry season started.[55] Soon enough, the ultra-mechanized groundnut scheme was forced

– or the "visual representation of efficiency" – is one of the central characteristics of "high-modernist" projects according to J.C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed,* Yale University Press, New Haven 1998.

[52] Wood, *The Groundnut Affair* cit., p. 124.

[53] D. Harrison, "Civil Engineering Problems of the East African Groundnuts Scheme", in *The Engineer*, 30 July 1948, p. 121; Wood, *The Groundnut Affair* cit., p. 177f.

[54] Hogendorn, Scott, "Groundnut Scheme" cit., p. 96, 89f.

[55] Ibid.; Wood, *The Groundnut Affair* cit., pp. 179-182, 235.

to follow the supposedly "lazy" African cultivators in working the soil during the rainy season only.[56] In their despair over insufficient precipitation and dying crops, the scheme's scientists even experimented with artificial rainmaking, only to find that their magic was no less fault-prone than its African equivalent.[57]

Warnings that environmental conditions forbade what the plan proposed to achieve were repeatedly ignored by the scheme's planners. One of their most perplexing decisions was the selection of the arid region around Kongwa in central Tanganyika as the first site to be developed. Here, the Wakefield mission acted not only against local wisdom, which knew the area as the "country of perpetual drought", and the explicit advice of the governor of Tanganyika himself. They also ignored the best available meteorological data, showing the region to be one of the driest in the whole country, with precipitation levels well below the required minimum for peanuts.[58] Instead, in addition to "aerial reconnaissance of many thousands of square kilometers",[59] the experts seem to have based their decision primarily on digging up "one fortieth of an acre taken within a field of native-grown groundnuts" – a quite unconventional statistical sample for a gigantic industrial agriculture project.[60] Even on the

[56] "Again and again in England I had heard some pontifical panjandrum pointing out that one of the difficulties in developing Africa was that it was hard to make good workers out of the lazy Africans, who had been quite happy for centuries to tend to their shambas [fields] during the wet season, and do nothing all the rest of the year round. Now the sun and the rain and the soil of Africa were imposing exactly the same timetable on the latest invaders". Wood, *The Groundnut Affair* cit., p. 182.

[57] Cf. the series of articles by D.A. Davies, "Artificial Stimulation of Rain at Kongwa", in *Nature*, 167, 1951, p. 614; id., *Nature*, 169, 1952, p. 1001f; id., *Nature*, 171, 1953, p. 829; id., *Nature*, 174, 1954, pp. 256-258.

[58] Morgan, *Developing* cit., p. 228; Iliffe, *Tanganyika* cit., p. 443. One might even add a fourth, historical warning: Wood, *The Groundnut Affair* cit., p. 38, cites the accounts of a missionary who unsuccessfully tried to establish agriculture in the region in 1878, and had to give up for lack of water.

[59] Cmd. 7030 cit., 18f.

[60] John Wakefield, "Note on Agricultural Soundness of the Scheme", quoted by Morgan, *Developing* cit., p. 248. A further example of this cavalier approach to data-gathering would be the preliminary rainfall data for Urambo, which was tak-

more suitable sites around Nachingwea and Urambo, the huge and uniform fields proposed by the architects of the groundnut scheme were simply not compatible with the ecological limitations imposed by nature. Agronomists of the Colonial Office already pointed out in 1946 that under East African conditions it would be next to impossible to select "very large blocks of land of such uniform topography and soil that they would be ideally suitable for development by mechanization".[61] Neither was the botanical lead well cast in this respect: because of its growing and ripening patterns, the peanut was generally not a good candidate for large-scale mechanized agriculture.[62] The scheme's own mission, sent to North America in 1946 to inquire about agricultural equipment, had recorded that even in the US – the very model of mechanized peanut production that the "groundnutters" wanted to transplant to Africa – mules were often preferred to tractors and field sizes were generally rather small.[63] A continuous peanut monoculture would furthermore provide a veritable field day for the rosette virus, a plant disease affecting groundnuts. This fear proved well-founded: the disease soon became so endemic in Urambo that cultivating peanuts was officially forbidden in the region for several years from 1953 onwards.[64]

Unsurprisingly, the technical and scientific personnel of the scheme were haunted by its ignominious breakdown. As early as 1950, the scheme's former head of information, Alan Wood, imagined his former colleagues "sitting by their firesides in a reminiscent mood", wondering "if it really happened, or whether they merely dreamt in some idle moment, that a timber mill was sited before anyone had really counted the trees for the wood; that a pipeline

en almost 100 kilometers from the site (Hogendorn, Scott, "Groundnut Scheme" cit., p. 94).

[61] Morgan, *Developing* cit., p. 248f., cites the report of the so-called Clay Mission, sent by the Colonial Office to investigate the peanut production in West Africa, commenting on the Wakefield paper.

[62] Ibid. The OFC came to the same conclusion in 1951; cf. Cmd. 8125 cit., 10.

[63] Morgan, *Developing* cit., p. 253f.

[64] Morgan, *Developing* cit., p. 228f.; Hogendorn, Scott, "Groundnut Scheme" cit., p. 101.

costing £500,000 or more was built to take fuel, at a huge expense, to tanks set miles from anywhere in the African bush; that a railway was begun without anyone knowing exactly where it was going to in the end and that inspiring everything was a faith that you could grow groundnuts when you had not even bothered to inspect the ground".[65] In search of explanations, many fingers were pointed at politicians. Echoing some of the scheme's scientists, who had previously complained that "they never really had a chance to do their work properly", technical experts in the Colonial Office blamed "extreme Ministerial pressure" for the fiasco.[66] On the other side of the Atlantic, in a 1952 meeting of the American Geographical Society, the peanut project served to exemplify what would happen if "the knowledge of specialists should be frittered away by the ignorance of politicians and administrators".[67]

The doubts raised by the crushing failure of the groundnut scheme – corroborated by similar experiences with the OFC's "twin", the Colonial Development Corporation[68] – caused British colonial development in the mid-1950s to backtrack to more conservative methods of agricultural modernization, focused on small, inexpensive pilot projects. In fact, the remains of the groundnut scheme itself were soon physically re-integrated into colonial agricultural development orthodoxy. After the abandonment of the original plans in 1951, a series of experimental schemes were started under the tutelage of the

[65] Wood, *The Groundnut Affair* cit., p. 151. Written in a popular vein, the book was widely read at the time of its publication, gleefully quoted from in Parliament by the opposition, and became a point of departure for most subsequent studies. Strachey and Plummer apparently tried to prevent its publication, but only managed to delay it for some months; cf. HC Deb 20 March 1950, vol. 472, cols. 1535-1537.

[66] "Groundnut Scheme 'Disappointment'", *The Times (London)*, 1 January 1949, p. 4; Morgan, *Developing* cit., pp. 306-308.

[67] "Changing Trend in Geography", *The Times (London)*, 5 August 1952, p. 3.

[68] After some expensive failures in its early projects (the most famous of which was the so-called Gambian Egg Scheme), the Colonial Development Corporation (CDC) gradually abandoned direct production and switched to less risky endeavours – mostly giving out loans; see Havinden, Meredith, *Colonialism and Development* cit., pp. 283-298.

cautious Colonial Office, aimed at finding out how to make use of the already cleared areas. In the view of the *Official History of Colonial Development*, "the attempt to bustle Nature was abandoned in favor of an attempt to provide a viable pattern for African agricultural development".[69] Largely unnoticed by the British public, these pilot projects were passed on by the OFC to its successor, the Tanganyika Agricultural Corporation (TAC) in 1955, and were ultimately taken over by the independent Tanzanian state in 1961. The World Bank, which replaced Britain as the main provider of outside expertise to the Tanzanian department of agriculture after independence, regarded the scheme in 1961 as "an expensive, but in the long run salutary, demonstration of the need for thorough research and experimentation before attempting radical innovations in tropical agriculture".[70]

The memory of the groundnut scheme raised the standing of pilot projects for a while and prompted the British state to abstain from primary production in its African colonies, but it only temporarily dampened the general enthusiasm for large agricultural development projects in what was soon called the "developing world".[71] In the wake of African decolonization in the 1960s and the enthusiasm sparked by the "Green Revolution" in India and Mexico, the "American model" of mechanized large-scale agriculture became, if anything, even more dominant around the world. Under these circumstances, agricultural scientists liked to present the groundnut scheme as an

[69] Morgan, *Changes* cit., pp. 247-248.

[70] International Bank for Reconstruction and Development (IBRD), *The Economic Development of Tanganyika*, Johns Hopkins University Press, Baltimore 1961, p. 23. A similar view of an ultimately useful if overpriced experiment was put forward by some of the scheme's former scientists; cf. A.H. Bunting, "Methods of Land-Clearance for Agriculture", in *Nature*, 174, 1954, p. 68f.; K. Mellanby, "Post-Mortem on Groundnuts?", in *Nature*, 185, 1960, p. 564.

[71] See S.P. Voll, *A Plough in Field Arable: Western Agribusiness in Third World Agriculture,* University Press of New England, Hanover, NH 1980, p. 85 for an overview of similar project undertaken soon after the scheme. Whether the project discouraged investment in Tanganyika (as e.g. C. Ehrlich, "Some aspects of economic policy in Tanganyika, 1945-69", in *Journal of Modern African Studies,*11, 1964, p. 267, claims) is hard to decide. As J. Iliffe points out, "nothing suggests that much investment was ever contemplated" (Iliffe, *Tanganyika* cit., p. 442).

"exceptional case" for which it would be "unfair" to blame the profession.[72] The scheme's former chief scientific officer, the renowned agricultural scientist Arthur Hugh Bunting, still deplored in 1986 that the experience of Kongwa had scared developers in East Africa into conservatism. His plea for a return to more courageous approaches reads almost like a one-sentence summary of the Wakefield report: "The old ways won't do; we must have new ones on a large scale".[73]

By the end of the 1970s, however, some development economists had revived the debate on scale in tropical agriculture, promoting a return to small-scale, labor-intensive "peasant" farming as a more efficient and socially equitable method of rural development.[74] J.S. Hogendorn and K.M. Scott, who investigated the groundnut scheme in 1981 for the United Nations World Hunger Program, concluded that the fundamental error had been what they called "the disregard of the Nigerian alternative". By means of economic incentives combined with relatively moderate infrastructural investments, it would have been possible, they claimed, to make peasant farmers in West Africa produce the required quantities of peanuts, without taking any unreasonable risks and at substantially lower costs.[75] Their analysis drew on the fundamental critique of the groundnut scheme written in 1950 by Herbert S. Frankel, one of Britain's most renowned development economists at that time. Directly after his return from Kongwa, which he had visited as a member of the Working Party sent by Parliament, Frankel had examined what he called the "theoretical considerations"

[72] Quotes from H. Ruthenberg, *Agricultural Development in Tanganyika,* Springer, Berlin 1964, p. 47.

[73] A.H. Bunting, "The Groundnut Scheme", in *Tanzanian Affairs*, 1 September 1986; online at http://www.tzaffairs.org/1986/09/the-groundnut-scheme (accessed 26 February 2012). Bunting had to resign from the scheme in 1951 after accusing John Strachey of lying. He held the chair for Agricultural Botany at the University of Reading from 1956 to 1982.

[74] See e.g. M. Lipton, *Why Poor People Stay Poor: A Study of Urban Bias in World Development*, Harvard University Press, Cambridge, MA 1977; A. Berry, W. Cline, *Agrarian Structure and Productivity in Developing Countries*, Johns Hopkins University Press, Baltimore 1979.

[75] Hogendorn, Scott, "Groundnut Scheme" cit., pp. 104-107.

behind Operation Groundnuts in two articles for the *Times*.[76] He found it a "surprising" idea to bet everything on maximum size; in his view, such an approach ran "counter to the accepted principle that agriculture is generally the least likely form of economic enterprise to yield considerable large-scale economies".[77] Moreover, he took the scheme to task for its blind fixation on total mechanization, which had gone so far as to neglect from the outset every possibility that human labor might be an economically more viable solution for certain tasks. While large-scale industrial agriculture might be a good idea in general, this was not necessarily true for southern Tanganyika, an environment completely lacking in technical infrastructure.[78]

Yet, at the same time, Hogendorn and Scott warned against extrapolating general conclusions from the experience of the groundnut scheme. While the fundamental question of whether economies of scale exist in tropical agriculture has remained a matter of debate to this day, the scheme is rarely mentioned as a pertinent example.[79] Most scholars seemed to doubt whether much analytical insight could be derived from "a project that had so many flaws that if it had not failed for one reason it would still have failed for several others".[80] This perception might also explain the somewhat paradoxical finding that, while "in development circles […] the groundnuts scheme is one of a handful of legendary failures cited as examples of

[76] The two articles appeared in the *Times* of 4 October 1950 and 5 October 1950, and were reprinted later with a new introduction in Frankel, *Economic Impact* cit., pp. 141-153.

[77] Ibid., p. 145.

[78] Ibid., pp. 145-146. In economic terminology, the project did not account for relative factor prices in Tanganyika.

[79] An exception is N. Johnson, V. Ruttan, "Why Are Farms so Small?", in *World Development*, 22, 5, 1994, pp. 691-706, who include the scheme in their case studies chosen to demonstrate diseconomies of scale in tropical agriculture, "because it is generally viewed as the classic example of an ill-fated large-scale project". For a very short overview over the discussion on economies of scale in rural agriculture see P. Woodhouse, "Beyond Industrial Agriculture? Some Questions about Farm Size, Productivity and Susainability", in *Journal of Agrarian Change*, 10, 3, 2010, pp. 441-443.

[80] Coulson, "Agricultural Policies" cit., p. 76.

what not to do",[81] the project received surprisingly little analytical attention.[82] The prevailing memory of the scheme amongst development experts, then, seems to resemble that of a nightmare rather than that of a lesson learned. "It is fair to say," conclude Hogendorn and Scott, "that no new economic principle was forthcoming from the failure. That is the saddest admission of all."[83]

"These Days of Great Prosperity"? Tanzanians and the Groundnut Scheme

Herbert Frankel's reflections draw attention to a "factor" that had received only scant attention in the disputes surrounding the scheme in Europe and the United States: the inhabitants of East Africa. The peanut planners had deliberately decided to have as little as possible to do with Tanganyikans. The most difficult environmental conditions – preferably "uninhabited, tsetse-infected and waterless areas" – were to be chosen to avoid having to deal with any kind of existing land use by local populations, which was thought to be time consuming and politically problematic.[84] The main role the groundnut scheme wanted to assign to Africans was that of awed spectators. The white paper stated that "by far the most important long-term advantage of the scheme from the African point of view" would be that the project would provide an "ocular demonstration of the benefits of modern agricultural methods".[85] Seeing the well-ordered groundnut fields, it

[81] Scott, *Seeing Like a State* cit., p. 228.

[82] Since Hogendorn and Scott observed a "surprising paucity of analytical studies" in 1981 (Hogendorn, Scott, "Groundnut Scheme cit., p. 82), the main addition to the literature seems to be M. Rizzo, *The Groundnut Scheme Revisited: Colonial Disaster and African Accumulation in Nachingwea District, Southeastern Tanzania, 1946-1967,* unpublished dissertation, School of Oriental and African Studies, University of London 2004.

[83] Hogendorn, Scott, "Groundnut Scheme" cit., p. 108.

[84] Cmd. 7030 cit., p. 20. The fear of destabilizing "traditional" African societies by developing them "too fast" (and hence creating political instability) is a recurrent theme in British colonial development; for the late 1940s see e.g. Kelemen, "Planning for Africa" cit., p. 85f.

[85] Cmd. 7030 cit., p. 6f.

was hoped, would finally convince African cultivators to give up their supposedly hopelessly backward ways and adopt "modern" agriculture – a longstanding aim of colonial agricultural policy. Still, in spite of Frank Samuel's claim that "no operation will be performed by hand for which mechanical equipment is available"[86], the original plans foresaw a workforce of up to 57,100 "Africans" for land clearing and agricultural operations alone. These workers were to be drawn from the "local populations" living in the vicinity of the three sites, as well as migrant workers from further afar, including northern Mozambique.[87]

In the eyes of the groundnut scheme, all of these people, mostly independent farmers with essential survival skills, were reduced to "unskilled labour". For the relatively small number of skilled and semi-skilled workers needed, a special (if short lived) training camp at Ifunda was set up to teach English, basic mechanic skills and tractor driving.[88] Quite a few African apprentices surprised their European instructors with an exceptional aptitude for handling heavy machinery after very short training periods. In general, ordinary Tanganyikans adjusted to the new conditions with a speed and swiftness that belied colonial prejudices about lazy and backward Africans.[89] Many Tanganyikans seem to have perceived the groundnut scheme as an opportunity rather than a disruption to their lives, and they were willing and able to use it to their own advantage.

In some places, the sudden influx of thousands of peanut workers and of huge amounts of money into virtually uninhabited areas led to veritable "gold rushes", with all the concomitants. As demand for labor rose sharply, the bargaining position of workers improved.

[86] Quoted by Johnson, Ruttan, "Why Are Farms so Small" cit., p. 694.

[87] Cmd. 7030 cit, p. 23. Of these, 32,000 were to be employed permanently. The figures did not include workers needed in transport, shipping, construction of the port, railways, roads etc. Migrant workers from Mozambique routinely crossed into Southern Tanganyika to work on the sisal estates there; see Rizzo, "What Was Left" cit., p. 206.

[88] The camp was considered ineffective and was closed down quickly to save expenses; Wood, *The Groundnut Affair* cit., pp. 126-128.

[89] Cf. for a contemporary's report Wood, *The Groundnut Affair* cit., pp. 77f., 126-128.

The colonial authorities' efforts to avoid "wage wars" between employers were only partly successful, and different contractors tried to attract workers by offering shorter working hours or by improving workers' living conditions. On the other hand, the sudden emergence of whole new towns in regions that had previously been "more densely populated by elephants, lions and other game than by human inhabitants"[90] led not only to an often dangerously close cohabitation of humans and wild animals, but also to social problems. Whilst the concerns of colonial authorities and local missionaries that increasing theft, alcoholism, and prostitution might bring about a general "dissolution of moral standards" were probably somewhat exaggerated, Kongwa in particular acquired a true "frontier town" reputation, making African workers reluctant to bring their families there.[91]

Not all the money was squandered, however. Colonial authorities reported that the surprising total of £100 was deposited at the Kongwa Post Office Savings Bank on the day of its opening. The economic opportunities were not restricted to those who worked directly for the OFC. A colonial labour officer remarked on the "large numbers of labourers [...] who do not wish to be employed for the simple reason that they can make quite a good living by selling their own produce i.e. chicken, eggs, fruit etc." at high prices to the scheme's employees.[92] In 1952, the local newspaper *Habari za Nachingwea katika Kiswahili* ("Nachingwea News in Swahili") celebrated "these days of great prosperity" that had come to the region with the project.[93] Matteo Rizzo, retracing the biography of several "rural entrepreneurs" in the Nachingwea district, has pointed to the importance of these economic opportunities for his interviewees. Julius Mtenda, for example, on whom Rizzo gives the most details, built

[90] M. Rizzo, "Becoming Wealthy: The Life-History of a Rural Entrepreneur in Tanzania, 1922-80s", in *Journal of Eastern African Studies*, 3, 2, 2009, p. 225.

[91] Wood, *The Groundnut Affair* cit., pp. 166-173. According to Wood, the bad reputation was primarily due to the "bad example" of Europeans.

[92] Quoted by Rizzo, "What Was Left" cit., p. 229; cf. Wood, *The Groundnut Affair* cit., p. 76f.

[93] *Habari za Nachingwea katika Kiswahili*, 4 June 1952, quoted in Rizzo, "What Was Left" cit., p. 212.

up a small capital stock through wage labor in connection with the groundnut scheme. This allowed him to profit from the small-scale trading opportunities in the new groundnut towns, and ultimately to become a comparatively wealthy landowner. The unintended side-effects of the scheme thus made it possible for him to escape his poverty and lay the foundations of his subsequent career.[94]

Others might have had a very different experience. Gregory Maddox has argued that in the arid highlands around Kongwa, the Scheme's demand for labor added to the pressure on the local Gogo people to leave their fields for wage work. This not only led to tensions within Gogo society – not least between absent male workers and their wives, who were left to tend to the fields on their own – but also drove down agricultural productivity, which aggravated local famines in 1947 and 1949/50 and ultimately contributed to the impoverishment of the Gogo.[95] While this dovetails with contemporary fears of the corrosive effect of wage labor expressed by the colonial administration, the significance of the Scheme seems to have consisted mainly in reinforcing longstanding colonial labor policies. For the Southern Province, Matteo Rizzo has even made the opposite argument: In his view, local peasants successfully integrated the new employment opportunities into their livelihood patterns as a fall-back for difficult times, thereby increasing food security. They worked for money if harvests failed, and went back to farming as soon as circumstances allowed – one reason for the high turnover rates of African employees that exasperated the OFC.[96] In the end,

[94] Rizzo, *Groundnut Scheme Revisited* cit., pp. 202-258. In total, Rizzo could locate "about eighty" persons (all of them male) in the Nachingwea area who profited from the scheme to accumulate a relatively substantial amount of capital (ibid., p. 149).

[95] G.H. Maddox, *"Leave, Wagogo! You Have No Food!": Famine and Survival in Ugogo, Central Tanzania 1916-1961*, unpublished dissertation, Northwestern University 1988, esp. pp. 322-325; Id., "Famine, Impoverishment and the Creation of a Labor Reserve in Central Tanzania", in *Disasters*, 15, 1, 1991, pp. 35-42; Id., "Gender and Famine in Central Tanzania: 1916-1961", in *African Studies Review*, 39, 1, 1996, pp. 83-101.

[96] Rizzo, *Groundnut Scheme* cit., pp. 35-36, discusses Maddox's arguments

the extent of the specific contribution of the groundnut scheme to larger processes of economic transition remains hard to gauge, not least because of its very limited life span.

To many Tanganyikans, the whole project must indeed have seemed little more than a quickly passing mirage in retrospect. When the writer Evelyn Waugh visited Tanganyika as a tourist in 1958, the three original sites had already changed almost beyond recognition. He found the former headquarters, once housing over 30,000 men, abandoned and overgrown, the roads beginning to break down, and the train lines dismantled.[97] Virtually the entire area cleared around Kongwa had become grassland supporting a cattle ranch, since the precipitation had proved insufficient for anything else. In Urambo, agricultural production focused on flue-cured tobacco as a cash crop.[98] The only area in which large-scale peanut farming had survived at all was the south around Nachingwea – and even here the scale was incomparably smaller than initially envisaged.[99] Instead of the mechanized monoculture planned for, an increasing part of the cleared land was used for so-called "African tenant schemes". In these, African volunteers were given smallholdings of around 10 to 50 acres of cleared land, including newly built housing and a small garden. A limited amount of mechanized assistance with activities like plowing, as well as seed, fertilizer, and insecticides was provided by the management for a fixed fee. In return, tenants had to plant, weed, and harvest, follow-

linking the Scheme to famines; Rizzo, "What Was Left" cit., pp. 231-235. Turnover rates of African employees on the scheme sometimes surpassed sixty percent per month; cf. Hogendorn, Scott, "Groundnut Scheme" cit., p. 92.

[97] In fact, he wrote that Kongwa was "difficult to find"; E. Waugh, *A Tourist in Africa*, Little Brown, London 1960, pp. 84-86.

[98] Ibid.; on Urambo see J. Boesen, A.T. Mohele, *The "Success Story" of Peasant Tobacco Production in Tanzania: The Political Economy of a Commodity Producing Peasantry*, Nordic Africa Institute, Uppsala 1979, esp. pp. 26-30.

[99] Fourteen state farms of under 1,000 acres on average – rather minuscule compared to the gigantic 30,000 acre "units" planned for by the Wakefield mission – were occasionally able to achieve rather satisfying peanut yields, but still operated at a loss; Overseas Food Corporation, "Annual Report and Statement of Accounts for the Year 1954", H.M.S.O., London 1955, p. 12; IBRD, *Economic Development* cit., p.403.

ing – most importantly – a crop management program meticulously planned and closely supervised by the management agency. This close colonial control was meant not only to ensure that agricultural advice was heeded; it also had sociopolitical reasons. The explicit goal was to create a new class of "African yeoman farmers" that, it was hoped, would form the social backbone of the colony in the future.[100]

In reality, meager returns, services charges, and intrusive management made the program quite unpopular with potential as well as actual tenants. In Nachingwea, more than 50 percent of the tenants left after only one year, and in the early 1960s the project was effectively wound down.[101] In spite of this, the OFC's tenancy schemes proved to be a direct forerunner of the "villagization" program, one of the central pillars of independent Tanzania's interpretation of state socialism. In regrouping the rural population in so called "Ujamaa" villages – socialist cooperatives planned, constructed, and coordinated by the state – President Julius Nyerere and his Tanzanian African National Union (TANU) hoped to increase agricultural productivity, while bringing the notoriously dispersed majority of Tanzania's inhabitants within the grasp of state bureaucracy. In its first Five Year Plan of 1964, the TANU explicitly embraced the World Bank's "transformation approach" to agricultural modernization, prescribing a shock-modernization of cultivation methods through the resettling of peasants, explicitly modeled on the OFC/TAC tenancy schemes in the 1950s. Seven out of the 23 settlement schemes controlled by the Tanzanian Village Settlement Agency in 1966 had been directly taken over from the TAC and were located on ex-groundnut scheme land.[102] Ultimately, "villagization" was abandoned in 1976, after it

[100] Overseas Food Corporation, "Annual Report and Statement of Accounts for the year ended 31st March 1955", H.M.S.O., London 1956, p.163.

[101] Even in Urambo, where a rewarding cash crop was found in tobacco, remunerations for the individual farmers remained low in spite of state subsidies to overhead managing costs; Ruthenberg, *Agricultural Development in Tanganyika* cit., pp. 80-89; IBRD, *Economic Development* cit., pp. 402-407; Boesen, Mohele, *Success Story* cit.

[102] IBRD, *Economic Development* cit., pp. 129-140; Coulson, "Agricultural Policies" cit., p. 89.

had dangerously eroded the country's agricultural productivity and forced Tanzania to import large quantities of food the country could ill afford. For large parts of the population, the program had been a highly traumatic experience. In the "largest resettlement effort in the history of Africa",[103] the lives of an estimated five to nine million people were disrupted by increasingly violent resettlement measures, which in some cases included burning down whole villages to prevent its inhabitants from returning to their homes.[104] There was widespread resistance to resettlement, and to this day, "rural people all across Tanzania […] tell tales of the enormous suffering it engendered."[105]

Not unlike the groundnut scheme, villagization failed catastrophically, because it overemphasized human willpower and overestimated the possibilities of modern planning. While in some respects the approach was almost the exact opposite of the groundnut scheme, focusing as it did on small scale farming and manual labor, an argument can be made for at least some continuity in the mentality that informed both projects.[106] Both were based on the conviction that the sorely needed agricultural modernization of Tanzania could be brought about only by radical, large-scale, and highly centralized measures. Their common enemy was the "primitive ways of the African peasant", which were thought to be inefficient, wasteful, and even actively harmful to the soil.[107] While the groundnut scheme had intended to

[103] G. Hyden, *Beyond Ujamaa in Tanzania: Underdevelopment and an Uncaptured Peasantry*, University of California Press, Berkeley 1980, p. 130.

[104] Huge imports of food became necessary in the early 1970s. For an account of "villagization" see e.g. Scott, *Seeing Like a State* cit., pp. 223-247.

[105] J.B. Shetler, *Imagining Serengeti: A History of Landscape Memory in Tanzania from Earliest Times to the Present*, Ohio University Press, Athens 2007, p. 218.

[106] Scott, *Seeing Like a State* cit., p. 228, calls the groundnut scheme a "dress rehearsal for massive villagization".

[107] Some more extreme voices even saw the tsetse fly as a blessing in disguise, the real "trustee" of East African land who would at least keep it safe from erosion until it could be opened up to more enlightened methods at some point in the future. This thought can still be found in pamphlets of the UN Food and Agricultural Organization (FAO) as late as 1962; cf. H. Kjekshus, *Ecology Control and Economic Development in East African History: The Case of Tanganyika, 1850-1950*, University of California Press, Berkeley 1977, p. 175.

bypass local populations by "importing" a huge industrial farming complex directly from the industrialized countries, the basic idea of "villagization" was to uproot Tanzanian peasants, in order to put them in a position in which they could no longer refuse expert advice. Both projects aspired to re-mold the Tanzanian landscape into not only a new agricultural, but also a new sociopolitical system. In focusing on the latter aspect, they did not take ecological limits into account.[108]

One main reason for this was their misreading of the relation of local populations to the land.[109] The historian John Iliffe has described pre-colonial Tanganyikans' "struggle with their enemies in nature" – poor soils, drought, wild animals, diseases – in terms almost as martial as Strachey used for the groundnut scheme, and there is certainly no reason to idealize their harsh and mostly short lives as some kind of idyllic "community with nature".[110] Nevertheless, the historical role of humans in the creation of the East African ecosystems was arguably much bigger than colonial authorities had allowed for. Seemingly "primitive" and ephemeral methods like shifting cultivation, intercropping, or the mixing of pastoralism and agriculture were often the result of long adaption to and great familiarity with local specificities – and as such were in fact very efficient.[111] Moreover, much of the vast stretches of "empty wilderness" that were taken as proof of African technological inadequacy might

[108] H. Kjekshus, "The Tanzanian Villagization Policy: Implementational Lessons and Ecological Dimensions", in *Canadian Journal of African Studies*, 11, 2, 1977, pp. 269-282; J. Shao, "The Villagization Program and the Disruption of the Ecological Balance in Tanzania", in *Canadian Journal of African Studies,* 20, 2, 1986, pp. 219-239.

[109] A variety of very different groups were concernced. For Urambo and surroundings see R.G. Abrahams, *The Peoples of Greater Unyamwezi, Tanzania (Nyamwezi, Sukuma, Sumbwa, Kimbu, Konongo),* International African Institute, London 1967; for the Kongwa region G. Maddox, "Environment and Population Growth in Ugogo, Central Tanzania", in Id., J. Giblin, I. Kimambo*, Custodians of the Land: Ecology and Culture in the History of Tanzania*, Athens, Ohio University Press 1996, pp. 43-65; for a short overview of ethnic groups in the Nachingwea region see Rizzo, *Groundnut Scheme Revisited* cit., pp. 10-15.

[110] Iliffe, *Tanganyika* cit., pp. 4, 6-21.

[111] Cf. esp. Kjekshus*, Ecology Control* cit.; Iliffe, *Tanganyika* cit., pp. 6-21.

actually have been a product of colonialism itself, as Helge Kjekshus has argued.[112] Due to the demographic decline caused by colonial warfare, exploitation, and the importing of various diseases, from rinderpest to influenza, local populations were no longer capable of exerting environmental control through settlements, cultivation, and fire-clearing.[113] Between the late nineteenth century and the 1930s, large areas previously inhabited by humans were therefore "reconquered" by nature – "pigs, lions, bush and tsetse".[114]

For the western Serengeti further to the north of Tanganyika, Jan Shetler has shown impressively how what was perceived as a pristine wilderness by Europeans is intricately linked to the collective memory and identity of the people that had lived on it for a long time. In her reading, the landscape is essential to the persistence of oral traditions, becoming itself part of a "text of history" that is experienced through walking the land and hearing the stories mapped onto its spatial extension.[115] If the closing off of the Serengeti as a national park disrupted these traditions, the total refurbishment of the groundnut scheme sites might have had an even more drastic effect on those living close-by. Although the plan's claim that "[i]n no instance would native rights or other interests be prejudiced by the location of the project" might have been legally accurate,[116] it seems that the displacement of a significant number of people was only avoided by the Scheme's early demise. As one colonial administrator remembered later, the area that the game warden Ionides had wanted

[112] Cmd. 7030 cit., pp. 41-43, repeatedly refers to "primitive methods", the "small home-made ax and primitive hoe" to explain why supposedly fertile soils recommended for the Scheme were not being cultivated.

[113] Kjekshus, *Ecology Control* cit.; Iliffe, *Tanganyika* cit., pp. 123-167. For a discussion of Kjekshus's thesis see Beinart, *Environment and Empire* cit., pp. 189-199.

[114] Iliffe, *Tanganyika* cit., p. 163.

[115] Shetler, *Imagining Serengeti* cit.

[116] Cmd. 7030 cit, p. 44. This claim was only made for Tanganyika. The land recommended for the never realized developments in Kenya and Northern Rhodesia also included Native Reserves; at least for Kenya, the Paper concluded that for this reason "difficulties […] may be experienced".

to preserve for elephants was also inhabited by humans: "[T]o many of us, there was great relief that the fold-up of the Scheme meant the abandonment of the greedily sought new land in the Liwale District, north of Nachingwea and known as 'Block B', particularly the fairly populous Kipule chiefdom. The specious argument that the Scheme would by its occupation eradicate the tsetse fly and thereby the endemic sleeping sickness in the area was no answer to the sturdy Wagindo who complained that the Angoni (spearhead of the Zulu advance northward) had destroyed many of them and their homes, that the Germans had then decimated them after the Maji Maji rebellion, and that the British were about to finish them off altogether."[117] Ultimately, the development of Block B never happened, not out of ecological concerns or because of the protest of the Wagindo, but – according to Alan Wood – because of logistical difficulties.[118]

What Remains of the Groundnut Scheme?

Thanks to modern communication technology, it has become easy to steal a glance at some of the private memories connected to the groundnut scheme. The photographs of former participants, shared and discussed online by their relatives and families, show a very peculiar vision of the project, centering on happy families, modern technology (cars, trains, tractors, new houses, and even swimming pools), and remarkably few black Africans.[119] Insofar as these memories have become part of professional and private biographies and family stories, they form a parallel (if strictly separate) "white" equivalent to the "black" memories that Matteo Rizzo has recorded. Both seem to

[117] Johnston, "The Groundnut Scheme" cit., p. 16. According to Johnston, the only displacements taking place in connection with the Scheme were those of two villages at Mtwara in the context of the construction of the new port in the Southern Province.

[118] Wood, *The Groundnut Affair* cit., p.145.

[119] Children and grandchildren of participants started sharing family photographs of the groundnut scheme, e.g. on the website www.flickr.com (accessed October 2012).

emphasize personal opportunities over the Scheme's shortcomings.[120] If in the context of family histories the groundnut scheme seems to appear largely as a fond memory, the relatively small group of the "veterans" themselves did not play a substantial role in upholding a public memory of the project in Britain.[121]

In the realm of collective memory, the scheme has been adapted into the British national folklore and popular culture – it was even granted a disparaging offhand mention in one of Ian Fleming's "James Bond" stories.[122] Yet in the process, it has been reduced to its symbolic component and lost its physical basis. To mark the fiftieth anniversary of the groundnut scheme's abandonment in 2001, the London-based *Sunday Business* half-mockingly proposed the erection of a memorial to the project on the site of the so called "Millenium Dome" in Greenwich, arguing that the scheme "– had it been better remembered – might have saved us from building the Dome" in the first place.[123] No such memorial was ever built, and consequently, the scheme remains a British "lieu de mémoire" without a strong association to a specific place. This is to an extent also true for the global community of development experts, where the project seems to have an almost mythical status. While the list of very large agricultural development flops has grown quite long in the meantime, Hogendorn and Scott assure us that "somewhere in the collective memory of all food and agricultural scholars there lies

[120] Rizzo, *Groundnut Scheme Revisited* cit. Most of the descendants of European groundnut workers seem to recognize the Scheme as a "failure", but one Flickr user identifying himself as Paul Jackson commented: "My folks had a terrific time though and my sister was born there"; http://www.flickr.com/photos/92943860@N00/353725428/in/set-72157605607627022/ (accessed July 2013).

[121] One veteran, when asked by the Imperial War Museum's oral history project in 2001 if he had any memories of the groundnut scheme, replied with "only complete chaos" (IWM, interview with Kenneth Norman Thomson Lee, Catalogue number 21063, online at http://www.iwm.org.uk/collections/item/object/80020095).

[122] Ian Fleming, *James Bond: Quantum of Solace*, Blackstone, London 2008 [1960], p. 98.

[123] "The Dome: A Chamber of Spending Horrors", *Sunday Business (London)*, 7 January 2001.

some recollection, however hazy, of the largest of all the projects, the ill-conceived, ill-managed, and unlucky East African Groundnut Scheme".[124] As far as Tanzanians are concerned, not much evidence of a collective memory beyond individual recollections has been unearthed, and it seems safe to assume that events like villagization and sites like the Serengeti national park made a more pronounced impact on national as well as local memory.

In a reversal of Aleida Assmann's thoughts, it might therefore be tempting to think of the groundnut scheme as a case of "history not taking place" – a story of what was planned but did *not* happen, how specific sites were *not* transformed into a repository of memory.[125] John Iliffe seems to take such a stance when he writes that the "real significance" of the project lay in its failure, as success would have made it a major obstacle for decolonization.[126] However, such a counterfactual view neglects the very real traces the project left in the landscape. In 1992, a survey conducted by the Institute of Resource Assessment of the University of Dar es Salaam found that "the Nachingwea arable scheme was completely abandoned. Most of the land was left unutilised, with a small area being used for subsistence farming. In Kongwa, most of the area is still a cattle ranch managed by the National Ranching Company with a small area managed by the Ministry of Agriculture, Livestock and Cooperatives as the Kongwa Pasture Research Station. At Urambo, the land has been taken by villagers for subsistence farming."[127] Compared to what Frank Samuel saw from his airplane in 1946, the character of two of the three sites had changed permanently, if not quite in the way the groundnut scheme's planners had intended. The possible exceptions are the "unutilized" parts of the Nachingwea site, which is located

[124] Hogendorn, Scott, "Groundnut Scheme" cit., p. 81.

[125] A. Assmann, "How History Takes Place", in Sengupta, *Memory, History, and Colonialism* cit., pp. 151-165.

[126] Iliffe, *Tanganyika* cit., p. 442.

[127] According to A.S. Kauzeni et al., "Land Use Planning and Resource Assessment in Tanzania: A Case Study", in *IIED Environmental Planning Issue*, 3, 1993, p. 32.

next to the world's largest protected Miombo forest ecosystem. At least parts of the area originally planned for seem to have been integrated into the Msanji Game Reserve created in 1994.[128]

Yet as the area under cultivation in Tanzania has been continuously expanding since the 1950s, mainly driven by a population explosion from around 7.5 million in 1950 to over 44 million in 2011, the quantitative importance of the changes introduced by the groundnut scheme should not be overestimated.[129] In fact, Tanzania still has enough "underused" land to have become a target in the so called "new land grab". Soaring food and energy prices in 2007/8 triggered a global run on arable land involving industrialized countries from China to Sweden, as well as various private multinational corporations.[130] In this context, the model of the groundnut scheme seems have enjoyed a remarkable return to popularity: In Tanzania, international agricultural companies have invested (and partly, lost) millions of dollars in huge, highly mechanized plantations growing Jatropha, an oil-producing shrub suitable for producing biodiesel for the industrialized world.[131] This provokes difficult questions about

[128] R.D. Baldus et al., "The Selous-Niassa Wildlife Corridor," in *Tanzania Wildlife Discusion Paper,* 34, 2003, online at http://www.wildlife-baldus.com/download/nr_34.pdf; R. Hahn, "Environmental Baseline Study for the Ruvuma Interface", *Gtz Paper*, 2004, http://www.selous-niassa-corridor.org/fileadmin/publications/Ruvuma_Interface_Study_Institutional_Report.pdf (all accessed October 2012).

[129] Between 1990 and 2007, the population of Tanzania jumped from 7.5 to 40.4 million people; growth of the agricultural sector, which was up to 4.9 percent per year between 2004 and 2006, "has been brought about mainly by increases in cultivated area and crop diversification"; cf. World Bank, *Tanzania Country Brief*, World Bank, Washington 2009, here p. 10.

[130] L. Cotula et al., *Land Grab or Development Opportunity? Agricultural Investment and International Land Deals in Africa*, FAO/IIED/IFAD, London/Rome 2009; S. Borras et al., "Towards a Better Understanding of Global Land Grabbing", in *Journal of Peasant Studies*, 38, 2011, pp. 209-216; A. Zoomers, "Globalisation and the Foreignisation of Space: Seven Processes Driving the Current Global Land Grab", in *Journal of Peasant Studies*, 37, 2010, pp. 429-447.

[131] "Tanzania's Biofuel Project's Promise Proves Barren", *Mail & Guardian Online*, 10 March 2011, http://mg.co.za/article/2011-03-10-tanzanias-biofuel-projects-promise-proves-barren (accessed June 2011).

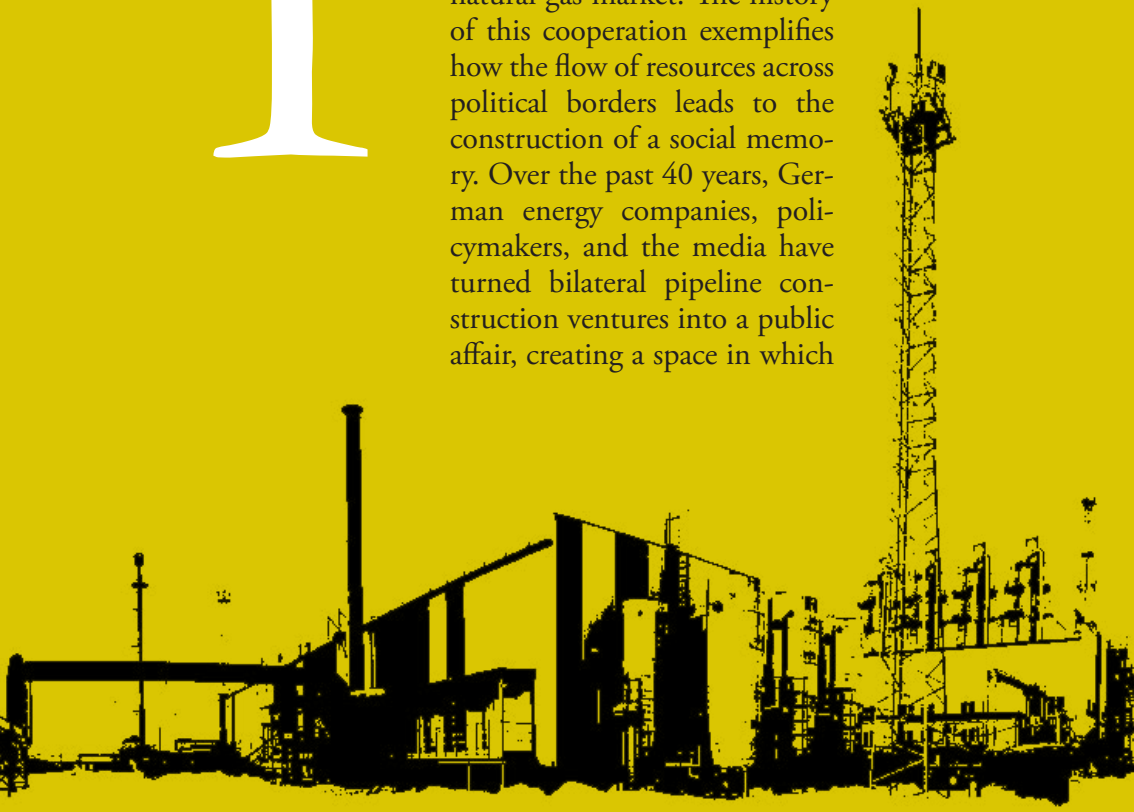
food security and about national sovereignty over land in what is still one of the poorest parts of the world. Moreover, in light of efforts to limit global carbon dioxide emission and rising concerns about dependency on fossil fuel, the general question of the efficiency of industrial agriculture becomes more complex still – especially with regards to biofuel production.[132] In this context, it might be useful to remember that there once was a quick solution to a global oil crisis that ended up importing more peanuts than it produced.

[132] T. Weis, "The Accelerating Biophysical Contradictions of Industrial Capitalist Agriculture", in *Journal of Agrarian Change*, 10, 2010, pp. 315-341.

Fossilized Memory: The German-Russian Energy Partnership and the Production of Energo-political Knowledge[1]

Jeannette Prochnow

The discovery of the Urengoi gas field in 1966 marks the beginning of the cooperation between Germany and Russia in the natural gas market. The history of this cooperation exemplifies how the flow of resources across political borders leads to the construction of a social memory. Over the past 40 years, German energy companies, policymakers, and the media have turned bilateral pipeline construction ventures into a public affair, creating a space in which



the interactions of energy and politics are visible. In this article, I will focus on how knowledge of the German-Russian energy partnership has been organized, represented, and disseminated, but also on how it has been contested in the public sphere by media outlets and public relations representatives of the energy industry.

Hitherto, academic inquiry has paid little attention to the question of "how societies come to devote their attention to […] events along complex commodity chains".[2] Since the extension of the German-Russian pipeline network is not yet at an end, the progression of time generates ever new pasts, entailing a constant reframing of the representations of the bilateral trade of natural gas and altering the communicative dynamics between discourse participants. I therefore consider the notion of "sites of memory" to be a helpful analytical tool for outlining the epistemic developments of energo-political knowledge in the longue durée.

I will first introduce the particularities of the West German perspective on the German-Russian energy cooperation; I will then turn to the East German story, before outlining the intricate unification of both German corporate cultures and its mediation. Finally I will consider under which circumstances the trade of resources gains media attention lasting long enough to leave traces in public memory. Large technological networks are missing in memory studies and theoretical engagements with commemorative performances. In order to understand how and why the German-Russian energy cooperation has gained increasing public attention, I first suggest that, from an epistemological standpoint, the context (the mass media) in which the German-Russian energy partnership has been represented as an event of public concern over the past four decades requires methodological and theoretical consideration. It is well known that modern societies acquire information about the world beyond the realm of direct experiences through mediation. Theoreticians of social and cultural memory such as Pierre Nora, Maurice Halbwachs, and Aleida and Jan Assmann

[1] Parts of this essay were originally written in German and have been translated by Brenda Black, including all German-language sources unless otherwise specified.

[2] F. Uekötter, "Recollections of Rubber," in *Imperial Sites of Memory,* F. Müller, D. Geppert (eds), Manchester University Press, Manchester (forthcoming).

have stressed the role of material artefacts and processes of mediation when describing the transformation of first-hand experiences into collective bodies of historical knowledge that outlive temporal and spatial limitations. Nevertheless, the focus has been on the semiotic content of historical visions and collective self-images. Here, on the contrary, I will begin with the assumption that mass media are self-regulating systems whose selection and representation of topics have to be explained before the content of the representations can be discussed. Why and how was the German-Russian energy partnership – which, in reality, can be described as an assemblage of singular events, participants or actors, and mediated representations – made into a 40-year-long tradition?

Secondly, I will argue that the widely-preferred concept of memory as a collective narrative has to be re-conceptualized as the "public recursivity of topical careers" in the media ("öffentliche Rekursivität thematischer Karrieren").[3] Maurice Halbwachs construed collective memory as the supra-individual (historical) consciousness of communities whose identity draws upon a common vision of their past. However, the exploitation and usage of resources and commodities usually occupy a precarious place in collective thought. Accordingly, some difficulties arise from the concept of sites of memory.[4] I attempt to resolve these difficulties by defining a "site of memory" in less figurative terms. Here, the examined site of remembrance is empirically founded. Concrete sources, newspaper articles, and the publicity brochures of energy companies from 1968 to 2012 are considered the literal site of memory. The focus shifts away from cultural consciousness. Recollections appear objectified in "communicative operations"[5] of the mass media in which the German-Russian energy partnership has been a recurring topic over the past four decades. I will show that interpretations of the extraction and trade of natural gas, as well as the construction of technological infrastructure that connects Russian gas fields and German households, has taken various shifts. Only *ex post facto* is a narrative about this "tradition" of cooperation discernible.

[3] N. Luhmann, *Die Realität der Massenmedien*, VS Verlag, Wiesbaden 1995, p. 28.
[4] Uekötter, "Recollections of Rubber" cit.
[5] Luhmann, *Die Realität der Massenmedien* cit., p. 11.

System theory offers a useful framework to understand the structural functions of these recursive formulae. In his discussion of mass media, Niklas Luhmann argues that the system of mass media is a set of self-referential operations of communication. When topics recur or are revived, the presentation must deviate from earlier accounts so as to appear newsworthy. Newsworthiness – the mass media's code of conduct that discriminates between information and non-information[6], rather than between external factors like objective and subjective and true and untrue – is a key part of the system's "autopoiesis", its self-creation. Despite arguing for this self-referential quality, Luhmann expressed doubts about solipsism and stressed the importance of referential realities.[7] He spoke of structural interconnections between self-regulating systems – for instance, couplings of mass media with the economic or political system. Thus the societal function of the mass media reveals itself. The reality of mass media, Luhmann argues, forms a reservoir of options for the coordination of communication beyond the internal realm of the mass media and produces a continuous description of the world, around which modern societies can orient themselves. These constant reproductions of recourses within the media and among recipients he denoted memory: "The function of the mass media lies after all in the directing of self-observation of the social system […] What is involved is a universal, not an object specific observation. We have already spoken […] of the function of the system's memory which provides a background reality for all further communication which is constantly reimpregnated by the media."[8]

In fact, Luhmann was able to illustrate the structural functions of topical careers but he was less successful in finding convincing explanations for why particular topics are repeatedly awarded media attention, apart from cognitive programs such as scandal, morality etc.

In the wake of Actor-Network-Theory, this article has to be taken as an intellectual experiment in which I make the effort of re-embed-

[6] Luhmann, *Die Realität der Massenmedien* cit., p. 122.

[7] Ibid., p. 36.

[8] H.-G. Moeller, *Luhmann Explained: From Soul to Systems*, Carus Publishing Company, Peru (Illinois) 2006, p. 136.

ding the materio-realities, the "vibrant matter"[9] of the world we live in and that we create, into the analysis of the "referential realities" of the mass media's discourse about the German-Russian energy partnership. In her critique of the "methodological naivité" of constructivism – i.e., a life/matter binary[10] – philosopher Jane Bennett made clear that "what is manifest arrives through humans but not entirely because of them".[11] In this vein Bruno Latour criticized the "anti-fetishism of sociologists".[12] The sociology of technology, ethnomethodology, and lab studies have located social practices within a multitude of ecological – spatial, material, semiotic – conditions. The study of media communication however, is widely devoid of "vibrant matter", and no great efforts were made to determine the impact of objects and materials on the selection of topics. What exactly is it that makes the discovery, extraction, transportation, and trade of natural resources newsworthy? I am undecided about the materializations of "thingly power"[13] in mediated discourses and I will certainly not be able to give a satisfying answer, but I am sure that it is worth considering.

1. Russian Gas, Bilateral Business, and German Legacies

"Nowadays it is impossible to imagine either our everyday lives or the economy without natural gas and electricity. They are essential for our society"[14] proclaims the homepage of Gazprom Germania. This company, a subsidiary of the Russian OAO Gazprom, advertises natural gas as a "safe, environmentally-friendly, and efficient energy source". Another natural gas supplier, E.ON Ruhrgas AG in

[9] J. Bennett, *Vibrant Matter: A Political Ecology of Things*, Duke University Press, Durham and London 2010.

[10] Ibid., p. 75.

[11] Ibid., p. 17.

[12] B. Latour, "Eine Soziologie ohne Objekt? Anmerkungen zur Interobjektivität", in *Berliner Journal für Soziologie*, 11, 2, 2001, pp. 237-252.

[13] Bennett, *Vibrant Matter* cit., p. xiii.

[14] Gazprom Germania, "Energieträger Erdgas," http://www.gazprom-germania.de/erdgaswissen/energietraeger-erdgas.html (accessed 20 September 2010).

Essen, also emphasizes its "high level of environmental friendliness, and not just in comparison with other fossil fuels" on their website. Natural gas is "an energy form with a low environmental impact" and "an option for the future". In this context, a pictorial brochure of the Essen-based company suggests:

> E.ON Ruhrgas's longstanding and reliable relationship with the supplier Gazprom and its participation in projects such as the construction of the Nord Stream Pipeline actively contributes to further developing the connection between Germany and Russia and channeling natural gas to Europe for the long term.[15]

The German-Russian natural gas partnership had its beginnings in the discovery of the Urengoi gas field at the end of 1966. Both the then-existing German Democratic Republic (GDR) and the Federal Republic of Germany (FRG) signed long-term contracts with the Soviet Union for natural gas deliveries.[16] The Soviet Union expanded their centrally planned natural gas industry from a regional to a global sector of the economy, which has provided the nation with Western investments and currencies since the 1970s.

Since the "oil crisis" in 1973 the Western European industrial nations, as well as the GDR, became noticeably more interested in diversifying their resources and energy sources.[17] One long-term effect of this change in strategy was a gradual shift from oil to gas in the heating market and the electricity industry. At the same time, the newly discovered Siberian gas fields also allowed power generation by means of coal to be supplemented with imported natural gas.[18] In the past 40 years this shift in priorities has been expressed

[15] E.ON Ruhrgas AG, "Erdgas aus Russland: Gewachsenes Vertrauen und langfristige Energiepartnerschaft", company publication, 2008, p. 8.

[16] N.M. Victor, D.G. Victor, "Bypassing Ukraine: Exporting Russian Gas to Poland and Germany", in *Natural Gas and Geopolitics: From 1970 to 2040*, D.G. Victor, A.M. Jaffe, M.M. Hayes (eds), Cambridge University Press, New York 2006, p. 129.

[17] See J. Barnes, M.H. Hayes, A.M. Jaffe, D.G. Victor, "Introduction to the Study", in Victor et al., *Natural Gas and Geopolitics* cit., p. 3.

[18] J. Stern, "Gas Pipeline Co-operation between Political Adversaries: Examples from Europe", Report Submission to Korea Foundation, 2005, p. 2f.

in Germany particularly through a greater reliance on Russian gas,[19] which has increasingly supplemented imports from Norway and the Netherlands. Russian natural gas offered the German industries a long-term alternative natural resource[20] and accounts for 36 percent of natural gas usage in Germany today. [21]

After the fall of the Soviet Union in 1991 the Russian state-owned company Gazprom advanced to become one of the largest gas companies in the world and an outstanding trading partner for Western European and German companies, who have joined with Gazprom in making new investments such as the construction of the Baltic pipeline. In 2005, when former German chancellor Gerhard Schröder accepted an offer by the giant corporations Gazprom, E.ON, and BASF to become the chairman of the supervisory board of their consortium Nord Stream, which has since been responsible for constructing the Northern European Gas Pipeline, it caused a sensation in the German and international media. "Schröder sells his reputation for rubles" read the headline of an online article in the magazine *Der Spiegel*.[22] But Schröder's influential position on the staff of Gazprom, a company closely connected with the Kremlin and one subjected to heavy criticism since the 1990s due to its politically dubious activities, was not the primary subject to stand in the spotlight of the discussions about the Northern European Gas Pipeline. The pipeline project would endanger the German-Baltic and especially the sensitive German-Polish relations because it would bypass the land transport route which would pass through these countries and from which they stood to benefit. The newspaper *Frankfurter Rundschau* suggested furthermore that the pipeline construction elicited "fears of the environmental

[19] See A.M. Jaffe, M.H. Hayes, D.G. Victor, "Conclusions", in Victor et al., *Natural Gas and Geopolitics* cit., p. 467.

[20] F. Hill, "Russia: The 21st Century's Energy Superpower?" in *Brookings Review*, 20, 2, 2002, pp. 28-31.

[21] German Federal Government, *Bericht der Bundesregierung zur Öl- und Gasmarktstrategie*, Berlin 2008, p. 31

[22] A. Schwabe, C. Volkery, "Schröder verrubelt seinen Ruf", in *Spiegel Online*, 12 December 2005, http://www.spiegel.de/politik/deutschland/0,1518,389956,00.html (accessed 16 September 2010).

damages caused by the construction and operation, of explosives, and also of Russian espionage and the presence of the Russian military for the protection of the facilities and of dependence on the Siberian gas supply". [23] At the same time, however, the author of the article was of the opinion that "Russian gas [is] indispensable for the European [gas] supply". And indeed, the largest natural gas reserves in the world are located in Russia. At the same time, 90 percent of the natural gas in the European market is currently supplied via pipelines.[24] "The large share [of natural gas] in Germany accounted for by imports from Russia is a tradition that goes back decades," according to a report published in 2008 by the Federal Ministry of Economics and Technology.[25] The "political endorsement"[26] of the natural gas industry mentioned in the government report has not only given rise to pressing issues regarding the security of the gas supply among policymakers, scientists, and journalists since the 1970s; it also strikes at the heart of the political identity of a reunified Germany that is still conscious of its divided past. Political scientists in the US have spoken of the "geopolitics of natural gas" in this context.[27]

The start of construction of the Nord Stream Pipeline through the Baltic Sea in 2005 stimulated public debates about the German energy industry and the German-Russian natural gas partnership in particular. The ongoing controversy about the pipeline demonstrates how closely energy questions are entangled with the memory of the post-war period in Germany and the rest of Europe and the political self-image of Germany that arose out of this. The various organs that shape and present public opinion – energy companies, the federal government, and the media – evaluate the pipeline construction in the light of a 40-year history of cooperation between Germany and Russia on energy matters. Their arguments mutually refer to one an-

[23] H. Gramillscheg, "Ärger mit der langen Leitung. Gaspipeline durch die Ostsee: Während Geologen den Meeresboden untersuchen, hält der Protest der Anrainer an", in *Frankfurter Rundschau*, 39, 2008.

[24] German Federal Government, *Bericht der Bundesregierung* cit., p. 17.

[25] Ibid., p. 41.

[26] Ibid., p. 41.

[27] See Barnes et al. "Introduction to the Study" cit., p. 5.

other in a way that goes far beyond the solid economic facts. Energy politics and the energy industry are, it turns out, to a large degree also symbolic. In the striving for economic, political, and environmental legitimation (or de-legitimation) of the Nord Stream Pipeline, those concerned make use of an inventory of symbols which draws largely on Germany's national memory. The groups involved in this energy discourse communicate by means of a set of relevant events from the political and economic past. The interpretation of these events remains in the process of negotiation and is shaped by the various economic, environmental, and political interests and concerns of these parties. Because the discussion about energy politics is carried out in connection with the German past, it is hardly surprising that the selection of events used in the arsenal of arguments have tended to show regional characteristics specific to the history of divided Germany. Interestingly, in the course of vigorous debates about the construction of the Baltic pipeline, it is possible to observe how this historical division is to some degree overcome. Although little known to the West German public, the prestigious "Drushbatrasse" ("Friendship Conduit") and "Erdgastrasse" ("Natural Gas Conduit") projects were considered quintessential examples of the German-Soviet friendship by the East German political establishment, and in the course of recent energy debates they have found their way to the "top of the charts" in the historical narrative of unified Germany, both in the energy industry and the popular media. Thus, the energy discourse not only feeds upon existing historical narratives, which are always limited to a small subset of events, but also itself influences which events are selected. Energy resource policy and cultural memory are not separate, isolated spheres, but rather create new ecological and energy-related sites of memory. Since the beginning of the controversial energy cooperation, energy companies as well as government agencies responsible for energy policy have played an active role in the "invention" of the site of memory that is the "German-Russian energy partnership". As will be shown, their interpretive model spoke both of "rescuing the political climate" and of an avowed commitment to ecological climate protection in order to justify their bilateral operations to the media.

Today the German natural gas business is dominated by the company Gazprom Germania GmbH, the Essen-based E.ON Ruhrgas AG, the East German VNG-Verbundnetzgas AG, BASF, Wintershall Holding GmbH, and Erdgas und Erdöl GmbH (BEB). These companies are tightly connected with and dependent upon one another through appropriation of shares and the foundation of subsidiaries and joint enterprises. The German Energy Industry Act of 2005, which was designed to implement guidelines established by the European Parliament and Council on 26 June 2003 and was directed towards the goal, in the words of the German Parliament, of "increasing competition",[28] in actuality has not resulted in the desired "decartelization of the natural gas industry"[29] but rather in a fissuring of the industry. In practice, the companies mentioned above continue to divide the tasks of production, sales and distribution, and infrastructure among themselves. Furthermore, they maintain close ties with politicians and policymakers. The representatives of the energy industry are as familiar with the East as with the West and they re-affirm four decades of cooperation at each anniversary with great confidence for the future. These ceremonies always take place in alliance with the German and Russian political elite, who establish the conditions necessary for the German-Russian natural gas trade. During Vladimir Putin's state visit in 2001, for example, the chairman of Ruhrgas AG, Dr. Burckhard Bergmann, gave the Russian president a historic gas meter "as a symbol of the nearly 400 billion cubic meters of natural gas which have been delivered to Germany since 1973".[30]

A rigorous constructivist explanation of the described organization of energy complicities would read that such symbolic acts and rituals not only convey knowledge about certain events which are commemorated during anniversaries; they also provide assurances of mutual

[28] German Federal Government, *Bericht der Bundesregierung* cit., p. 7.

[29] German Federal Government, "Gesetz über die Elektrizitäts- und Gasversorgung (Energiewirtschaftsgesetz – EnWG)", 7 July 2005, p. 1.

[30] E.ON Ruhrgas AG, "Highlights 2001", http://www.eon-ruhrgas.com/cps/rde/xchg/SID-E5F12DDB-987B1BB2/er-corporate/hs.xsl/3865.htm (accessed 16 September 2010).

support between politics and the industry and function as legitimation strategies. The interpretation of the past goes hand in hand with the production of models for the future as well as the goal of gaining public approval for current and future investments. An alternative way to construe the course of events is offered by the concept of an "object-centered sociality"[31] that abandons an ontological divide between cognition, power, and communication versus objects. The starting point is interrelations between experts and their object of expertise.[32] The epistemic object, i.e., the technological and/or natural object is considered to be one component among others of processes in agency and articulation.[33] In the same vein Jane Bennett's term "thing-power" "draws attention to an efficacy of objects in excess of the human meanings, designs, or purposes they express or serve".[34] Bennett stresses the "distributive quality of agency" and reintroduces Deleuze's and Guattari's term "assemblage": "Assemblages are open-ended collectives composed of human actors and thingly actants. [...] The effects generated by an assemblage are, rather, emergent properties, emergent in that their ability to make something happen [...] is distinct from the sum of the vital force of each materiality considered alone."[36] I do not claim that hegemonies or the Foucauldian nexus of power and knowledge are insignificant. I rather doubt their power to explain all the idiosyncrasies of ecological communication. To put it very bluntly: Energy companies and stock holders have adapted themselves to fossil resources and not the other way around. Energy policy manages the legal distribution of resources that unfolded their vitality long before the term "energy policy" ever entered public discourse.

[31] K. Knorr-Cetina, "Theoretischer Konstruktivismus: Über die Einnistung von Wissensstrukturen in soziale Strukturen", in *Theoretische Empirie. Zur Relevanz qualitativer Forschung,* H. Kalthoff, S. Hirschauer, G. Lindemann (eds), Suhrkamp, Frankfurt am Main 2008, p. 56.

[32] D. Boyer, "The Corporeality of Expertise" in *Ethnos*, 70, 2, 2005, pp. 243-266.

[33] Knorr-Cetina, "Theoretischer Konstruktivismus" cit., p. 57.

[34] Bennett, *Vibrant Matter* cit., p. 21.

[35] Ibid., p. 21, p. 24.

[36] Knorr-Cetina, "Theoretischer Konstruktivismus" cit., p. 57.

Competition for natural resources presupposes their existence and availability in the soil; their finite quality makes them valuable for human actors. The ontological properties of natural gas make a difference in the social world: they engender economic, political, and cultural desires, and have an effect on technological developments. Resources have an effect on humans; they are, in Latour's terms, actants, for they make a difference and form the basis of an object-centered sociality.[37] The mass media and publicity material communicates an account of this "life-matter relationship"[37] that (as will be illustrated in what follows) has an informative quality. If Gregory Bateson was right when defining information as "a difference that makes a difference"[38] the question is: Are resources (good or bad) news in their own right?

2. The West German Story: The Natural Gas Pipeline Deal

The historic "Natural Gas Pipeline Deal", the foundations of which were established in a 1970 contract concerning natural gas deliveries between Ruhrgas AG[39] and the Soviet state-run trading enterprise Soyuzneft-Export, has been conventionally portrayed by both energy companies and the German government as the beginning of a tradition challenged primarily by skepticism and fears on the part of media reporting. "Gazprom seems to be as elusive as the gas it produces, as enigmatic as a Russian matryoshka doll that, rather than getting smaller with each layer stripped off, instead becomes even larger and more misshapen", the magazine *Manager* wrote in 1999, asking: "Where does Gazprom end and the state begin?"[40] Given Russia's tense relations with its neighbors, who, since the fall of the Soviet Union are also transit countries for the pipeline (for example Ukraine), this ques-

[37] Bennett, *Vibrant Matter* cit., p. 21.

[38] G. Bateson, *Ökologie des Geistes: Anthropologische, psychologische, biologische und epistemologische Perspektiven*, Suhrkamp, Frankfurt am Main 1985, p. 362.

[39] E.ON took over Ruhrgas in 2003.

[40] D. Student, "Frostige Oase: Innenansichten der größten Gasfirma der Welt", in *Manager Magazin*, 6, 1999, http://www.manager-magazin.de/magazin/artikel/0,2828,23192,00.html (accessed 20 September 2010).

tion concerns both the security of the energy supply and the ideal of a democratic free market economy. The mistrust of the former Soviet Union as a totalitarian and expansionist superpower has been deeply embedded in German and European memory ever since the October Revolution in 1917 and particularly since the end of WWII. Consequently, when the media gives its opinions on the German-Russian energy partnership, it makes use of idealized representations of the reunified Germany as a nation – images which portray Germany and Russia as antitheses of each other. The state-owned Gazprom is mostly assigned the role of a politically suspect business partner, as clearly seen in the controversy surrounding Gerhard Schröder's position as chairman of the supervisory board for the Nord Stream consortium, of which Gazprom holds the largest proportion of shares – 51 percent. Cooperating with an enterprise such as Gazprom, *Spiegel Online* commented in 2005, "does not correspond with the philosophy of someone who considers himself a democrat". [41] In addition, the "oil crisis" of 1973, triggered by conflicts between Israel and its Arab neighbors, taught the industrial nations a painful lesson: that energy resources can be employed as political weapons. The arrest of the oil baron and Putin critic Mikhail Khodorkovsky in 2003 and the subsequent collapse of his enterprise Yukos only served to strengthen the mistrust of the Russia-critical media regarding the Russian energy industry. It also gave weight to the statements of political scientists who have pointed out that a large portion of the natural gas reserves that are attractive to industrial nations are located in politically unstable countries and regions such as Russia, Iran, or Algeria.[42] However, such ideological misgivings have not diminished the interest of the German energy industry for the Russian market in the slightest, leading the online version of the *Frankfurter Allgemeine Zeitung* to conclude in 2005 that:

> In spite of being temporarily disconcerted by the actions of the state prosecution against Khodorkovsky, Germany remained an important investor in Russia in

[41] Schwabe and Volkery, "Schröder verrubelt seinen Ruf" cit.

[42] M.H. Hayes, D.G. Victor, "Politics, Markets, and the Shift to Gas: Insights from Seven Historical Case Studies", in Victor et al., *Natural Gas and Geopolitics* cit., p. 322f.

2004. [...] The [German] federal government therefore welcomes the direct involvement of German energy companies in Russian natural gas and oil fields.[43]

Remarkably, the attitudes expressed in the media about the German-Soviet natural gas trade were much more positive during the Cold War era. The "Natural Gas Pipeline Deal" of 1970 was a triangular transaction between a Soviet trade delegation led by the Foreign Trade Minister Patolitshev, Ruhrgas AG, Mannesmann-Export GmbH, and Deutsche Bank. Deutsche Bank was the head of a German bank consortium which provided the Soviet government with intermediate loans that would allow it to purchase the necessary pipes from Mannesmann AG. The debt was later paid back through revenue from the natural gas purchased by Ruhrgas. Subsequent contracts up through the 1980s were based on the same principle. In the context of an overall thawing of relations between the Soviet Union and West Germany, the media praised the agreement as "the largest and most politically significant East-West transaction of the post-war era".[44] The enthusiastic endorsement of the treaty was based on the belief that such "spectacular bargains"[45] would improve relations with the East and provide "more certain guarantees of peace".[46] The media received the news of the activities of the West German government and the companies Ruhrgas and Mannesmann quite positively. In addition, the contract came to serve as a model for subsequent trade agreements between West German companies and the Soviet government in the course of the 1970s. The newly flourishing trade with the East was supported politically by a bilateral German-Soviet trade agreement. According to a 1974 article in *Der Spiegel*, the German chancellor Helmut Schmidt's main goal in the agreement was to prevent the German industries from suffering

[43] "Chodorkowskij-Urteil ohne Auswirkung auf deutsche Wirtschaft", in *FAZ.net*, 31 May 2005, http://www.faz.net/s/RubDDBDABB9457A437-BAA85A49C26FB23A0/Doc~EA532128326B742FCAE4B48DB165ACD82~ATpl~Ecommon~Scontent.html (accessed 20 September 2010).

[44] "Auf kleiner Flamme", in *Der Spiegel*, 33, 1969.

[45] "Taube Ohren", in *Der Spiegel*, 37, 1973.

[46] "Fangen wir mit der Wirtschaft an", in *Der Spiegel*, 21, 1973.

economic setbacks in the face of the oil crisis by opening trade with the USSR as a supplier of energy resources.[47] Finally, the "Natural Gas Pipeline Deal" was also a way to overcome the "Pipeline Debacle"[48] of 1963. During the height of Cold War tensions, the German chancellor Konrad Adenauer had given in to pressure from the United States to embargo exports of steel pipes to the USSR, with the result that German companies were forced to break existing contracts.[49] During this period (the late 1960s and early 1970s), it wasn't the Soviet Union that was the target of reporters' distrust, but the United States instead. *Der Spiegel* even speculated that the real reason the United States initiated the embargo wasn't the alleged danger to the "European flank of the NATO", but rather a desire to protect the market position of US companies involved in the natural resource industry. The German industry was "left empty-handed".[50] Thus, the "Natural Gas Pipeline Deal" not only served the interests of the government's *Ostpolitik*[51]; it also was seen as a sign of emancipation from the USA.

This last aspect became particularly clear in the 1980s when the Reagan administration tried unsuccessfully to intervene and prevent another natural gas pipeline contract from being made after Soviet troops marched into Afghanistan. The West German government refused to implement another embargo. Politicians and the media anticipated any number of positive results from this, both for East-West relations and for the German industry. After all, business journalism of the 1970s and 1980s called upon the German image of itself as a leader in cutting-edge technology and quality workmanship. While Siberia might be a "treasure chest" of natural resources, the shortage economy and the technological backwardness of the USSR

[47] "Kanzler Schmidt: In Moskau Weichen stellen", in *Der Spiegel*, 42, 1974.

[48] W. Nagel, "Gibst du Röhren – geb' ich Gas", in *Die Zeit*, 19 December 1969.

[49] P. Högselius, *Red Gas: Russia and the Origins of European Energy Dependence*, Palgrave Macmillan, New York 2013, p. 52.

[50] "Sowjet-Entwicklungsauftrag: Turnier der Großrohre", in *Der Spiegel*, 19, 1969.

[51] Högselius, *Red Gas*, cit. p. 105.

hindered the Soviets from developing these resources on their own without the aid of German expertise, journalists thought.[52]

Even so, a gradual change of attitude can be discerned in the media over the course of the 1980s. The positive portrayal predominant in the 1970s of the Soviet Union as a partner for German energy policy began to crumble in the face of the Soviet invasion of Afghanistan and concerns that the Moscow government would intervene in Poland, where the Solidarity Movement was gathering more and more supporters. In the 1970s it was still possible to claim that the "Natural Gas Pipeline Deal" was above all an economic matter in which the Soviet Union had proved to be a reliable partner. But starting around 1980 public attention focused increasingly on the points of conflict in the contract negotiations. These included attempts by Soviet negotiators to lower interest rates in the triangular transactions. The Soviet natural gas export company was also criticized for raising prices. In addition, delivery delays in the winter of 1981 caused doubts about the reliability of the natural gas supply and concerns about being too dependent upon the Soviets. The increase in commissions which the German industry had hoped for also failed to materialize. This was all the more aggravating when their Soviet partners awarded a contract for the delivery of technical appliances to Caterpillar, a US company of all things.

It is characteristic of the Soviet negotiation strategy that Moscow honored the US corporation Caterpillar with a government contract: Business clearly comes before politics. They failed to give special regard even to long-time suppliers. This has been driven home particularly strongly to the men of Mannesmann.[53]

In 1981 the newspaper *Die Zeit* recognized with disappointment that while the "Natural Gas Pipeline Deal" decreased dependence on OPEC oil, in exchange it increased the dependence on natural gas from the USSR.[54] As long as the energy industry was evaluated in terms of the Cold War divisions, the German-Russian business rela-

[52] "Die Gas-Scheichs von Sibirien", in *Der Spiegel,* 48, 1981.

[53] "Verbissen gefeilscht", in *Der Spiegel*, 35, 1981.

[54] H.-G. Kemmer, "Energie-Vasall Bundesrepublik?" in *Die Zeit*, 20 November 1981.

tionship continued to be imbued with positive associations of promoting political stability. With the breakup of the Eastern bloc, however, this geopolitical argument became much less convincing. As a result of changes in the international political situation, the media rapidly withdrew their support for the German policymakers. Starting in the 1990s, Russia was seen more than ever before as an extremely questionable energy partner, energy companies in both the East and the West were subject to increasingly sharp criticism, and the fear of becoming too dependent upon Russian natural gas increased.

The media coverage of the German-Russian cooperation on the gas market reveals "distinctive discontinuities"[55] over the period examined. During the late 1960s and early 1970s, it wasn't the Soviet Union that was the target of reporters' distrust, but the United States instead. Cold war rhetoric was turned upside down.[56] Following Bateson, Niklas Luhmann argued that discontinuities are one of the most typical selectors in news writing, for ruptures make a difference and as such are informative. However, Luhmann's analysis of the mass media centered on the internal mechanism of the media system, therefore his theory falls short of providing adequate explanations about how topics enter the system before they run through recursive operations. The question at hand is whether the illustrated discontinuities were a mere product of cognitive and creative strategies applied by the journalists to create a story that sells. Where can the origins of discontinuities properly be located? At the end of the 1960s and early 1970s, discontinuities can initially be described as discontinuities in the writing on the geopolitical divisions of the northern hemisphere, before the German-Russian energy partnership subsequently materialized as a topic in its own right. But what made the difference in the economic or political field, around which the mass media created a mediated reality? Discontinuities must not be interpreted solely in terms of discourse constellations. Rather, academic inquiry should also take into account material or, in this case, fossil preconditions. Germany clearly does not possess natural gas resources and Russia does. The discovery

[55] Luhmann, *Die Realität der Massenmedien* cit., p. 58
[56] Högselius, *Red Gas* cit. p. 3.

of rich gas fields in Russia attracted economic interests. The impact of their existence on global political and economic strategies must not be underestimated for they opened up new options for relevant actors. It might be fruitful to abandon "the habit of parsing the world into dull matter (it, things) and vibrant life (us, beings)"[57] and rather to take into consideration that "animate things"[58] at least "co-co-ordinate" political structures and discursive operations, for they encode what might be politically and economically operable. Innovative operations on the gas market altered bilateral collaborations and altered discourses on the relationship between Germany, the USA, and the Soviet Union, thus creating news. Whatever the situated estimations, Russian natural gas recursively appeared as/in the news: At the end of the 1960s Russian gas fields meant good news; since the 1990s they have become bad news due to changing geopolitical and national contexts.

The energy companies themselves present a completely different view of the situation, of course. E.ON Ruhragas, which has a joint share in Wintershall (a sunsidiary of BASF) in the Nord Stream Consortium and maintains close business relations with Gazprom through mutual appropriation of shares, continues to respond with geopolitical rhetoric to the public's doubts about the political integrity of Russia and the dangers for the security of the energy supply which could result from this. The "Natural Gas Pipeline Deal" is still presented as having been "an important pillar of political détente"[59] during the Cold War. The corporate branding and promotional material of E.ON Ruhrgas AG portrays both the 1970 contract and the construction of the Nord Stream Pipeline as part of a single continuous tradition spanning decades:

> The natural gas industry in Germany – in the old German federal states [FRG] as well as the new ones [former GDR] – has obtained gas from Russian since 1973. [...] In August 2006 a large percentage of these contracts were extended until 2035, and a new agreement about deliveries via the Nord Stream Pipeline through 2035 has been agreed upon.[60]

[57] Bennett, *Vibrant Matter* cit., p. vii
[58] Ibid.
[59] E.ON Ruhrgas AG, "Erdgas aus Russland" cit., p. 20.
[60] Ibid.

Or consider a promotional flyer from Gazprom Germania, which includes a photo depicting Russian president Medvedev and Foreign Minister Steinmeier pressing a symbolic "start button" for the opening ceremony of the Baltic pipeline construction. The flyer suggests that:

> Only a close friendship between Russia and Europe based on a history of co-operation and due consideration of the interests of both parties will enable the partners to meet the challenges of the 21st century. [...] The past 40 years have shown that the Russian supplier has always fulfilled its obligations. [...] Promising investments in such projects as the Nord Stream Pipeline [...] guarantee the stability and security of the Russian natural gas deliveries for decades to come.[61]

The German government's "Report on the Oil and Natural Gas Market Strategy" gives an impression that industry and politics are singing the same tune.

> The large proportion of imports coming from Russia has a long tradition. [...] In the past centuries Russia has always proved to be a reliable supplier. This partnership must be developed further. [...] Additional diversification of sources of supply and transit routes remains a central concern. In the case of natural gas the Baltic pipeline Nord Stream is a substantial contribution to the efforts to expand the trans-European networks.[62]

As a country poor in natural resources, Germany and its government are dependent upon the private natural gas industry, both in terms of economic and energy policy. On the other hand, without the investment guarantees of the German government, these companies would not be able to make investments in their "friendly relationship" with their Russian partners. The government and energy companies join in defending themselves against any doubts about the correctness of this partnership and strive to protect the political climate both with Russia and within Germany by emphasizing that Russia has never been responsible for any disruptions in the natural gas delivery. As it happens, Germany and other EU countries have had repeated problems with natural gas deliveries because Russia was

[61] Gazprom Germania GmbH, "Mit Erdgas in die Zukunft", company publication, 2008, p. 13.

[62] German Federal Government, *Bericht der Bundesregierung* cit., p. 41

involved in conflicts with transit countries such as Ukraine. However, thus far these conflicts have never resulted in serious shortages.[63]

In addition to PR aimed at justifying their actions, the energy companies also make use of strategic sponsorship. For example, E.ON Ruhrgas AG supports the financing of the Petersburger Dialog, an annual gathering of key players in politics, business, the media, and science, which was called into being by the Russian President Vladimir Putin and the former German chancellor Gerhard Schröder in 2001. During the 2006 session of the Petersburger Dialog, Professor Georg Unland, Rector of the TU Bergakademie Freiberg, and Professor Vladimir Litvinenko, Rector of the National Mining Institute in St. Petersburg, signed a "Memorandum for the Foundation of an Ongoing German-Russian Natural Resource Forum" in the presence of German Chancellor Angela Merkel and Russian President Vladimir Putin. This forum was to pursue the goal of "discussing and developing strategies for the effective use of fossil, mineral, and alternative natural resources." Additionally, the two universities planned cooperative research projects.[64] In order to realize these goals, the research institutions formed a research group whose members include the industrial partners OOO Gazexport (the successor to the Soviet state trading enterprise Soyuzgazexport, which was integrated into OAO Gazprom in 1991) and the Leipzig Verbundnetz Gas AG (VNG).[65] The controversial energy companies thus secure a place for themselves outside of the energy industry in various sectors of the public sphere through such cooperative projects with universities, as well as through providing financial support for other cultural, educational, and sports institutes – for example, the Bundesliga soccer team FC Schalke 04. Their company logos appear on all the pamphlets of the organizations and events they sponsor.

Compared with the media coverage, promotional material from

[63] "Putin und EU streiten über Gasprom", in *Zeit* online, 24 February 2011, http://www.zeit.de/politik/ausland/2011-02/putin-konfrontation-eu (accessed 3 October 2011).

[64] Technische Universität Bergakademie Freiberg, "Report 41. Nachrichten aus Lehre und Forschung", http://tu-freiberg.de/presse/report/R41November06.pdf (accessed 20 September 2010).

[65] Ibid.

the energy industry and governmental reports have developed a surprisingly consistent interpretation of the events over the past 40 years. Furthermore, the brochures of relevant companies and the governmental reports bear an uncanny rhetorical likeness to each other. The essence of these texts is less to provide a background reality for further communication than to represent the energy industry's mission, which in fact hasn't changed much over the decades. The objective is the extraction, trade, and transportation of natural gas. Altogether the assemblage (including human and non-human actants) that is known as the German-Russian energy partnership is rather solid in its structure, for a handful of enterprises share the market. Quantities of gas to be delivered, transport routes, and competition with gas suppliers (for instance from Norway or the Netherlands) are stipulated by policymakers in such a way that competition is limited. The stability of the assemblage is mirrored by the industry's self-presentation in the media. It should be mentioned that since competition is restricted and all operations on the market are endorsed by policymakers, the promotional material does not promote or advertise in the proper meaning of the word, nor are the actors required to align their self-presentation with the ideological critique of the mass media.

In conjunction with extensive PR activities, the sponsoring campaign is intended to win the import countries' trust in the energy companies and support for the construction of additional pipelines between western Europe and Russia. Above all the campaign seeks to influence the customers. Through its advertisements, the energy industry reminds the viewers who directs the natural gas trade between Russia and Germany. Precisely because the traders and producers operate beyond the perception threshold of the users, they develop open spaces through public relations. Through advertisements, promotions, and sponsorship, they manipulate their audience even while declaring their motives. Precisely because advertisers reveal their interests, they are allowed to pursue the sought-after memory in a rather blatant manner.[66] In the case of the energy indus-

[66] Luhmann, *Die Realität der Massenmedien* cit., p. 86

try's self-promotion, the properties of memory do not require new information – unlike the mass media, which constantly reframes its evaluations of the bilateral gas business. Rather, the commemorative mode of operation entails a stoic ignorance towards journalistic misgivings, for instance, regarding Gazprom's undemocratic nature. For the natural gas industry it is a crucial not to respond to the critical voices. Frame theory has shown that the negation of a frame activates the same frame.[67] Thus the most proficient strategy to counter the mass media's suspicions is to ignore them. Confidence in the German-Russian energy partnership is produced through pronounced discursive stability and modes of public presence that don't cause any harm. By creating a uniform narrative, public relation experts secure the energy industry's unique market position for the future.

The companies also claim to "actively support the intercultural dialogue between Germany and Russia"[68] in order to "build bridges between the nations".[69] As one of the financial sponsors of the reconstruction of the Amber Room in the Catherine Palace near St. Petersburg, E.ON Ruhrgas contributed to a project that was presented to the public as "a symbol of German-Russian friendship".[70] For the citizen of the former East Germany, the phrasing might well evoke certain political rituals from over 20 years ago, perhaps even the climax of the German-Soviet friendship as manifested in the construction of the "Drushbatrasse" and "Erdgastrasse" in the 1970s and 1980s.

3. The East German Story: "Drushbatrasse" and "Erdgastrasse"

In 1968 the first international treaty between the GDR and the USSR was signed, including details of natural gas imports. In 1974, during the 28th session of the Council for Mutual Economic Assist-

[67] J.I. Saeed, *Semantics*, Blackwell Publishing, Oxford 2009, p. 365.
[68] Gazprom Germania GmbH, "Mit Erdgas in die Zukunft" cit., p. 28.
[69] Ibid., p. 13.
[70] E.ON Ruhrgas AG, "Geschäftsjahr 2003", p. 46, http://www.eon-ruhrgas.com/cps/rde/xbcr/er-corporate/Ruhrgas_GeBe03_de.pdf (accessed 28 September 2010).

ance (Comecon) in Sofia, the delegates of the participating countries signed a "General Agreement" on cooperation in the development of the natural gas fields in Orenburg. In return for the natural gas deliveries the countries committed to taking over the construction of sections of the natural gas pipeline "Soyuz" in the Soviet Union. This included relocating natural gas conduits, constructing compressor stations and providing technical equipment and supplies. From 1974 to 1978, East Germany took over the construction of what came to be called the "Comecon Pipeline", a 550 km section of pipeline in Ukraine. As part of the Urengoy Agreement in 1982 and the Yamburg Agreement in 1984, the GDR committed itself to constructing additional sections of pipeline, known as the "Erdgastrasse" ("Natural Gas Conduit"), in Ukraine, Belarus, the Urals, and Kazakhstan. In order to fulfill their contract responsibilities, the GDR recruited a total of 15,000 workers (primarily male) from various state-owned enterprises and conglomerates who carried out the pipeline construction as contractors and sub-contractors. Like Ruhrgas AG in West Germany, the East German VEB Verbundnetz (part of the conglomerate "Schwarze Pumpe") served as the central purchasing and distribution agent.

In addition to the construction of the pipeline and natural gas facilities, the state also assumed responsibility for expanding the infrastructure along the course of the pipeline; that is, housing, schools, and other facilities were constructed for the future Soviet operators. Both the building materials and the technical equipment were purchased from West Germany – for example, the pipes manufactured by Mannesmann AG, which were also being employed in the "Natural Gas Pipeline Deal" arranged by the West German government at the same time.[71] The "Drushbatrasse" and "Erdgastrasse" projects were embedded in one of the largest political campaigns of the GDR. In 1974, Klaus Siebold, the Minister for Coal and Energy, declared this socialist integration project to be a "national youth project" which was officially overseen by the Freie Deutsche Jugend ("Free German Youth",

[71] R. Karlsch, "Erdgasverträge und Trassenbau", in *medium gas,* 3, 2008, p. 56, http://www.vng.de/VNG-Internet/de/3_Presse/mediathek/unternehmensmagazin/mg_archiv/index.html (accessed 29 August 2013).

FDJ). As a result of this, by 1976 2,500 of the 4,000 on-site workers, foremen, and engineers were members of the FDJ.[72] Those involved in the project included welders, turners, and various other technicians, mechanics, and loggers, as well as masons, cooks, cleaners, medical workers, and of course FDJ officials, nicknamed "kulturniks", who arranged leisure activities for the workers as well as political events and joint assemblies with the Soviet youth organization "Komsomol".

The pipeline was declared to be the "construction project of the century"[73] and was praised as "a tangible expression of socialist economic integration". The East German and Soviet energy cooperation was considered "the optimal alliance between the national economies" of the two countries and a cornerstone for "creating the material and technological basis for a shared communist future".[74] It is worth noting that the public discourse in the two German states regarding their respective energy cooperation with the USSR show astonishing similarities. The "future-oriented enthusiasm for technology"[75] wasn't just prevalent in the GDR. West German newspapers, too, saw the "Natural Gas Pipeline Deal" as an "indication of East-West relations becoming more objective as a result of economic and scientific-technological interchange".[76] In much the same vein, the East German media also praised the intention to secure peace between East and West, speaking of "a piece of visible peace-making policy" and "cooperation between two nations with different social systems to the economic advantage of both".[77] As the technological and environmental historian Joachim

[72] K. Belwe, *Zentrales Jugendobjekt der FDJ "Erdgastrasse"*, Gesamtdeutsches Institut, Bundesanstalt für Gesamtdeutsche Aufgaben, Bonn 1983.

[73] Zentralrat der Freien Deutschen Jugend, *Am Bauwerk des Jahrhunderts: Erlebnisse vom Zentralen Jugendobjekt "Ergastrasse" der Freien deutschen Jugend*, Verlag Neues Leben, East Berlin 1985.

[74] G. Eggers, H. Matthies, M. Neumann, U. Völkel (eds), *Abenteuer Trasse: Erlebnisse und Beobachtungen*, Verlag Neues Leben, East Berlin 1978, p. 5f.

[75] J. Radkau, *Technik in Deutschland vom 18. Jahrhundert bis heute*, Campus Verlag, Frankfurt am Main 2008, p. 388.

[76] M. Gräfin Dönhoff, "Signal aus Moskau: Auch im Wahlkampf darf Bonn sich nicht schwerhörig zeigen", in *Die Zeit*, 1 August 1969.

[77] Zentralrat der Freien Deutschen Jugend, *Am Bauwerk des Jahrhunderts* cit., p. 14.

Radkau writes, "the history of technology in Germany can still be considered a single history during the period of German division!"[78]

The mass media's appraisals of the nascent pipeline network as a "piece of visible peace-making policy" in East Germany and as "East-West relations becoming more objective" in West Germany can be interpreted not solely as metaphoric references to ideological convergences but also as the media's representation of an object-based alteration of East-West relations. In the 1970s and 1980s the media reported on what Latour called the "interobjectivity"[79] of the pipeline enterprise, which had been accomplished with an East German work force and West German pipes and additional technical equipment. Interobjectivity challenges concepts of social theory that designate modes of interdependencies such as intersubjectivity, intertextuality, and interdiscusivity, for it describes a "fabric that includes non-human actants".[80] During the construction and expansion of the pipeline infrastructure throughout the 1970s and 1980s, East-West relations were subject to discursive re-framings, but the interpretation of economic acts of cooperation cannot be restricted to the symbolic superstructure of power relations, acts of governance, etc. The construction and expansion of the pipeline network not only generated political realignments; it also established a material connection between states. What is more, the assembly produced a permanent modification of the physical environment. The pipeline's "material recalcitrance" outlived the great geopolitical reformations of 1989 and therefore became a source for future newswriting in the 1990s, as will be illustrated later.

The technological, interobjective, and discursive similarities should not cause us to overlook the substantial differences, however. In the East German media, Radkau notes, "the Marxist dogma of the progress of the productive forces was still in effect – and by [these forces] was meant more concretely technology and technologically

[78] Radkau, *Technik in Deutschland* cit., p. 399.

[79] Latour, "Eine Soziologie ohne Objekt?" cit., pp. 237-252.

[80] B. Latour, "Technology is Society Made Durable", in *A Sociology of Monsters: Essays on Power, Technology and Domination*, J. Law (ed.), Routledge, London 1991, p. 103.

skilled people".[81] At the core of the East German media campaign, therefore, was the ideal of proletarian internationalism, in which "friendship between nations" and "achievement of the [socialist] plan" were guiding principles. The "Trasse," as the project was usually referred to, was considered a site of "communist education".[82] The campaign for the pipeline was carried to East German society through the media. The official newspaper of the FDJ, "Junge Welt", followed pipeline construction through a series of exclusive reports, the state-owned DEFA Studios shot four documentary films about it, and multiple volumes illustrating the project were published. The pipeline builders were called "the proletarian reserve forces", "young revolutionaries", "heroes of labor", and, in reference to the blue shirts of the FDJ uniform, "blue-shirted ambassadors". In addition to official awards and ideological rewards recognizing their "fight for the daily plan-plus",[83] they also enjoyed various material rewards and sociopolitical advantages such as high wages (by DDR standards), access to export goods, preferential treatment in receiving vacation, allotment of places at the university, apartments, telephone connections, and automobiles.[84] The far-reaching media campaigns and special privileges for workers came to an abrupt end with the fall of the Wall and reunification. The construction project "Erdgastrasse" was brought to a close in 1993 after a substantial reduction in personnel and the integration of West German companies into the project.

It is astonishing how much the publicity material of the now-private energy companies today resembles the "friendship" mantra of the FDJ campaigns during the GDR pipeline construction in the USSR. It almost seems as though the public relations experts for energy companies located in the former East German states, namely VNG and Gazprom Germania, merely made a few adjustments to their word choice after 1989, replacing the idea of communism with that of Europe. After all,

[81] Radkau, *Technik in Deutschland* cit., p. 391

[82] Zentralrat der Freien Deutschen Jugend, *Am Bauwerk des Jahrhunderts* cit., p. 108.

[83] Ibid.

[84] Belwe, *Zentrales Jugendobjekt* cit.

since the fall of the Berlin Wall, the relevant reference point for their business operations is no longer Comecon, but rather the European Union. Apart from that, the natural gas industry remains dedicated to the ideals of shaping the future and technological progress. The companies prefer to work with each other to achieve these goals, as shown by a 2008 article entitled "A Poisonous Cocktail"[85] in *Der Spiegel* which denounced the "old boys' network" at Gazprom Germania. The magazine identified the traditions of the natural gas industry since the construction of the "Ergastrasse" as above all a matter of the people involved. Thus the 50-year anniversary of the Leipzig-based VNG was attended primarily by familiar faces from East and West German energy giants who have played a leading role since the 1970s in the German-Russian natural gas business. Among the guests and speakers were the German chancellor Angela Merkel, high-ranking officials of VNG's partners E.ON Ruhrgas, Gazprom, and the BASF subsidiary Winterhall, as well as Kurt Biedenkopf, Prime Minister of Saxony, Wolfgang Tiefensee, the Minister for Transportation, Building and Urban Development, and finally the ambassador of the Russian Federation Vladimir Kotenev, who became the chief executive officer of Gazprom Germania in July 2010. Kotenev was already well-acquainted with German policy-makers and the successor of Hans-Joachim Gornig, the former government representative of the natural gas pipeline construction in the GDR and one of the founders of Gazprom Germania.

These continuities in personnel and management in VNG and other East German energy companies created a particular set of challenges for the companies seeking to maintain their corporate image, as they were forced to deal with (or at least live with) the legacy of the socialist state. The company's chronicle particularly emphasizes the treaties between the USSR and GDR as key events in its development. The fact that these agreements were accompanied by one of the largest political campaigns by the single-party government is mentioned neither in the VNG chronicle nor in *medium gas*, the publicity brochure of the company, however. The reasons why pro-

[85] J. Dahlkamp, F. Dohmen, U. Klußmann, G. Latsch, J. Schmitt, S. Simons, "Giftiger Cocktail", in *Der Spiegel*, 35, 2008.

motional texts tend not to correspond to ideological concerns have been explained earlier. On the other hand, the modernization of the company since reunification is described in great detail.

4. The Intricate Unification of the East and West German Stories

In the course of the reorganization of the energy industry in East Germany, the natural gas import company VEB Verbundnetz Gas began to establish itself as an independent company as early as the spring of 1990, breaking away from the conglomeration Schwarze Pumpe. The West German companies Ruhrgas and BEB supported it in this process, as well as the Federal Ministry of Economics, with the result that the state-owned enterprise was turned into a joint-stock company (the current VNG) a few days before the two German states signed a treaty agreeing on monetary, economic, and social union on 18 May 1990. Ruhrgas AG acquired 35 percent of the shares and BEB 10 percent; today EWE Oldenburg, Wintershall Holding GmbH, and Gazprom Germania also own shares of VNG. While the publicity brochures of VNG suggest that Ruhrgas AG and BEB "[helped] the Leipzig company with the first steps into a free market economy"[86], *Der Spiegel* expressed a different opinion. In 1990, the magazine remarked in the title of an article about the reorganization of the East German energy company for the new economic order that there was "too much scheming going on".[87]

The changes in the energy industry during the transition period can scarcely be described as a harmonious unification process. In 1991 *Die Zeit* even referred to an "East German natural gas war".[88]

[86] R. Karlsch, "Vom Plan zum Markt. Die Transformation der ostdeutschen Gaswirtschaft", in *medium gas*, 4, 2008, p. 46, http://issuu.com/vngag/docs/medium_gas_2008_4 (accessed 13 July 2013).

[87] "Zu viel gemauschelt: Deutsche Konzerne kämpfen um das lukrative Erdgasgeschäft in Ostdeutschland; Auch die Russen mischen mit", in *Der Spiegel*, 43, 1990.

[88] M. Huber, H.-G. Kemmer, "Kampf der Monopole: Ist die Energieversorgung in den neuen Bundesländern nach dem Jahreswechsel gefährdet?" in *Die Zeit,* 13 December 1991.

During this time VNG was carrying on fierce price wars in its competition with Wintershall Erdgas Handelshaus GmbH (WIEH), a joint subsidiary of BASF and the Russian company Gazprom. After reunification the new federal government took over the "Yamburg Agreement" made by the GDR in 1986 with the Soviet Union. The supplier VNG was allowed to purchase the natural gas from Yamburg at the so-called "Waidhaus price", the cost which Ruhrgas AG paid when the gas entered German territory at Waidhaus in Bavaria. The privately owned WIEH acquired the right to set prices as a result of the "Orenburg Agreement", thus achieving a monopoly on the delivery of natural gas in the former East German states. When the gas entered Sayda in Saxony, WIEH calculated a higher price than the federal government.[89] VNG, backed by their shareholder Ruhrgas, filed a legal complaint and attempted to force WIEH to adjust their prices for the gas in Sayda to correspond with the Waidhaus price. In response, WIEH cut off deliveries to VNG. According to *Die Zeit*, the real issue was a dispute between the natural gas importer Ruhrgas and BASF. The latter, according to the journalist, wanted to challenge the privileged position on the market held by the monopoly.[90] Intervention by the anti-trust authorities was necessary before the conflict could be settled and a pricing compromise was negotiated between WIEH and VNG. The end of the political Cold War era was succeeded by an economically heated period, at least in respect to the fierce competition on the German-Russian natural gas market. What is portrayed by the energy companies today as a cooperation between the partners of the Nord Stream Consortium is in fact the result of a series of hard-won compromises which drew the criticism and mistrust of the press. But even if the critical attitude of the media towards the energy companies has remained unchanged since 1990, the companies – who have reached an understanding with the politicians in the public discourse since reunification – are assured of their political blessing. Chancellor Angela Merkel, for example, praised the VNG during its 50-year anniversary celebration

[89] H.-G. Kemmer, "Machtkampf der Monopole", in *Die Zeit,* 1 November 1991.
[90] Ibid.

as "a model business in the former East German states".[91]

In the media discussion of the East German pipeline construction the term "Trassenbau" ("conduit construction") became the established name for these large-scale economic projects, and after reunification, too, the projects continued to be well known in the eastern federal states. The local media and natural gas industry contributed to this, as well as "Trassenvereine" ("pipeline associations"), which were founded in the 1990s by former employees of the GDR pipeline projects. Regional newspapers and the popular East German magazine *SUPERillu* reported on regular get-togethers for the former pipeline builders. The multimedia project "Damals in der DDR" ("Life Behind the Wall"), coproduced by the Mitteldeutscher Rundfunk, Westdeutscher Rundfunk, and Looks Films TV, included the "Trassenbau" as a memorable and characteristic event in the history of the GDR. The Stadtwerke Chemnitz (Chemnitz Department of Utilities) and Erdgas Südsachsen created an exhibition about the project entitled "Faszination Erdgas" (The Fascination of Natural Gas") at the Chemnitz Museum Night in 2007. The documentation "Honeckers Jahrhundertbau" ("Honecker's Construction Project of the Century") by Jürgen Ast and Hajo Obuchhoff, who had himself taken part in the pipeline construction, was so successful that it was broadcast repeatedly both on regional and national TV stations.

The pipeline construction is unquestionably an East German site of memory which demonstrates more than just the functioning of the youth organization FDJ and the mechanisms of socialist propaganda. For many East Germans – thousands of former pipeline laborers, old boys' networks, and journalists – the German-Russian Energy Partnership is first-hand biographic experience: They were or still are part of the assemblage. Among their communities, the construction of the "Drushbatrasse" has maintained a high profile in collective memory and they have managed to generate publicity for themselves.

Since the start of construction of the Nord Stream Pipeline, inter-

[91] "50 Jahre VNG", in *medium gas*, 3, 2008, p. 8, http://www.vng.de/VNG-Internet/de/3_Presse/mediathek/unternehmensmagazin/mg_archiv/index.html (accessed 16 October 2013).

est in the German-Soviet natural gas partnership has increased, and national (not just East German) media has focused its attention more and more on the "Trassenbau". In 2009 the national public broadcasting station Deutschlandfunk aired a three-hour feature entitled "Das blaue Wunder bei Fünfzig Minus" ("An Unpleasant Surprise at Fifty Below") about the construction of the "Erdgastrasse". It focused on the lives of the ten thousand Germans who were employed in the Soviet Union for the project. During the same year, the "Trassenbau" – or at least the landmark date of 1 October 1975, when the first seam for the "Drushbatrasse" was welded – was shown as a characteristic event of the post-war years in the multimedia project "60 x Deutschland" produced by the Bundeszentrale für politische Bildung (Federal Agency for Civic Education, bpb) and the broadcaster Rundfunk Berlin Brandenburg (RBB). This program, too, paid particular attention to the everyday lives of the workers. Finally, an article in *Die Zeit* from 15 April 2010 explicitly connected the "Trassenbau" in the GDR with the Nord Stream Pipeline as part of a single chain of events in German energy history. The notice about the inauguration of the first section of pipeline construction was framed by two large pictures with the captions "westbound" and "eastbound". The first picture showed the Russian president Medvedev ceremonially opening the construction project; the second, two East German welders working on the GDR's section of the "Drushbatrasse". "The fact that [West] Germany was willing to provide pipes even back then was an act of friendship which is now paying off", the announcement suggested.[92] These backwards glances at the past do not wallow in nostalgia, however. The role of the FDJ and the disastrous financial ramifications for the East German State of the pipeline project are also discussed. Nor does the article neglect to mention the harsh working conditions under which thousands of men and women labored for two to ten years on the pipeline construction in the Soviet Union. And it does not let us forget that these pipelines still contribute substantially to the natural gas supply in Germany and central Europe today. While the politicians and energy companies are often subject to criticism, the radio and TV pro-

[92] *Die Zeit,* 16, 15 April 2010, pp. 14-15.

grams are more sympathetic when portraying the lives of the workers. The viewer becomes familiar with the often unknown realities of life for the average East German citizen. In contrast with the many negatively charged East German sites of memory, such as the Berlin Wall or the detention centers for political prisoners, the "Trasse", in spite of the ideological context in which it arose, represents one of the few industrial accomplishments of the East German state.[93]

And how does the formerly state-owned natural gas import company VNG deal with the "Drushbatrasse" and "Erdgastrasse" and its socialist past? Its attitude is above all flexible and directed towards the future. The company's marketing is careful to adopt, on the one hand, the political language of the reunified Germany, and on the other, the economic language of the energy industry. It praises the Peaceful Revolution of 1989 and German reunification in unequivocal terms. At the same time, however, the accomplishments of the GDR are emphasized:

> Fifty years after [VNG's] founding and eighteen years after the crucial process of privatization, Prof. e.h. Dr. Ing. Klaus-Ewald Holst also looks towards the future with enthusiasm. In a world which is constantly moving onwards, companies must also constantly change. [...] The experiences and events of the last fifty years justify this optimism: they have shaped this company like no other. Holst gives as an example the peaceful demonstrations in October 1989, which decided the fate of all East Germans.[94]

Finally, the East German pipeline project and above all the integration of West Berlin into the East German gas network in 1985 are cited as important events in the politics of détente between the two Germanys. The transport of natural gas to West Berlin, which VNG arranged together with Ruhrgas AG, encouraged "change through rapprochement".[95] In reality the political leaders of the GDR agreed to allow the country to be used as a transit country only with great reluctance and after pressure on the part of the Soviet Union, which had

[93] M. Sabrow, *Erinnerungsorte der DDR*, C.H. Beck, Munich 2009.
[94] "50 Jahre VNG" cit., pp. 6-7.
[95] Karlsch, "Erdgasverträge und Trassenbau" cit., p. 56.

long since learned to strategically exploit the economic potential of its natural gas resources.[96] There is no doubt that the transformation of VNG after reunification was not just a result of restructuring measures for the free market economy, but also to a large degree a symbolic reinterpretation and re-conceptualizing of its company image. The success of this transformation is anchored in the company's status as a prestige project of the former GDR. The pipeline projects, the company's promotional material suggests, "provided an opportunity to modernize parts of the economy and offered long-term security of the [natural gas] supply which, since 1990, has benefited reunified Germany as well".[97] The chairman of the OAO Gazprom, Alexei Miller, expressed this idea in similar terms during a speech at the fifty-year anniversary of VNG, referring to a recurring motto of the German-Russian natural gas partnership, namely "a secure future […] with Gazprom as a reliable supplier and VNG as a reliable customer".[98]

A pipeline is a classic example of a network that "gathers around itself a different assembly of relevant parties".[99] During the transition period the "material recalcitrance"[100] of the pipeline ensured its longevity. While the surrounding sociohistorical world changed, with state borders being redrawn, economic systems reorganized, and agreements renewed, the path of the pipeline remained unvaried. After the fall of the Berlin Wall, governments and businesses repositioned themselves within the German-Russian energy partnership. A new position was achieved in relation to a) other relevant (social, political, economic) parties on the natural gas market and b) within the space of operations delimited by the pipeline route. Importers, traders, and purchasers of natural gas all had distinctive commercial interests. Yet each participant was entitled to negotiate prices with the business partner only within the geographical point of reference (Waidhaus or Sayda) that had been attributed by

[96] Stern, "Gas Pipeline Co-operation" cit., p. 2f.

[97] Karlsch, "Erdgasverträge und Trassenbau" cit., p. 57.

[98] "50 Jahre VNG" cit., p. 7.

[99] B. Latour, "From Realpolitik to Dingpolitik", in *Making Things Public: Atmospheres of Democracy*, B. Latour, P. Weibel (eds), MIT Press, Cambridge, Mass. 2005, pp. 4-31.

[100] Bennett, *Vibrant Matter* cit., p. 1.

the contract. Apparently Latour was right when he stated that "each object triggers new occasions to passionately differ and dispute".[101] The case demonstrates that academic inquiry in "procedures to authorize and legitimize are important, but it's only half of what is needed to assemble. The other half lies in the issues themselves, in the *matters* that matter, in the *res* that creates a *public* around it. They need to be represented, authorized, legitimated and brought to bear inside the relevant assembly".[102] Far-reaching changes in the sociopolitical world, coupled with the immutable existence of the pipeline, generated fierce price wars on natural gas. This new situation, in which parties were repositioned around the matter that matters, stood out from earlier versions of the assemblage and thus qualified to appear in the newspapers. Comparing new to old versions, it was said, generated the informative code of news writing. Thus the memory of the history of the Russian-German energy partnership – or the mediated representations of it, to be more precise – has been important at every stage of reporting on the issue.

5. Solipsism or Vibrant Environment? Towards a Theory of "Fossilized Memory"

In this essay I have suggested that life/matter dualism in constructivist approaches is problematic from the beginning. Because the exploitation and usage of resources usually occupy a precarious place in collective thought yet can be discovered as a recurring topic in the newspapers, I introduced a concept of memory that is not limited to the symbolic content of narratives. Instead, memory is understood as recursive operations of empirically identifiable phenomena, in this case representations of the German-Russian energy partnership in print media over the past four decades. According to Niklas Luhmann, recursive formulae are at the core of communicative operations of the mass media. Nevertheless, they must offer something new or unsettling in order for the updated topic to qualify as informative and newsworthy. The mass media's societal function lies in the self-observation of society insofar as the mass media's memory provides a background reality for further communica-

[101] Latour, "From Realpolitik to Dingpolitik" cit. p. 5.
[102] Ibid., p. 6.

tion among recipients. Conceptualized in this way, memory denotes a communicative practice, and the analytical focus shifts away from cultural consciousness and collective thought.

System theory can help us learn much about how topics circulate within the self-regulating system of the mass media and how accounts and information leave the system. Yet little can be said about how they enter it. Information, according to Gregory Bateson, is "a difference that makes a difference"[103]. In connecting this idea with Latour's idea of non-human actants that have an effect on the (social) world, I addressed the question of whether fossil resources qualify as news in their own right. This led to the proposition that news items about the German-Russian Energy partnership constitute a mediated representation of an assemblage of relevant human and thingly members that have effects on each other.

The German-Russian energy partnership is embedded in a multitude of sociopolitical, economic, and technological operations that repeatedly outpace each other. Similarly, the ontological properties of that assemblage do not remain unaffected by historical changes, as was illustrated by the example of the transformation process. Of informative value for the media are the interdependencies of human and thingly actants. Political and economic-industrial actors appropriated Russian natural gas through the establishment of a transportation infrastructure. Nevertheless, it would be too shortsighted to assume that humans one-sidedly manipulate nature. The construction of the pipelines was shadowed by a recalcitrance of the installed pipeline conduit, which also had effects on the relationships within the assemblage. The properties of things affected social configurations. Stories of this process of interobjectivity are what have appeared in the newspapers. Recollections of earlier representations of the fabric are needed to make the news accountable.

In his study about the reality of the mass media, Niklas Luhmann described the latter as a closed system. Despite illustrating this self-referential quality, he emphasized the structural interconnections between fundamentally self-regulating systems, for instance between the mass media and the economy. In this respect, my essay prompts

[103] Bateson, *Ökologie des Geistes* cit., p. 362.

the question of how far "matters that matter"[104] entail a hinge that connects social systems with each other.

However, in order to come to a firm conclusion, further research is required. First of all, it was said that the energy discourse also feeds upon existing historical narratives (primarily Europe's postwar history). Academic inquiry therefore needs to focus its attention on the relationship between material infrastructure and symbolic superstructure. As Jane Bennett wrote, "Humans encounter a world in which nonhuman materialities have power"[105] but they also encounter a pre-interpreted world in which humans are equipped with power and cognitive creativity. The concept of interobjectivity challenges related concepts that designate modes of interdependencies – such as intersubjectivity, intertextuality, and interdiscursivity – but does not necessarily prove them inadequate. More theoretical and methodological work is needed here. Secondly, an analytical specification of the matters involved in the German-Russian energy partnership needs to be done. What exactly are the ontological properties of the commodity of natural gas and the constructed technological infrastructure of the pipeline, and what idiosyncratic effects do they cause? Last but not least, for analytical purposes I distinguished between the assemblage of the German-Russian energy partnership in terms of energy policies and economic operations on the one hand and the system of mass media on the other hand. Only in this sense is it consistent to ask how far commodities or matter constitute a hinge between system-specific operations. Consequently, further inquiry is needed to clarify whether this binary distinction is adequate. It may be that journalists – even though they reproduce the mass media's code of information/non-information – are likewise part of the assemblage, for Russian natural gas has an impact on their commemorative performances.

[104] Latour, "From Realpolitik to Dingpolitik", cit. p. 5.
[105] Bennett, *Vibrant Matter* cit., p. 16.

Radiation and Borders: Chernobyl as a National and Transnational Site of Memory[1]

Karena Kalmbach

If, as Etienne François suggests, a site of memory is only "alive" when it is discussed and debated, Chernobyl is unquestionably a very living site of memory indeed. Opinions about how many deaths the nuclear accident caused, what kinds of illnesses have resulted from the radioactive fallout, or what to do about the most contaminated areas in Eastern Europe could hardly be more divergent. The public debate about the consequences of Chernobyl is of particular political relevance because

each interpretation of the event also involves a judgment about the danger of low-level radiation exposure. Thus, statements about Chernobyl and its aftermath are also claims about what it should teach us about the nonmilitary use of nuclear energy. Commemorations of Chernobyl, such as those that occur on its anniversary, are therefore inherently political: the forms of language and the "facts" used to talk about it are an attempt to influence public perceptions about the risks connected with this type of electricity production. Furthermore, the narratives created by various participants in the Chernobyl debate demonstrate how different the perceptions of risk really are.

This essay examines different forms of remembering Chernobyl, from both a national and transnational perspective. "Forms of remembrance" are understood here in a broad sense, including material representations as well as performative practices. In addition, the analysis will give particular attention to the participants in this memory discourse. Before looking at these aspects in detail, however, I will provide a short overview of the accident and its reception.

The Chernobyl Accident and How It Has Been Evaluated

During the night of 25/26 April 1986 an accident happened in reactor unit 4 of the nuclear power plant "Lenin", located about 100 kilometers north of Kiev. It would go down in history under the name of the neighboring town, Chernobyl. "Lenin", which consisted of four RBMK-type reactors[2] with a total production capacity of 4,000 megawatts, had been built in the 1970s and 1980s, with two additional reactor units under construction in 1986. Together with the nearby city of Pripyat, which had been created specifically to house the workers at the plant, this industrial complex was the embodiment of technological progress in the Soviet Union. During that night in April 1986, a

[1] This essay was translated from German by Brenda Black, including all German-language sources unless otherwise specified.

[2] The Reaktor Bolshoy Moshchnosti Kanalniy (RBMK) is a graphite-moderated and light-water-cooled reactor that was developed in the Soviet Union and has been used only in plants on its (former) territory.

nuclear meltdown occurred during a performance test, resulting in a series of explosions which destroyed the reactor building and released vast quantities of radioactive material into the environment. Smoke and dust caused by the fires carried the particles high into the air where they were distributed across the globe. The concentration of radionuclides deposited in any given area depended not only on air movements, but also local weather patterns and geographical factors.

Both the physical distribution of its fallout and the coverage in media reports made Chernobyl into a transnational event. The Soviet Union initially said nothing about the event after the national press agency TASS reported on 28 April that an accident had happened in the nuclear power plant in Chernobyl.[3] In Western European and US media, however, there was intense speculation about the situation in the surrounding area and the number of casualties. East of the Iron Curtain the topic was not discussed, except in Poland, where the media reported on Chernobyl. However, a map of the protective measures undertaken by various European countries painted a very different picture – although not necessarily one which corresponded with the actual regional intensity of the radioactive fallout. There was no unified response at the level of the European Communities; EC regulations setting limits on the radioactivity level in foodstuffs were only established after Chernobyl. As a result, on the German side of the Rhine lettuce was removed from the markets and playground sand was replaced, while the French radiation protection agency on the other side of the Rhine announced that these measures were absurd. Although the southeastern part of France and Corsica received significant radioactive fallout, Paris was primarily worried that the Germans would infect the French population with their "Atomangst". The government feared the economic and social consequences of a loss of trust in the quality of French agricultural products or a growing opposition to French nuclear policy.[4]

[3] Phrasing of the TASS announcement as translated in "Neues Deutschland", cited in M. Arndt, *Tschernobyl – Auswirkungen des Reaktorunfalls auf die Bundesrepublik Deutschland und die DDR*, Landeszentrale für politische Bildung Thüringen, Erfurt 2011, p. 48.

[4] On the Chernobyl debate in France see K. Kalmbach, *Tschernobyl und Frank-*

While in the West, advocates and opponents of nuclear power were already engaged in a struggle over the "right response" to Chernobyl, those at the power plant "Lenin" and the vicinity faced an entirely different set of problems. It took several days to extinguish the graphite fires in the reactor, followed by months of work to clean up the site and build a sarcophagus containment structure around the destroyed reactor. More than 600,000 men and women, called "Liquidators", were brought in from throughout the Soviet Union. Although a 30 kilometer radius around the plant was declared a "forbidden zone", controlled by the military, the remaining reactor units resumed normal operation in late 1986. However, because the radioactive contamination was not limited to this arbitrarily determined territory, resettlement measures continued for years, particularly in Belarus, the country that received the majority of the fallout. Thus the number of evacuees, originally around 116,000 and consisting primarily of residents of Pripyat, today amounts to some 350,000.[5]

Western proponents of nuclear power didn't change their position much after the early reports of the events. By using the rhetoric and clichés of the Cold War, they quickly found a narrative which discredited the Soviet nuclear policies and information policies while emphasizing that such an accident could never happen in a Western facility. This narrative – supported by information in reports by critics from within the Soviet nuclear industry such as Grigori Medvedev[6] – still dominates accounts of the accident today, even outside pro-nuclear circles. It describes the accident as the result of faulty reactor design and untrained personnel carelessly handling this highly sensitive technology. On an international level, pro-nuclear institutions emphasized that there was no need for alarm. Whatever lessons were to be learned from Chernobyl concerned above all the RBMK reac-

reich: Die Debatte um die Auswirkungen des Unfalls im Kontext der französischen Atompolitik und Elitenkultur, Peter Lang, Frankfurt am Main 2011.

[5] For more on this topic see the essays in A. Sahm, M. Sapper, V. Weichsel (eds), "Tschernobyl – Vermächtnis und Verpflichtung", in *Osteuropa*, 56, 4, 2006.

[6] G. Medvedev, *The Truth about Chernobyl*, trans. E. Rossiter, Basic Books, New York 1990.

tors, and not the nuclear industry as a whole, they claimed. One of the most prominent examples is a comment by Morris Rosen, director of nuclear safety of the IAEA (International Atomic Energy Agency), during the Chernobyl Conference in August 1986 in Vienna that "even if an accident of this type should happen once a year [...] I would still consider nuclear power an interesting energy source".[7]

The site of the Chernobyl power plant has never been completely abandoned. Even after the last reactor was turned off in 2000, thousands of workers are still employed maintaining and inspecting the facilities and, since 2007, building a new sarcophagus. Opinions vary widely about whether the new sarcophagus is needed.[8] For just as some details of the accident are still debated, there is also much disagreement about how much radioactive material is still in the reactor – a question that in its turn refers back to the debate about how much radioactive material was released into the environment during the accident. Such discussions also have a direct influence on the recurrent question of which regions are contaminated and how much, and, in consequence, what negative effects it might have upon the health of the people living there.

Thus, there are a great number of uncertainties surrounding the Chernobyl accident, all of which contribute to the most difficult question of all: the death toll. Determining this number requires making a whole set of assumptions about the amount and quality of the material released by the accident, how it spread through the atmosphere, how radionuclides behave in the earth and water in various places, and so forth, in order to finally reach a conclusion about how much fallout radioactivity people were exposed to. Each

[7] In French: "Même s'il y avait un accident de ce type tous les ans, – ce qui est loin d'être le cas – je considérerais le nucléaire comme une source d'énergie intéressante". Cited in "La catastrophe de Tchernobyl pourrait être à l'origine de 24 000 décès par cancers", *Le Monde*, 28 August 1986, p. 20.

[8] The various positions in this debate are summarized in a Deutschlandfunk radio report by N. Schröder, "Der Tanz um das 'Goldene Grab' – Wem nützt der Sarkophag von Tschernobyl?" Transcript at http://www.dradio.de/download/148967/ (accessed 30 June 2012).

of these steps depends upon dispersion models, for it is not possible to determine individual data points. In the next step, determining what negative health effects this additional radioactive exposure might have for an individual means relying entirely upon probability models. In theory every radioactive isotope has mutagenic potential and could trigger cancer. However, since this does not happen in every case, and since there are of course also many other factors leading to cancer – without any way of telling in the end what the precise trigger was – all casualty figures for Chernobyl are reported as "probabilistic", that is, statistically possible, illnesses or deaths.

In addition to the widely varying assumptions upon which such calculations are based, the question of how many people have fallen ill or died (or will fall ill or die) due to Chernobyl also depends upon a central unknown: the question of which illnesses can be caused by long-term exposure to low-level radiation – in this case primarily in the form of contaminated food. The official international groups of experts evaluating the consequences of Chernobyl, namely the "International Chernobyl Project" and its successor, the "Chernobyl Forum", have considered the negative health effects of low-level radiation to be negligible. As a result, the number of deaths listed in their 2006 report[9] is much lower than in other studies.[10]

In addition to a small number of firefighters who died of acute radiation syndrome and the children who died from thyroid cancer, they calculate the possibility of some 4,000 fatal cancer cases among the Liquidators, evacuees, and the population of the highly contami-

[9] Chernobyl Forum, *Chernobyl's Legacy: Health, Environmental and Socio-Economic Impacts and Recommendations to the Governments of Belarus, the Russian Federation and Ukraine*, IAEA, Vienna 2006.

[10] Compare especially the Torch Report, which offers a critical analysis of the studies by the international organizations and today is one of the main references for nuclear critics: I. Fairlie, D. Summer, A. Nyagu, *The Other Report on Chernobyl (TORCH)*, Greens and EFA in the European Parliament, Berlin/Brussels/Kiev 2006. The prominent North American anti-nuclear activist Rosalie Bertell calculates a particularly high number of deaths (899,600 to 1,787,000). C. Busby, A. Yablokov (eds), *Chernobyl 20 Years On: Health Effects of the Chernobyl Accident*, published on behalf of the ECRR by Green Audit, Aberystwyth 2006, p. 247.

nated area as victims of Chernobyl radiation. The Chernobyl Forum considers health effects upon the five million residents of the other "contaminated" areas (the report always puts the word "contaminated" in quotation marks) to be even more speculative, and calculates radiation-related deaths as less than one percent of the normal rate of cancer mortality.[11] The report rejects the possibility that radioactive exposure from Chernobyl could cause DNA mutations that would affect future generations – from the perspective of this group, birth defects caused by Chernobyl do not exist. Instead, it considers the increasing number of congenital malformations observed in Belarus to be most likely the result of a more active reporting of such cases.[12]

For years, however, not only Liquidator associations but also doctors working in the areas in Belarus particularly affected by the fallout have been pointing out that since 1986 there has been a rapid increase in a variety of diseases in the most affected regions – especially circulatory-system disorders in children. For them these illnesses are directly connected with the radioactivity to which the children are exposed on a daily basis, beginning in the womb.[13]

Neither the International Chernobyl Project nor the Chernobyl Forum have ever denied that the frequency of many illnesses has increased in these regions; however, they attribute this to improved methods of recording these diseases and a "radiophobia" among the population.

[11] Compare Chernobyl Forum, *Chernobyl's Legacy* cit., p. 15 f.

[12] Compare Ibid., p. 19 f: "These doses are also unlikely to have any major effect on the number of stillbirths, adverse pregnancy outcomes or delivery complications or the overall health of children. Birth rates may be lower in 'contaminated' areas because of concern about having children (this issue is obscured by the very high rate of medical abortions) and the fact that many younger people have moved away. No discernible increase in hereditary effects caused by radiation is expected based on the low risk coefficients estimated by UNSCEAR (2001) or in previous reports on Chernobyl health effects."

[13] The doctors Yury Bandazhevsky and Vassili Nesterenko have played the most prominent role in international discussions. In Germany, Sebastian Pflugbeil has spoken out for encouraging public debate about the health effects of the radiation in Eastern Europe. Cf. S. Pflugbeil, "Alle Folgen liquidiert? Die gesundheitlichen Auswirkungen von Tschernobyl", in Sahm, Sapper, Weichsel, "Tschernobyl, Vermächtnis und Verpflichtung" cit., pp. 81-104.

The concept of "radiophobia" had already been used as an explanation in the very first official international evaluation of the situation in the affected regions, in which it was claimed that people weren't becoming sick because of the radioactive exposure, but rather their fear of it was making them sick, both psychologically and physically as a result of increased consumption of alcohol and other drugs.[14] This fear, along with stress from the evacuations and resettlements, from the breakup of the Soviet Union, and from the social and economic upheaval that accompanied it, was given as the real cause of the "legacy" attributed to Chernobyl – not radioactive exposure.[15] Accordingly, the 2006 report by the Chernobyl Forum advocated re-settling the regions that had been evacuated in the late 1980s and taking back "Chernobyl-related benefits and privileges". A return to "normality", from their point of view, was the best way to deal with "radiophobia".

This interpretation of Chernobyl as a finished occurrence stands in stark contrast to the interpretation of the accident as an ongoing event. If one operates under the assumption that the radioactivity of the most affected regions causes diverse illnesses and alters the genetic material of the people, animals, plants, and other organisms living there, it follows that Chernobyl is still happening in the present and will continue into the future, for the full extent of its effects are still unfolding.[16]

The active memory work that many actors have engaged in during

[14] International Chernobyl Project, *An Overview; Assessment of Radiological Consequences and Evaluation of Protective Measures*, Report by an International Advisory Committee (IAEA), Vienna 1991, p. 32. The term "radiophobia" was used for the first time in a report by the national radiation protection committee of the USSR. As the term was severely criticized it is no longer used in official reports but is paraphrased as "exaggerated sense of the dangers to health of exposure to radiation" or the like. For more on the development of this concept see T. Hlukhava-Kasperski, "La politique de la mémoire d'une catastrophe nucléaire: les usages de l'accident de Tchernobyl en Biélorussie (1986-2008)", dissertation, Institut d'Études Politiques de Paris 2012, p. 393.

[15] Compare Chernobyl Forum, *Chernobyl's Legacy*, cit., p. 36.

[16] Guillaume Grandazzi and Frédérick Lemarchand in particular have looked at the subject "Chernobyl as a future event" from the perspective of social philosophy. Cf. G. Grandazzi, F. Lemarchand (eds), *Les silences de Tchernobyl – L'avenir contaminé*, Éditions Autrement, Paris 2004, expanded edition 2006.

the 25 years since the accident focuses on precisely this aspect. The emergence of Chernobyl as a site of memory is thus directly connected with its politicization. Furthermore, because the media coverage and the memory work of those involved crosses national borders, it is not just a national site of memory, but a transnational one as well.

Narration as a Carrier of Memory

This brief summary has shown how statements about the effects of Chernobyl are rife with implications, unknowns, and assumptions. I will now look at how these interpretations of the event are reflected in specific narratives, with a particular focus on narratives that portray Chernobyl as an "apocalypse". This narrative is not only widespread in popular literary works but has also been the subject of photography and films; it has become the carrier of memories of Chernobyl. The counter-narrative, which sees the effects of Chernobyl as primarily caused by "radiophobia", is found mostly in the official evaluations of international organizations and their expert committees. In contrast to the "apocalypse" narrative, this narrative is not a carrier of memory, for it does not consider Chernobyl to be an event worth remembering – indeed, in this interpretation Chernobyl actually needs to be forgotten, for it perpetuates the problem of "radiophobia".

National Narratives

The remembrance of Chernobyl has occurred in part through fictional adaptations showing the effects of such an event in the author's own country. Two novels, one from Germany and one from France, will serve as examples of "forms of remembrance through novels". Both were written in the immediate aftermath of the accident and adapted the event to their own national framework.

In Germany the book *Die Wolke* ("The Cloud") by Gudrun Pausewang has played a central role in the interpretation and remembrance of Chernobyl. The children's novel, published in 1987, focuses on the experiences of a girl named Janna-Berta. Janna-Berta lives near the nuclear plant Grafenrheinfeld. After an accident at the plant, she and her

brother Ulli try to flee the radioactive "cloud" released by it. The people's flight is described as mass panic in which everyone fights for themselves without consideration for others, and the radioactive "cloud" is a storm front approaching visibly on the horizon. Ulli dies during the flight, and Janna-Berta collapses during a radioactive rainstorm. She wakes up in an emergency hospital, suffering from acute radiation sickness. Around her children are dying one after another. She survives, and since her parents also died in the accident, she is sent to her aunt in Hamburg, where she fights to keep the event from being forgotten.

The comparison to Chernobyl is explicit, and not just because the novel includes as a foreword an announcement published in the newspaper *Die Zeit* on 23 May 1986 about the government's handling of Chernobyl. Within the story itself, the characters use their memories of Chernobyl as a basis for interpreting what is happening around them.[17]

Important for the reception of the book is the fact that, while the story is fictional, the scenes of mass panic and mass deaths due to radiation poisoning haven been considered as being realistic scenarios. For example, a teachers' manual with classroom materials mentions the "real background" of the book.[18] This article will not discuss the question of whether such a scenario could really happen, but instead the lasting impact of this story. The book received the Deutscher Jugendliteraturpreis (German Children's Literature Prize) in 1988, in spite of substantial criticism from conservative circles, and by 2011 about 1.5 million copies had been sold. It is available as an audio book and graphic novel, and a film adaptation was released in 2006 on the twentieth anniversary of Chernobyl. It is a standard school text that has shaped the imagery of nuclear accidents for a whole generation of children, for whom nuclear accidents are associated with an apocalypse.

In France, too, Chernobyl motivated literary investigation of what would happen if a similar accident were to happen in one's own coun-

[17] G. Pausewang, *Die Wolke*, Gütersloh, Rheda-Wiedenbrück 2003, p. 16 and 23.

[18] B. Reddig-Korn (ed.), *Materialien zur Unterrichtspraxis – Gudrun Pausewang, Die Wolke*, compiled by G. Runge, Ravensburger Buchverlag, Ravensburg 2009, p. 3.

try. Hélène Crié and Yves Lenoir offered one answer in their novel *Tchernobyl-sur-Seine*,[19] also published in 1987. Even before the book was published, Crié, the main author, had written a variety of articles for the newspaper *Libération* in which she took a critical stance towards French nuclear policy. In *Tchernobyl-sur-Seine,* the authors imagined an accident scenario for the nuclear facility at Nogent-sur-Seine. The choice of location was no coincidence: in 1987 this nuclear reactor was in the final stages of construction and even prior to Chernobyl had already been subject to criticism from anti-nuclear activists because of its proximity to Paris (it is located about 120 kilometers southeast of the city).[20] The goal of the novel was primarily to reveal some of the problems of the French nuclear sector, which, according to the authors, the official responses to Chernobyl had made particularly clear: the exclusiveness and secrecy of the "nucleocratic system"[21] and a policy of disinformation intended to protect this industrial sector which was so important for France's economy. Therefore, many of the actors who had shaped the French response to Chernobyl in spring 1986 made appearances in the novel: the director of the French radiation protection agency, Pierre Pellerin (here called Pierre Fouchon), who stated that the accident would not have any negative effects off-site; the safety experts from EDF, the company operating the French nuclear plants, who initially completely misjudged the situation; the media, who were denied access to information; and finally the government, who cared more about preventing panic than it did about the health of the population.

The story paints a very different picture from that of *Die Wolke* about the effects of the radioactive contamination. There are no im-

[19] H. Crié, Y. Lenoir, *Tchernobyl-sur-Seine*, Calmann-Lévy, Paris 1987.

[20] The novel was not the first time the idea of a "Tchernobyl-sur-Seine" was expressed. In the *Libération* on 22 May 1986, an article entitled "Nogent, 7 décembre 1990, 20h 11: Catastrophe-fiction" described the course of a fictional accident using a comic strip.

[21] The (negatively connoted) term "nucleocracy" is used frequently in France to further specify the idea of "technocracy" used in other languages. For the argument that the French "nucleocrats" are a sociologically homogeneous group in their background and education, see in particular P. Simonnot, *Les nucléocrates*, Presses universitaires de Grenoble, Grenoble 1978.

mediate episodes of mass death. The novel's protagonists (two hikers who are unknowingly exposed to radioactivity in the forest near the nuclear plant, while the surrounding region has been put under a disaster warning and citizens have been told not to leave their houses) are exposed to radioactivity, but unlike Janna-Berta, they do not fall unconscious and lose all their hair. Instead, they are picked up by rescue workers in protective suits and are brought to a Paris hospital. They are soon released since they do not show any signs of acute radiation syndrome. In comparison to *Die Wolke*, this story is much less apocalyptic: There are few deaths and no evacuation of entire regions; only the area immediately surrounding the plant is declared a prohibited zone. But in this story, too, people die during their panicked flight to escape the approaching radioactive cloud, and uncertainty remains about how many thousands will die from the effects of exposure. If one only considers the description of the accident, whose wording echoes official French descriptions of the events at Chernobyl, then this novel should indeed be considered an apocalyptic narrative, for the French nuclear experts constantly emphasized that an accident such as Chernobyl could not occur at a French facility.

Finally, it is worth noting that *Tchernobyl-sur-Seine* has not enjoyed the same popularity as *Die Wolke*. However, it is one of many publications in France that thematize the policy of disinformation about Chernobyl.[22] Thus, French literature is in no way less concerned with the topic than in Germany; we simply find a wider variety of carriers of memory.

The comparison of the two novels clearly shows the different reactions and debates that Chernobyl has evoked in Germany and France. In Germany the fear of the immediate health effects from radioactive exposure was predominant, while in France people's

[22] Apart from a remarkable look at Chernobyl in the form of a comic (C. Montellier, *Tchernobyl mon amour,* Actes Sud, Arles 2006), French writing on Chernobyl consists mainly of non-fiction. Among the most important are W. Tchertkoff, *Le crime de Tchernobyl – le goulag nucléaire*, Actes Sud, Arles 2006; CRIIRAD, A. Paris, *Contaminations radioactives – atlas France et Europe*, Y. Michel, Barret-sur-Méouge 2002; J.-M. Jacquemin-Raffestin, *Tchernobyl – aujourd'hui les Français malades*, Éd. du Rocher, Monaco 2001.

concerns focused on the structures within the nuclear industry and, linked to this, on the information policies of the government and the institutions in charge of radiation protection.

Transnational Narratives

In addition to works looking at Chernobyl from a national perspective, whose audience is also largely national, portrayals of the effects of the accident have taken the form of transnational carriers of memory. Among the literary treatments of the topic, the book *Voices from Chernobyl* (in Russian: *Chernobyl'skaia molitva*) by the Belarusian author Svetlana Alexievich is the most important. Originally published in Russian in 1997, it was translated into Swedish and German in the same year. Translations into Japanese, English, Chinese, and Spanish, among other languages, soon followed. The book continues to be reprinted today. Its worldwide success is to a large degree due to the artistic quality of the narrative. Although Alexievich claimed to be simply recording eyewitness reports, she in fact heavily edited the interviews and combined them into a coherent narrative of incredible intensity.

In *Voices from Chernobyl*, Alexievich gives a voice to the "victims of Chernobyl" from the contaminated regions in Eastern Europe – people who were evacuated in 1986, family members of deceased Liquidators, sick patients and their families, and people who have returned to their evacuated villages, as well as those who moved to these regions because they considered them safer than their homelands. She lets them tell their stories in the form of monologues – sometimes nine to ten pages, sometimes only half a page – without any editorial commentary. The book has served as inspiration for a number of artists: theater groups in particular have found the texts suitable for stage adaptation.[23] However, *Voices from Chernobyl* is generally read as a documentation of the situation around Chernobyl rather

[23] For adaptations in France see V. Symaniec, "Mettre en scène La Supplication: du déni de la réalité au rejet de la représentation", in Grandazzi, Lemarchand, *Les silences de Tchernobyl* cit., p. 178 f.

than a literary creation. As a result, quotations from the book have frequently been used as captions or explanatory texts in books and exhibits.[24] *Voices from Chernobyl* has come to be the prime example of narrations that portray Chernobyl as an apocalypse – the French translation even uses the word "apocalypse" in its title: *La supplication: Tchernobyl, chronique du monde après l'apocalypse*. It is anything but an easy reading: The monologues describe the suffering of the Chernobyl victims in great detail, allowing readers to visualize, for instance, the skin peeling off of the irradiated body of a firefighter when his wife talks about his time in hospital. Thus the book has become a model and reference point for narratives about the "true" effects of the accident, narratives that aim to make visible the suffering that has been disguised by the "radiophobia" concept of official reports.

Images of the accident and its aftereffects are just as transnational and universal as the reception of Alexievich's book. Igor Kostin's photos have enjoyed a particularly wide circulation. He was there in 1986 with his camera to document the firefighters dying from radiation sickness in the No. 6 clinic in Moscow, as well as on the roof of the destroyed reactor while Liquidators cleared the rubble from it in order to start building the sarcophagus. In the years that followed, Kostin has not only returned repeatedly to Chernobyl but has also visited hospitals in Belarus and Ukraine and the houses of the Liquidators. On the twentieth anniversary of the accident an illustrated book with his work was published.[25] The viewer will recognize many of the images, for they have been used in both media coverage of Chernobyl and on numerous book covers, and have also been displayed in many exhibitions.[26] Kostin's interpretation of the effects of the accident is

[24] See for example the children's book by P. Dowswell, *The Chernobyl Disaster: 26th April 1986*, Hodder Wayland, London 2003, p. 27 and 37; or the traveling exhibition of the Internationales Bildungs- und Begegnungswerk, "25 Jahre nach Tschernobyl".

[25] I. Kostin in collaboration with T. Johnson, *Tchernobyl: confessions d'un reporter*, Editions des Arènes, Paris 2006. The book has also been published in English ("Confessions of a Reporter") and German ("Tschernobyl: Nahaufnahme").

[26] For example, one of Kostin's photos is the cover image for Sahm, Sapper, Weichsel, "Tschernobyl: Vermächtnis und Verpflichtung" cit. The Willy-Brandt-Haus in Berlin put on a large exhibition with his photos in spring 2006.

the visual counterpart of Alexievich's narrative: his images show an accident that has brought unimaginable suffering upon humanity, the full extent of which is not yet known, for the mutagenic effects of radiation will only become visible in future generations.

In addition to the wide audience of Kostin's own work, numerous other photographers have been inspired by him. The ghost town Pripyat with its motionless ferris wheel and hastily abandoned classrooms, the plaintive faces of prematurely aged Liquidators, the scars on children's necks from thyroid operations – these motifs have become universal for portraying the "Chernobyl apocalypse".[27]

A National Site of Memory with Varied Implications

In addition to these narratives and images that are common to the transnational reception of Chernobyl, there are many forms of remembrance that are specific to particular countries. This is in part a result of the different degrees to which Chernobyl affected each country and their varied reactions, which resulted in "different events" that are remembered. Furthermore, the political instrumentalization of Chernobyl is quite varied, and did not always focus on questions of nuclear energy use, as the example of Belarus will demonstrate. The different implications of Chernobyl as a national site of memory mirror the divergent processes of coming to terms with the event and its consequences. The remembrance discourses in Germany, France, and Belarus will show what varied connotations Chernobyl has as a site of memory depending on the specific national perspective.[28]

[27] For a philosophical and art-historical analysis of Chernobyl photography see D. Bürkner, "Eine vollkommen neue Realität: Transgression des Wahrnehmbaren in den Bildern Tschernobyls", in *Maßlose Bilder: Visuelle Ästhetik der Transgression*, I. Reichle, S. Siegel, A. Spelten (eds), Wilhelm Fink, Munich 2009, pp. 189-206.

[28] Although it was not possible to consider the example of Ukraine in this essay, it is worth mentioning here some of the particular characteristics of Chernobyl as a national site of memory in Ukraine. Of prime importance is the "hero

Germany

It is necessary to distinguish between East and West Germany, at least in the early period of Chernobyl remembrance, for the reactions in 1986 were strongly divergent in the two German states. Thus, people in the GDR and FRG were in a sense confronted with two different "national events". In West Germany, responses to Chernobyl were characterized by an intense media debate about the potential dangers of the radioactive contamination. In East Germany, on the other hand, the experience was different, not least because the state-run media offered a much less drastic portrayal of the situation – when it reported about the event at all. For residents who learned about the accident only from East German media, Chernobyl was something happening far away. However, those who could access West German media as well were confronted by imagery that blatantly contradicted the East German reporting. They became increasingly aware of the possible harmful effects of the radioactive particles in their own gardens and were forced to confront the unpleasant situation of being left uninformed by their own government about a very real danger. Thus, for many East German civil rights

narrative" that portrays the firefighters and the Liquidators as having saved the country from a catastrophe and triumphed over the adversary (in this case the burning reactor) as though in a war. In Ukraine, these heroes are commemorated and thanked in the form of memorials. At the same time, the struggle to be recognized as a Chernobyl victim is a central element in the everyday lives of many people in the country (cf. A. Petryna, *Life Exposed: Biological Citizens after Chernobyl*, Princeton University Press, Princeton 2006.) Thus, the remembrance is marked by a sort of competition between the "hero" and "victim" discourses. In addition, the memory of Chernobyl is particularly concrete in Ukraine, whether in the form of exhibits in the Chernobyl Museum in Kiev, ethnographic collections of cultural relics from the evacuated towns in the "forbidden zone", or the red and white smokestack that has become a symbol of the site of the accident and which must be torn down before building the new sarcophagus – a proposal that is subject to substantial criticism. For the most recent works on the remembrance of Chernobyl, with a particular focus on Eastern Europe, see M. Arndt (ed.), "Memories, Commemorations, and Representations of Chernobyl", in *Anthropology of East Europe Review,* 30, 1, 2012.

activists – including the prominent example of Sebastian Pflugbeil – Chernobyl became an important reference point.[29]

While in West Germany individual memories involve activities such as stockpiling food products and replacing playground sand, in East Germany it is the sudden abundance of fresh fruits and vegetables in May 1986 – products that could no longer be exported to West Berlin and were therefore offered for sale locally. These different experiences are to some degree also reflected in sometimes different motivations for participating in Chernobyl humanitarian assistance programs, which continue to this day. The aid has mostly taken the form of providing places for recreational stays for children from the most affected regions in Ukraine and Belarus, as well as sending supplies such as medicine, clothing, and so forth. In West Germany, assistance came mostly from people actively opposed to nuclear power. In East Germany, by contrast, there was a stronger sense of fellow-feeling with the Chernobyl victims because they were from other Eastern bloc countries.[30] For the environmental and anti-nuclear movement, however, in both East and West Germany, Chernobyl is an important reference point for the call to stop using nuclear energy – a call that did not start in 1986, but rather was already so widespread by the 1980s that there was a receptive audience for Chernobyl and the dangers of the radioactive fallout.

Yet civil society was not the only place in Germany where the

[29] In contrast to West Germany, where the response to Chernobyl has been well studied, there are few studies that look at East Germany. Of particular importance are Friedrich-Ebert-Stiftung, Landesbüro Sachsen-Anhalt, *Tschernobyl und die DDR: Fakten und Verschleierungen – Auswirkungen bis heute?*, Magdeburg 2003; D. de Nève, *Die Atomkatastrophe von Tschernobyl – Reaktionen in der DDR*, Forschungsverbund SED-Staat, Berlin 1995. A rare study that looks at both East and West Germany is Arndt, *Tschernobyl – Auswirkungen des Reaktorunfalls* cit.

[30] This observation is the result of numerous conversations with active members of the Chernobyl Solidarity Movement during the "International Partnership Conference" organized by the IBB on 17-22 April 2011 in Minsk. A more in-depth analysis of West German activism beyond the anti-nuclear concern can be found in M. Arndt, "Verunsicherung vor und nach der Katastrophe: Von der Anti-AKW-Bewegung zum Engagement für die 'Tschernobyl-Kinder'", in *Zeithistorische Forschungen*, 7, 2, 2010, pp. 240-258.

memory of Chernobyl was used to support attitudes and actions. It has also been used as a political argument in federal energy policies, at the very latest since the institutionalized German environmental and anti-nuclear movement Bündis 90/Die Grünen (the German Green Party) became part of the German coalition government in 1998. Thus, on the twentieth anniversary of the accident in 2006, the Social Democratic Party (SPD), which was at that time in a coalition government with the Christian Democratic Union (CDU), and the SPD minister of the environment Sigmar Gabriel used Chernobyl as an argument supporting the party's energy and economic policy: an exhibit at the Willy-Brandt-Haus in Berlin displayed photography by artists such as Igor Kostin, Paul Fusco, and Rüdiger Lubricht,[31] and a leaflet entitled "Tschernobyl – Magazin zur Atompolitik" ("Chernobyl – Magazine on Nuclear Politics")[32] was mailed to 1.5 million households in Germany. With such campaigns, the SPD defended its decision to phase out Germany's nuclear power program that had been resolved in 2000 under the SPD/Green Party coalition government and that was subject to increasing criticism, particularly from the conservative CDU, because of the climate change debate.

In summary, in Germany today, the site of memory of Chernobyl represents a critical attitude towards the use of nuclear energy, if not a complete rejection of it. Chernobyl evokes the dangers of nuclear plants, the continual threat of an accident and its consequences over a nearly unlimited geographic area. It is a site of memory that is most firmly anchored in the anti-nuclear movement, but one which, as a result of the success and popularity of this movement and the Green Party, occupies a place in mainstream society. It is a fairly uncontested site of memory, which may even be used unproblematically

[31] For more on this exhibition see D. Haas, "Tschernobyl-Ausstellung – Nahaufnahmen des Leids", *Spiegel-Online*, 3 April 2006, http://www.spiegel.de/panorama/zeitgeschichte/0,1518,druck-409586,00.html (accessed 30 June 2012).

[32] Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, *Tschernobyl – Magazin zur Atompolitik*, BMU Referat Öffentlichkeitsarbeit, Berlin 2006.

as an official justification for national policies because it draws upon interpretive schema that are accepted by nearly the entire population and reach across class, regional, and ideological boundaries.

France

However, as a glance across the Rhine to France will show, the national site of memory of Chernobyl can be connected with implications beyond purely anti-nuclear sentiments. In France it is a heavily debated site of memory; there is no overarching consensus about how it is to be interpreted. And it is definitely not a site of memory that the government might consider using to support its energy policies. When Chernobyl is used as a political argument in France, it is by citizens justifying political protests. In this regard, references to Chernobyl and its memory have implications that go beyond the issue of nuclear energy. In France Chernobyl stands for a deliberate policy of disinformation by the government about the dangers that accompany the nuclear industry. In this discourse, the buzzword Chernobyl is supplemented by references to the "cloud that stopped at the border".

The development of this narrative around Chernobyl and its use as a frame for interpreting the position of the French government on nuclear questions in general is not only the result of the French authorities' response (or rather lack of response) to the accident in spring 1986. Far more important were the substantial unofficial responses that were widely reported in the media, such as the foundation of the first independent radiation protection institutes, the "Commission de recherche et d'information indépendantes sur la radioactivité" (CRIIRAD) and the "Association pour le contrôle de la radioactivité dans l'ouest" (ACRO). Doubts about the official French accounts of Chernobyl and its consequences had led a number of skeptics to carry out measurements of their own. They questioned not only the official reports about the situation near the plant, but particularly the statements about the radioactive fallout in France. They gave most of the blame for what they considered to be a deliberate politics of disinformation to the agency in charge of

monitoring the French population's exposure to radioactivity, the "Service central de protection contre les rayonnements ionisants" (SCPRI). Thus, in France Chernobyl was a catalyst for the development of an institutionalized "counter expertise" that opposed the position of the public authorities. Unlike previous critical voices, such as the "Groupement de scientifiques pour l'information sur l'énergie nucléaire" (GSIEN),[33] a group of concerned scientists and employees within the nuclear sector, these new institutes set up their own laboratories and conducted studies in order to discover the "true extent" of radioactive contamination in France and reveal the "lies" of the official French agencies.

In 1996, when the existence of radioactive "hot spots" in France became widely known, the competing interpretations of the government experts and the non-government organizations about the radioactive fallout received renewed public attention. "Chernobyl" had, in effect, become a site in France. The critics began an intense search for French victims of this radioactivity,[34] while the public authorities just as intensely collected data to demonstrate that these victims could not possibly exist. More and more people attributed their thyroid cancer to Chernobyl, and some of them attempted to prosecute Pierre Pellerin, the founder and director of SCPRI, as well as members of the 1986 government, for willful bodily injury. The last trial concerning this issue was settled in 2011, after ten years of negotiation: the accusation was dismissed.

However, the deep mistrust on the part of much of the popula-

[33] More information about GSIEN, the French "equivalent" of the Union of Concerned Scientists can be found in S. Topçu, "Confronting Nuclear Risks: Counter-Expertise as Politics within the French Nuclear Energy Debate", in *Nature and Culture*, 3, 2008, pp. 225-245.

[34] Jean-Michel Jacquemin-Raffestin's many publications have reached a wide audience and made him one of the most prominent representatives of the "search for French victims". See for example J.-M. Jacquemin-Raffestin, *Ce fameux nuage... Tchernobyl, la France contaminée*, Éditions Sang de la terre, Paris 1998; id., *Tchernobyl: Aujourd'hui les Français malades* cit.; id., *Tchernobyl, conséquences en France: J'accuse... !* Éditions Sang de la terre, Paris 2002; id., *Tchernobyl 20 ans après: Cachez ce nuage que je ne saurais pas voir*, Guy Trédaniel Éditeur, Paris 2006.

tion about the official evaluation of Chernobyl's effects in France[35] has other causes that go beyond the particular experience of the *affaire Tchernobyl*. From the beginning, democratic decision-making processes were bypassed for key aspects of France's nuclear program.[36] Neither the development of atomic bombs, nor the decision, referred to as "Plan Messmer", to expand French nuclear power facilities in the 1970s and 1980s were ever subject to parliamentary debate. From the perspective of the scientific and political elites, this is seen even today as an appropriate way to handle a matter which, they feel, requires expert knowledge in order to be able to form a judgment or make recommendations. However, the French educational system with its *grandes écoles* (elite post-secondary schools) ensures that only the graduates of certain prestigious institutions achieve recognition as experts; the system thus continually produces elites with favorable attitudes towards the use of nuclear energy. In the popular idiom, this "elite expert circle" is often referred to with the negatively connoted term "nucleocrats".[37] It is nearly impossible for anyone who is not part of this circle to convince the political elite to listen to them – a situation that the French anti-nuclear movement has struggled to overcome since the beginning, for all the parties (with the exception of the Green Party) are in agreement that nuclear energy is not only the energy of the future, but also a tremendous economic opportunity for France, both in terms of domestic reactors (with 58 currently in operation), and the export abroad of technology and expertise through the largely state-owned corporations Areva and EDF.

The criticism of particular aspects of the French nuclear sector, above all its elite culture and the way it cuts itself off from general public discussion and influence, has crystallized in France around

[35] Compare the results of an opinion survey by IRSN: *Baromètre IRSN 2006*, *La perception des situations à risques par les Français*, IRSN, Fontenay-aux-Roses 2006, p. 40.

[36] On the socio-political implications of the French nuclear energy program in the post-war period, see G. Hecht, *The Radiance of France: Nuclear Power and National Identity after World War II*, MIT Press, Cambridge, MA 1998.

[37] On the terms "nucleocracy" und "nucleocrat", see footnote 21.

the debate about the aftereffects of Chernobyl. This is the main reason why Chernobyl has been such a polarizing topic in France for so long and why the debate has actually become more heated as the accident retreats further into the past. On the twentieth anniversary in 2006, there were countless events organized in France, as well as a veritable flood of publications about Chernobyl.[38] This phenomenon must be understood in the context of a widely heralded worldwide renaissance in nuclear energy taking place at the time – a renaissance to which French nuclear politics and its promotion of the "green atom" contributed substantially.[39]

The critics of French "nucleocracy" are quite clearly the driving force behind the continuing remembrance of Chernobyl. From the perspective of the "nucleocrats", who from the beginning have considered the effects of Chernobyl to be quite limited and the meltdown to be merely an industrial accident like many others, there is no reason to emphasize this particular event. On the contrary, for them, every mention of Chernobyl only fuels the population's "radiophobia". To be sure, there are scientists such as Georges Charpak[40] – one of the most prominent French advocates of nuclear energy – who encourage the active remembrance of Chernobyl, but only under specific conditions: Charpak considers it important to remember the mistakes made by the operators of the nuclear reactor at Chernobyl in order to prevent careless actions. Only in this way can nuclear energy continue to be what he believes is the safest and best means of sustainable electricity production.

However, it is above all the active opponents of nuclear power who

[38] Not only were there multi-page feature articles in nearly all major newspapers, but radio and TV programs also gave substantial coverage of Chernobyl. For a detailed analysis of the publications see Kalmbach, *Tschernobyl und Frankreich* cit., p. 131 ff.

[39] On the role that France has played in the international lobby to "green the atom" see E. Mühlenhöver, *L'environnement en politique étrangère: raisons et illusions; Une analyse de l'argument environnemental dans les diplomaties électronucléaires françaises et américaines*, L'Harmattan, Paris 2002.

[40] G. Charpak, R.L. Garwin, V. Journé, *De Tchernobyl en tchernobyls*, Odile Jacob, Paris 2005.

shape Chernobyl's character as a national site of memory: the anti-nuclear network "Sortir du nucléaire" ("Phase out nuclear power"), Greenpeace France, and the French "nuclear counter-expert groups" CRIIRAD and ACRO.[41] For them Chernobyl was a "blot on the clean record" of the French "nucleocrats". Reference to the "cloud that stopped at the border" is therefore considered an ideal weak spot for revealing the "dark recesses" of the "nucleocratic" system: a system that, from the point of view of its critics, acts irresponsibly and is prepared to endanger its own people in order to protect itself. By keeping the memory of Chernobyl alive, many activists have seen a chance to broaden their protest against the "nuclear state".[42] As a national site of memory, Chernobyl represents not only a critical attitude towards the use of nuclear energy, but also criticism of the French elite system and thus also of the political culture of the country.

Belarus

A look at Belarus will show yet another national interpretation of Chernobyl: the memory of the accident as a site of conflict between an authoritarian president and his opposition. As Tatiana Kasperski shows in her work, for Belarus the expression "contested site of memory" has dimensions which go far beyond the disputes about the interpretation of events and how they are co-opted by opposing interests that are usually meant when discussing *lieux de mémoire*.[43] In Belarus we are

[41] Guillaume Grandazzi, Frédérick Lemarchand, Galia Ackermann, and Wladimir Tchertkoff, whose publications and ideas have significantly influenced the Chernobyl discourse in France, particularly on the twentieth anniversary, will not be discussed here further, since they belong more to the transnational discourse and the reception of Svetlana Alexievich's book than to a French site of national memory.

[42] With reference to R. Jungk, *Der Atomstaat: Vom Fortschritt in die Unmenschlichkeit*, Kindler, Munich 1977.

[43] The discussion of Belarus is based largely on Kasperski, "La politique de la mémoire" cit. Selections of her findings have been published in id., "Chernobyl's Aftermath in Political Symbols, Monuments and Rituals: Remembering the

confronted with a conflict with potentially serious consequences for the side of the opposition, as in the case of Yury Bandazhevsky.[44]

Since 1989, the annual "Chernobyl Path" (Charnobylski Shlyakh) has stood for public criticism of the political system of the country. Between 1989 and Belarus's independence in 1991, this criticism was part of a growing nationalist movement against the Soviet government in Moscow and the communist authorities in Belarus. Since 1996, however, the "Chernobyl Path" has become a ritual for those wishing to challenge Lukashenko's government and publicly criticize the official response to the accident and its aftermath. The "Chernobyl Path" consists of a religious service, a rally, and a protest march through Minsk. Every year the event is authorized only at the last minute and the path is altered as government officials attempt to keep the protest march out of the city center. This event organized by the opposition is a major thorn in the side of the Belarusian authorities because it calls into question official statements about the consequences of the accident. Unlike the government, the protesters don't think that the problems have all been addressed and overcome. Instead, they emphasize the danger that the radioactive contamination continues to present, particularly for people who live in the most affected regions

Disaster in Belarus," in Arndt, "Memories, Commemorations, and Representations" cit., pp. 82-99. For the memory of Chernobyl in Belarus see also A. Sahm, "Und der dritte Weltkrieg heißt Tschernobyl...", in *Erinnerungen gegen den Krieg*, F. Dorn et al. (eds), Journalistenfonds des Journalistenverbandes von Belarus, Minsk 1995, pp. 202-227; M. Arndt, "Von der Todeszone zum Strahlen-Mekka? Die Erinnerung an die Katastrophe von Tschernobyl in Belarus, der Ukraine und Russland", in *Zeitgeschichte-online*, April 2006; A. Dudchik, M. Fabrykant, "Ordinary Tragedy: 'Perestroika' of Collective Memory about Chernobyl Disaster in Belarusian History Textbooks", in Arndt, "Memories, Commemorations, and Representations" cit., pp. 65-81.

[44] Bandazhevsky is a Belarusian pediatrician who worked in one of the most heavily contaminated areas and carried out his own research on the relationship between the children's constant exposure to radionuclides in their food and their many sicknesses (particularly respiratory and cardiovascular). In 1999 he was arrested on charges of corruption. Worldwide protests against his arrest followed, both by human rights organizations such as Amnesty International, and antinuclear organizations. In 2005 Bandazhevsky was finally released on parole.

in the southeast of Belarus. The government, however, has opened up parts of precisely these regions for resettlement and is investing in the (agricultural) economy of the area. This policy is supported by statements of the IAEA and the Chernobyl Forum, who likewise call for "normalizing" the living conditions in the once-evacuated areas.

In addition to challenging Lukashenko's Chernobyl policy, the "Chernobyl Path" also threatens Lukashenko's portrayal of himself. Chernobyl was made into a national symbol by the opposition – first the opposition against the communist authorities and later the opposition against Lukashenko – yet Lukashenko has appropriated it in order to create the image of a "caring father of the nation". For this purpose, every year an official memorial ceremony takes place in Minsk, and the music festival "Chernobyl Path – The Road of Life" is staged in various cities in the most affected regions. The name of the event speaks for itself: It emphasizes the future-oriented nature of the event and thereby seeks to discredit the "backwards-looking" demonstration of the opposition in Minsk. Furthermore, around 26 April, Lukashenko personally undertakes a multi-day journey through the most affected areas, leaving wreaths on Chernobyl memorials, visiting local farms and industries, and meeting with the local population and presenting them with gifts. This last activity is particularly important for reinforcing his media image as "president of the people". Nor does he neglect to mention how the agitation of the opposition is destabilizing Belarusian society by disrupting its unity – a unity which, in his interpretation of history, Chernobyl brought clearly to light: The collective efforts to overcome the effects of the accident brought the Belarusian people together, and the fruits of this are reflected in the flourishing landscape of the once-evacuated zones.

The symbolic power of Chernobyl for Belarus as a nation – the land which received the largest amount of fallout – raises the general debate there about the (health) effects of the accident to a level beyond that found in other countries. People's positions in relation to Chernobyl shape their national and political identity. At the same time, Belarus's citizens are confronted with the conflicting need to "remember in order to survive" and to "forget in order to go on with their lives". In the heavily contaminated areas the people cannot for-

get Chernobyl because the only way to limit the amount of radioactivity they are exposed to is through strict regulation of their activities and food sources.[45] There is neither money nor political support for larger re-settlements; however there is plenty of money for promoting the economy in the once-evacuated areas, thanks to international financial aid programs. If one follows the "radiophobia" interpretation, the only way to overcome the effects of Chernobyl is to normalize the lives of the people living in these territories as quickly as possible. However, if one takes the position that Chernobyl has caused more deaths than the ones calculated by the Chernobyl Forum and has also led to mutations in the genetic material of humans, animals, and plants, then the proclaimed goal of "overcoming Chernobyl" and pushing ahead with "normalizing people's lives" is a perfidious experiment that may result in a future which nobody wants to imagine.

A Transnational Site of Memory: The Twenty-Fifth Anniversary of Chernobyl in 2011

In addition to the national responses to and memories of Chernobyl, this site of memory also has a transnational[46] dimension in which the narrative and images of Chernobyl as an apocalypse are of central importance. The following short account of the twenty-fifth anniversary of Chernobyl will show the particular material and performative characteristics of this transnational form of remembrance.

The "International Chernobyl Day", which in 2011 took place under the slogan "25th anniversary – 25 days of action", is one of the most important events in this context. The concept is less a unified event coordinated by a central organization than a loose network of

[45] See for example A. Pena-Vega, "Leben in einer Welt der Verbote: Eine Vergangenheit, die nicht vergeht", in Sahm, Sapper, Weichsel, "Tschernobyl, Vermächtnis und Verpflichtung" cit., pp. 71-80.

[46] Although those involved mostly designate these initiatives as "international", I am using the term "transnational" in order to make clear that this cooperation is rooted in civil society.

initiatives that organize public remembrances of the accident every year. This network serves as a platform for exchanging ideas and bringing together a wide variety of individual actors, thus increasing their visibility. The French anti-nuclear network "Sortir du nucléaire" provides a sort of coordination by listing individual events on the website www.chernobyl-day.org, where partner organizations from around the world can announce their calls to action. The site also provides Chernobyl Day materials such as posters. Partner organizations include, for instance, regional branches of Greenpeace and various local anti-nuclear groups.[47] The events organized in 2011 – the network listed 532 events in 27 countries – included commemorative rallies, marches, benefit concerts, and candlelight protests, to give just a few examples.

In addition to the anti-nuclear networks, the "Chernobyl Solidarity Movement" plays an important role in the transnational character of the site of memory Chernobyl. The "Chernobyl Solidarity Movement" refers to all of the community organized humanitarian aid, often the result of individual initiatives, for the most affected areas in Eastern Europe. This aid is best-known to the general public for organizing recreational stays for children from these regions and collecting relief items.[48] For the associations and individuals who are actively involved, the anniversary is always a time to remind people of the problematic situation of the residents – particularly the children – in these regions and to call for donations and support. For the twenty-fifth anniversary in 2011, a campaign by the Internationales Bildungs- und Begegnungswerk ("Association for International Education and Exchange," IBB) gained particular prominence. It pursued the goal of bringing together

[47] A detailed list of events and the organizations involved is at http://www.chernobyl-day.org/ (accessed 30 June 2012).

[48] For a history of the "Chernobyl Solidarity Movement", compare IBB (ed.), *Tschernobyl und die europäische Solidaritätsbewegung*, IBB, Dortmund 2011. For an analysis of the reasons for the commitment of West German groups see Arndt, "Verunsicherung vor und nach der Katastrophe" cit. For Belarus see A. Sahm, "Auf dem Weg in eine transnationale Gesellschaft? Belarus und die internationale Tschernobyl-Hilfe", in Sahm, Sapper, Weichsel, "Tschernobyl, Vermächtnis und Verpflichtung" cit., pp. 105-116.

the various aid initiatives at an "International Partnership Conference" in Minsk with the purpose of taking an active role in shaping the commemoration of Chernobyl on its twenty-fifth anniversary and after.[49] With this in mind, by November 2010 representatives of various associations had already gotten together and established the "European Chernobyl Network", which devised ideas for joint initiatives on 26 April, including a candlelight event.[50] During the conference in April 2011 the cornerstone for a "Zukunftswerkstatt" (workshop for the future) in the form of an information center on renewable energy was laid on the grounds of the IBB in Minsk. This "Zukunftswerkstatt" thus connects the transnational remembrance of the victims of Chernobyl with the demand for an energy transition – a connection that must also be seen in relation to the Belarusian government's decision in March 2011 to build their own nuclear power plant.

The Future of Chernobyl as a Site of Memory

Efforts to network and transnationalize the commemoration of Chernobyl, such as "Chernobyl Day" and the "European Chernobyl Network", stem from a fear that Chernobyl – and with it its victims and the dangers of nuclear power that they symbolize – is being increasingly forgotten. If the plans for resettling the evacuated zones are pushed forward, as well as additional plans for turning the forbidden zone into a nature discovery park,[51] Chernobyl will essentially disappear as a geographic reference point. Without this physical symbol,

[49] Compare A. Sahm, "Die Katastrophe von Tschernobyl im Kontext einer europäischen Erinnerungskultur", in IBB, *Tschernobyl und die europäische Solidaritätsbewegung* cit., pp. 16-32.

[50] The website of the European Chernobyl Network has more information about its members and the candlelight event: http://www.ecnchernobyl.eu/ (accessed 30 June 2012).

[51] The final report of the Chernobyl Forum presented a proposal "to explore the possibilities for promoting specialized ecological tourism". Chernobyl Forum, *Chernobyl's Legacy*, cit., p. 57. The proposal is inspired by the fact that endangered animal species such as wild horses and wolves have flourished due to the lack of human activity in the "forbidden zone" for many years.

all Chernobyl memory work by the anti-nuclear networks and the Solidarity Movement would need to be reconceptualized. Key elements of the imagery used to visualize the consequences of the radioactive fallout – the abandoned villages, the ghost town Pripyat – would no longer be available. It seems unlikely that the transnational anti-nuclear movement would then still be able to effectively point to Chernobyl in order to strengthen their position. And if the memory work conducted by these groups should cease, Chernobyl would also soon cease to be "alive" as a site of memory and would disappear from the collective memory. In a national context, the memory might continue to be accessible, but as has been shown, these national memories have very different implications, and this would make it extremely difficult for the anti-nuclear movement and the Chernobyl Solidarity Movement to find universal guiding principles in these disparate forms of recollection. The power plant and the city of Pripyat might continue to become increasingly appealing as a tourist attraction. However, it is unclear whether these locations would then offer more to visitors than merely the experience of industrial ruins and a ghost town.

Chernobyl could cease to be a guiding site of memory for reasons other than the disappearance of the geographical reference point that serves today as a concrete physical reminder of the event, as reactions to Fukushima in spring 2011 demonstrated. The question of whether Fukushima will replace Chernobyl colored the debates surrounding the twenty-fifth anniversary of Chernobyl. It was inspired by the fact that in certain countries the reactions to Fukushima had similar political effects and pursued similar goals as in 1986. In Germany, the Federal Ministry for the Environment was founded after Chernobyl, while after Fukushima the first Green *Ministerpräsident* (head of a German federal state's government) was elected in the state Baden-Württemberg. In Italy, an absolute majority voted against nuclear power plants in 1987 referenda, and in June 2011 they did so again. In 1986, the French government and radiation protection authorities saw no reason for concern and declared the French reactors to be absolutely safe. This attitude towards the event was to some degree similar to the French government's categorization of an

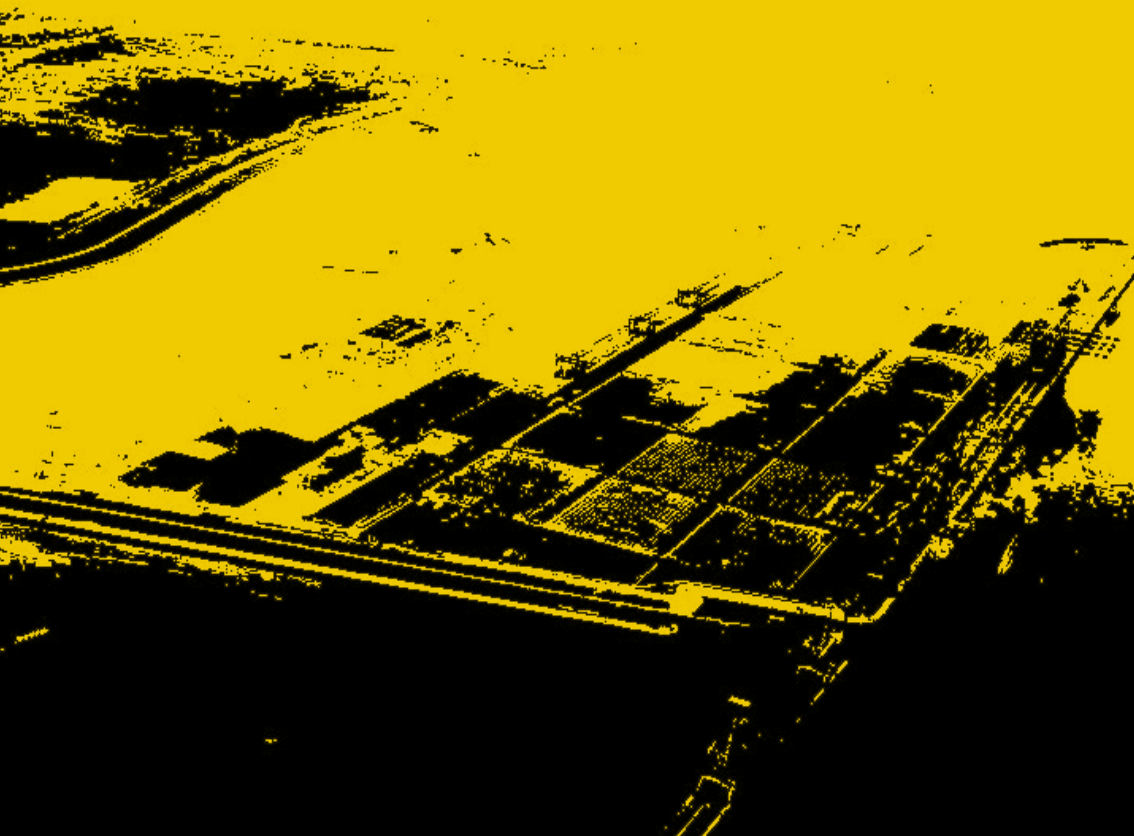
accident in the French nuclear facility Marcoule in September 2011 as an "industrial accident". It remains open to discussion whether there is also a certain continuity implied in the British government's attempt to influence media reports about Fukushima, an attempt that was revealed by the *Guardian* in July 2011.

Even these few examples of the political effects of Fukushima, the media response, and the corresponding public attention to the accident give reason to believe that in the long term Fukushima will also establish itself as an "ecological site of memory". Whether this happens will depend to a large part upon whether the media shows interest – particularly on anniversaries – in reporting about the current situation at the site, or whether it will succumb to the difficulty of capturing attention about an event which isn't "breaking news". Chernobyl, however, will continue for the time being to occupy a special position as the first demonstration that "it can indeed happen" to reach the broader public. Yet it is already clear that the status of this site of memory is being reevaluated as a result of Fukushima: the narrative of a "Soviet accident", implied in the discourse surrounding Chernobyl from the beginning, is slowly being displaced by the narrative of a "universal residual risk", since the issue of losing control over the technology, the difficulties of organizing mass evacuations, and the credibility of the operators and the information they report can no longer be explained using Cold War rhetoric. It remains to be seen whether this "universal residual risk" will be accepted as a satisfactory explanation or whether it will eventually lead instead to calling the entire nuclear industry into question.

Knechtsand: A Site of Memory in Flux[1]

Anna-Katharina Wöbse

This site of memory is almost unreachable. I am standing on the coast of the Weser estuary, in autumn, on the edge of the sea between the Cuxhaven boroughs of Sahlenburg and Berensch, and straining my eyes, looking out across the mudflats. The "Großer Knechtsand" sandbank lies, as evidenced by the map, a good 11 kilometers west of where I am standing. But hardly anybody can get to it.



The sandbank is in the Protection Zone I of the Lower Saxon Wadden Sea National Park. Trespassers prohibited. A desert of alluvial mud as far as the eye can see. The leftovers from the last high tide have formed puddles in the sandy furrows, the lugworms are working away and leaving their little spirals on the surface. It is cold, leaden, and drafty here. Not exactly a place one would associate with the spectacular description *world natural heritage*. Two dots emerge out of the greyness. A pair of common shelducks march into view. The beaks of the two birds are a luminous red, the black heads downcast; the reddish-brown breast feathers, black-and-white wings, and orange legs of the birds make a splash of glorious color against the dreary expanse. The pair are busy, combing the mudflats for mud shrimps and aquatic snails.

A blue metal signpost announcing the national park keeps visitors in their place but the birds are coming nearer as they scavenge for food. It may be hard to get to this site of memory, but its feathered representatives don't hesitate to get out of it. For one of the historical heartlands of the national park is this ephemeral sandbank, Knechtsand, geographically unreliable and almost invisible from the mainland, and the struggle to keep it untouched was won in part by the illustrious birds crossing the mudflats. The success inscribed in this site of memory is what makes it inaccessible here and now. But by approaching it historically and sketching out a topography of memory, one can uncover strands of tradition that are hugely significant for our understanding of the Wadden Sea.[2] In June 2009, this geologically still very young region was acclaimed by UNESCO, the educational branch of the United Nations, and given the highest consecration that a landscape can have: It became the 181st world natural heritage site. This nomination was accompanied by media

[1] This essay was translated from German by Katie Ritson, including all German-language sources unless otherwise specified.

[2] The archival records used for the story of the Knechtsand protests are located in the Niedersächsischen Hauptstaatsarchiv [Lower Saxony State Capitol Archive], the Stadtarchiv Cuxhaven [Archive of the city of Cuxhaven, henceforth StaCu] and the Archiv Naturschutzgeschichte [Archive for the History of Nature Conservation] in Königswinter (under "Frels").

pomp and public proclamations, drawing the attention of the entire coastal region. The same can be said for the early phase of the campaign to protect it. What happened in between the early phase of ecological mindfulness and the current one, and how did a peripheral island become the nucleus of today's world natural heritage?

Events Unfold

On 9 September 1952, what was known as the Knechtsand Treaty came into force.[3] It codified a barter agreement that the German chancellor Konrad Adenauer had negotiated with the Allies. Before this, the island of Heligoland, which had been evacuated during the Second World War, had served as a bombing range for the British and American air forces stationed in England. The (West) German government was keen to get the inhabitants of Germany's only real offshore island back to their red-cliffed home as soon as possible. The search for an alternative drop area had been difficult. Both Knechtsand and Norderoogsand had been considered as possible replacements. But the latter choice would have endangered the existence of a well-documented site of memory for the German conservation movement: the Norderoog's bird reserve, a popular institution that had been founded in 1909. Following the intervention of the Jordsand Association and the Schutzgemeinschaft Deutsches Wild (Society for the Protection of German Wildlife), both of which were well-connected with the flourishing international conservation community and could call on advocates for the bird-rich island in both Great Britain and Switzerland, the Allies were offered the uninhabited sandbank in the Weser estuary.[4] The locals were soon confronted with the drastic consequences of this

[3] The exact text of the agreement between Great Britain and Germany (Nr. 1997) can be found at www.untreaty.un.org/unts/1_60000/4/25/00007214.pdf (accessed 20 December 2010).

[4] "Norderoog – die Vogelfreistätte in Gefahr", *Flensburger Tageblatt*, 14 June 1951; correspondence between the Verein Jordsand with the Zentralstelle für Naturschutz und Landschaftspflege, the Tierschutz-Verein Hamburg and the Schutzgemeinschaft Deutsches Wild in June 1951, from the archives of the Verein Jordsand, Ahrensburg, filed under "Diverses".

barter. In the affected area of Wursten opposition quickly solidified.[5] It wasn't just the shrimp fishers and ferrymen who saw their existence on the line; the spa resorts and tourism industry were also looking at a precarious future. But amidst the opposing viewpoints, an ecological argument also came up, according to which the sand barrier was an important part of the coastal defenses, as it bore the brunt of the raging sea during storms and floods. The local population and their political representatives, though, had a poor hand against the interests of the national government. Adenauer was after a speedy restoration of national sovereignty, military security, and integration into West European politics. Heligoland was a symbol of this newly restored sovereignty, but it was linked to concessions to the Western Allies.[6] The Allied Forces agreed that, unlike Heligoland, the bank would not make a perfect range. But they gave in. *The Times* reminded its readers – and the Bundestag, which was about to discuss the issue – that the proper training of these air forces served the security of the Western world and not merely British or American interests.[7] In this context, local political concerns did not seem to be of a significant magnitude.[8] And in September, when local fishermen began to "agitate against the use of the sandbank" by organizing a "friendly invasion" of the spot, their protest could not stop the procedures.[9]

In November 1952, the first military aircraft flew over the sandbank and pounded practice bombs into the shallow waters. The people living in nearby districts wrongly imagined themselves at war again. In the heated debate that had overtaken the region since the

[5] Documentation of a "protest meeting", 9 November 1951, StaCu 467. "Bombenabwürfe auf Knechtsand".

[6] "Allied Bombing Practice in Germany", *The Times,* 7 November 1951, p. 5.

[7] "Helgoland Returned", *The Times,* 1 March 1952, p. 7.

[8] "Bombing Range in Germany", *The Times,* 8 Febuary 1952. In a letter to the editor of *The Times* the town councillor of Cuxhaven, W. Göhlke, suggested either focusing on the already devastated Heligoland or giving up the bombing altogether. Thus, "the feeling of gratitude in Germany towards Great Britain on account of the generous help accorded in the grim post-war period would be greatly enhanced".

[9] "Grosser Knechtsand Protest", *The Times,* 10 September 1952.

plans had been made known, the cold war fault lines were clearly drawn. The fishermen, traditionally conservative, suddenly found themselves supported by Hamburg communists, who argued in their protest meetings that the Allies were exploring and practicing future flight paths for the war against the Soviet Union.[10] But there were also voices raised in opposition to the *Fremdbestimmung*, Germany's rule by the victorious foreign powers. The local disagreements were bitter and difficult – and didn't alter the fact that Knechtsand was increasingly under fire. Negotiations were underway in Bonn to arrange compensation for shrimp fishers when, in January 1954, the bombing by the Royal Air Force increased in intensity.[11] In the course of the year, the fishermen were more and more frequently forced to stay in the harbor. Local inhabitants reported cracks in the walls of their houses, windows were shattered in Cuxhaven, housewives complained that their jars of preserves exploded, master baker Trautmann of Cappel suffered the collapse of his oven.[12] In the summer, stressed holidaymakers broke off their trips.[13] Sightings of injured and dying seals were reported.[14] But it wasn't until the bomber flights caused the mass annihilation of common shelducks that the protest gained significant political clout and the debate took on an ecological dimension that permanently transformed not just the local, but also the national understanding of nature and landscape.[15]

The fact that the Wadden Sea is home to a variety of coastal birds

[10] Conversation with eyewitness K.H. Carstens, 30 May 2001. Admittedly the fishermen's reaction to attempts to win them over was a dismissive "Dat geit nich – wech mit Politik" ("not a chance – no politics"). See also the correspondence of the communist representative of the Lower Saxony Parliament to the president of the parliament, 8 September 1954, StaCu 467.

[11] "Entschädigung der Knechtsand-Fischer", *Nordsee-Zeitung*, 22 January 1954; "Bisher stärkster Übungsangriff", *Nordsee-Zeitung*, 23 January 1954.

[12] "Backofen widerstand Luftdruckwellen nicht", *Nordsee-Zeitung*, 11 September 1954; "Knechtsandausschuß: So geht es nicht weiter", *Nordsee-Zeitung*, 14 September 1954.

[13] "Bombenlärm ist keine Erholung", *Nordsee-Zeitung*, 17 August 1954.

[14] "Verletzte Seehunde angetrieben", *Nordsee-Zeitung*, 8 July 1954.

[15] "Destruction of Birds in Bombing Practice", *The Times*, 20 September 1954.

and seabirds, or indeed that it is one of the most important stopover habitats for migratory birds crossing the Eastern Atlantic, was well known. But the discovery of the North Sea islands as tourist destinations, the large-scale harvesting of gull's eggs, and the popular leisure activity of shooting seagulls had been accompanied by movements for the explicit protection of "our feathered friends". Since its founding in 1899, the largest association of its kind, the Bund für Vogelschutz (Association for the Protection of Birds), had bought or leased a number of bird reserves along the coast and had equipped them with seasonal wardens who were supposed to ensure that, within a limited area, their charges could raise their young in peace. In the 1920s, the Bund für Vogelschutz had founded one of these reserves on Knechtsand, but had been forced to abandon it. The memory of the Knechtsand's unique ecological setting had to be reactivated. This task fell to Bernhard Freemann, a schoolmaster in the small coastal town of Wremen. Freemann was deeply interested in ornithology and had studied the habits of the common shelducks in particular. It had been known for a long time that large flocks of these birds were present here in summer. In 1952, Freemann began systematically ringing the birds on the nearby Wadden Sea coast to find out where the birds came from and where they were going.[16]

The results of his ringing quickly became evident – reports of ring finds came in from Denmark, Great Britain, the Netherlands, and France. Freemann's native turf was evidently a hotspot for the European common shelduck population. The evidence began to mount and indicated that the birds returned to this site in some style every year in late summer for a mass molt.[17] Almost the entire population of up to two hundred thousand birds met there to collectively shed their flight feathers. During this mass molting, the common shelducks are grounded for four weeks, and consequently very vulner-

[16] *F. Goethe,* "A Survey of Moulting Shelduck on Knechtsand", in *British Birds*, 54, 1961, pp. 106-115.

[17] B. Freemann, *Macht den Knechtsand zum Naturschutzgebiet,* Wremen 1956. Freemann's papers are deposited in the Archiv für Naturschutzgeschichte, Königswinter, under "Frels".

Figure 1. Bernhard Freemann ringing a common shelduck

Source: *Stiftung Naturschutzgeschichte*

able. They spend their days in the shallow and nutrient-rich waters of the flat beach and huddle together at night on the higher reaches of the sands. When the bombs fell into the apparently empty Wadden Sea in August and September 1954, they hit thousands of birds that were unable to flee. The birds seem to have been the victims less of shrapnel than of the shock waves that tore their entrails apart. The schoolmaster Freemann observed the bloody scenes and meticulously collected eyewitness reports by fishermen. He also gave clamorous testimony of the events and publicized his observations.[18]

The shelducks lent the protest new momentum. The movement had its icon; pictures of the lifeless shelducks washed inland by the tide became a staple of press reports and were circulated round the world. In contrast to many debates about species protection, the focus was not on the danger to individual birds, but the mass scale of the problem.[19] Hundreds of thousands of the birds that were a defining feature of the region, entrusting themselves to its protection, were suddenly – like the human inhabitants – exposed to a violent assault, and were unable to flee. But in contrast to the Germans, whose right to sovereign self-government was limited following their aggressive expansion in World War II, the birds symbolized a natural innocence and vulnerability, one that the discredited Germans were all too eager to embrace – and to use for political gain.[20]

The political and ecological experiment worked. Freemann and his initiative, the Schutz- und Forschungsgemeinschaft Knechtsand (Association for Research into and Conservation of Knechtsand), which represented the interests of the common shelduck population, became important political actors. While the protests have

[18] "Unter dem Kreuz vom Großen Knechtsand", *Nordsee-Zeitung*, 17 September 1954; "Destruction of Birds in Bombing Practice", *The Times*, 20 September 1954.

[19] "Bomben auf Brandgänse", *Die Zeit*, 1 July 1954.

[20] J.I. Engels, *Naturpolitik in der Bundesrepublik. Ideenwelt und politische Verhaltensstile in Naturschutz und Umweltbewegung 1950-1980*, Schöningh, Paderborn 2006; J. Radkau, F. Uekötter (eds), *Naturschutz und Nationalsozialismus*, Campus-Verlag, Frankfurt 2003; A.-K. Wöbse, "Der kleine Tierfreund – zur Jugend der deutschen Ökobewegung", in *Jahrbuch Ökologie,* 2007, pp.131-141.

been interpreted as being economically motivated, the foreign press seemed to find it easier to claim solidarity with the common shelduck than with parts of the German population. The migratory nature of the birds meant that they were seen as cosmopolitan, or rather pan-European. Freemann and his association were careful to organize cooperation with overseas societies to avoid even the slightest impression of nationalistic fervor in their campaign. The government, which was in a phase of reconstruction and reorientation following its close alliance with the Nazi regime, was not entirely enthusiastic about these autonomous projects. In designating the site, government authorities state in a report that "if we have to put up with targets for bombs, the designation of a sandbar that is under water at high tide must be seen as the least damaging in terms of nature protection",[21] thus legitimizing the site from a conservationist angle. Yet state conservationists found themselves faced with a self-governing, independent coalition under the leadership of the birdwatcher Freemann, who had exploited the dramatic potential of the mass deaths off the shore to ensure media attention.

Staging Protest

One publication that saw the commercial potential of the unfolding wildlife drama was the two-year-old offspring of the publishing giant Axel Springer, the tabloid newspaper *Bildzeitung*. On 19 October 1954, the newspaper printed a photograph showing two dead birds washed up on the beach, accompanied by the headline "Another Hailstorm of Bombs on Germany's Bird Paradise". The appeal to the public launched by *Bildzeitung* had a simple message: "*Macht Schluss! Macht Schluss!*" or "Put a stop to it!" The target of the reports, which centered on a girl who took home a baby seal orphaned by the bomb attacks, was unmistakable: the British occupying forces had, as far as the *Bildzeitung* was concerned, lost their

[21] Communication by the Niedersächsische Landesstelle für Naturschutz und Landschaftspflege to the Schutzgemeinschaft Deutsches Wild e.V., 18 June 1951. Transcript in the archives of the Verein Jordsand, Ahrensburg, filed under "Diverses".

credibility because of their military practice, whereas the Germans were wearing their hearts on their sleeves and showing sufficient love and empathy to prove their worth as a fully-fledged *Kulturnation*, or civilized society.[22] The topic was news across the country. 16 articles appeared concerning the bombing practice on the Wadden Sea in *The Times*, at that time the leading newspaper in Great Britain, between 1951 and 1958. In November 1954, the situation in the Weser estuary was debated in the German lower house, the *Bundestag*, as was the predicament of the common shelducks. But the foreign policy situation didn't seem to allow for any kind of offensive action against British interests, and the government, led by the conservative Christian Democrats (CDU), tried to avoid taking any firm position. Politicians questioned the estimate of more than 70,000 common shelducks killed during the 1954 molting season that the schoolteacher Freemann had introduced into the debate.[23]

Shortly afterwards, as the conflict became a matter of international concern and civilian groups demanded the right to participate in foreign policy discussions, the possibilities for action became more concrete. The International Council for Bird Preservation (ICBP) finally organized a delegation of experts from the Netherlands, Great Britain, Denmark, and Germany, who were to make a tour of inspection of the common shelduck population along the Wadden Sea coast from a Royal Air Force plane. They largely confirmed Freeman's observations of the mass-molting season. However, as ornithologists in the employ of their respective governments, they too limited their demands (in line with foreign policy considerations) to calling for a modification to the kinds of bombs dropped, rather than an outright end to the bombing raids: instead of explosives, they asked for smoke bombs to be dropped.[24] This proposal to mitigate the bombing was soon adopted by the British House of Lords.[25]

[22] A.-K. Wöbse, "Die Bomber und Brandgans. Zur Geschichte des Kampfes um den 'Knechtsand' ", in *Jahrbuch Ökologie*, 2008, pp. 188-199, esp. p. 193.

[23] "Bombing Practice near Cuxhaven", *The Times*, 6 November 1954.

[24] "Live Bombing to be Restricted", *The Times*, 2 January 1956.

[25] Compare F. Goethe, "Über den Mauserzug der Brandenten (Tadorna tador-

Borne along on the current of public interest, however, the local bird-lovers were not to be contented with this defusing of the bombing flyovers, or even with their ultimate cessation. They had set their sights on an even greater target: They wanted Knechtsand to be declared a nature reserve. When the extension of the Knechtsand Treaty came up for review in 1957, the Schutz- und Forschungsgemeinschaft Knechtsand mobilized all of its allies and contacted the press.[26] On 8 September 1957, the association called for a peaceful occupation of the sandbank. And the supporters began to arrive, busload after busload of them. In the early dawn, 20 cutters, festively adorned with bunting and banners and bearing several hundred activists, set off into the Wadden Sea. The cutters were followed by an entourage of journalists and press photographers with film cameras. Neither the site nor its use as a stage for this kind of demonstration was anything new: Both the struggle for Heligoland and the early protests by fishermen on Knechtsand had made use of the protest rituals that were now being reenacted.[27] A bonfire was lit, and a flagpole especially put up for the purpose flew not just the green-white flag of Europe, but also the flag of the county of Wursten, flanked by fluttering skull-and-crossbones flags that called to mind the independence of the region in medieval times and its history of resistance.

The horde of rebels, who were now chanting in chorus of the freedom of the sandbank, formed a heterogeneous group; envoys from animal welfare groups, bird-watching associations, and nature conservation movements had travelled to Knechtsand, together with representatives of the local conservation authorities, local politicians, scientists, and members of the regional society for hunting and fish-

na L.) zum Großen Knechtsand", in *Fünfzig Jahre Seevogelschutz*, W. Meise (ed.), Verein Jordsand, Hamburg 1957, pp. 96-106.

[26] "Readiness for New Agreement on Bombing Range", 17 August 1957.

[27] W. Kraushaar, *Die Protest-Chronik 1949-1959*, Vol. I: *1949-1952*, Rogner & Bernhard bei Zweitausendeins, Hamburg 1996, p. 343; "Helgolandfeuer für den Großen Knechtsand", *Nordsee-Zeitung*, 3 January 1952; compare *Der Knechtsand: Mitteilungen der Schutz- und Forschungsgemeinschaft Knechtsand, e.V.*, February 1958.

Figure 2. Flying flags of protest: The peaceful occupation of a sandbank, 1957

Source: *Stiftung Naturschutzgeschichte*

ing. Their petitions, read out from atop a driftwood crate that served as a podium, all centered on one single demand: Knechtsand was to be spared from all further bombardments of any kind and turned into a reserve. This staging of protest was a success: Photographs and newspaper articles covering the peaceful occupation of the sandbank were published in a variety of different media across the young republic, and presented in a positive light.

As the West German government made clear that it did not intend to bow to the pressure and would continue to acquiesce to the Allies' need for military practice areas, supporters looked for a new means of founding the nature reserve within the structure of the federal system. While politicians in Bonn debated the situation and held diplomatic meetings, the federal state of Lower Saxony, in its role as chief conservation authority, was cooperating with the head of the regional gov-

ernment in the city of Stade; on 8 October 1957, without further ado, the "Provision for the Conservation Area 'Knechtsand Bird Reserve'" was passed.[28] With its 244 square kilometers, it was the largest nature reserve in the new Federal Republic of Germany.

The Kingdom of Memory

Thus the battle was won. Once the designated nature reserve was recognized by international experts as a transnational home of the European common shelduck population, the Allies soon discontinued their bombing runs. The campaigns had developed a popular dimension and were effective in the public domain. Thanks to the iconic common shelduck, the humanitarian and ecological branding of the protest was able to win through. Once this goal had been reached, however, new interests began to come to the fore that had little in common with the ones held by Freemann and his comrades. They themselves soon became interlopers and undesirables. For with the preservation order came a prohibition against all trespassers, including Knechtsand's heroes and defenders. The officials of the local conservation organization were henceforth to decide who would be allowed to enter the kingdom of the common shelducks.[29] For those local inhabitants who had taken part in the protests, it was the beginning of a painful new process of estrangement from the site they had fought for. The site and the battle seemed to have been transposed into a self-contained past, one that was remembered very differently by the various groups involved.

[28] "Verordnung über das Naturschutzgebiet 'Vogelfreistätte Knechtsand' im Wattenmeer nordwestlich des Landes Wursten, Landkreis Wesermünde: Amtsblatt der Regierung" in *Stade*, 9 October 1957, p. 71; "Bombing Range Battle Ends", *The Times*, 22 February 1958.

[29] For example, after 1961 the schoolteacher Freeman was no longer granted permission to enter the nature reserve. When he entered it anyway, a complaint was filed against him by the lower nature conservation authority. Excerpt from the criminal files of the Dorum district court, 1963, filed under "Frels", Stiftung Naturschutzgeschichte, Königswinter. On the repeated demand to open the sandbank for guided tours, see "Knechtsand-Freunde: Besucher sollen Insel betreten dürfen", *Nordsee-Zeitung*, 18 April 1977.

Figure 3. Catching birds in the name of conservation: a young activist on Knechtsand, undated

Source: *Stiftung Naturschutzgeschichte*

There were the individual experiences. In oral history interviews in the small harbor town of Wremen, once home to the headquarters of the Schutz- und Forschungsgemeinschaft Knechtsand, the sandbank was recalled as a place of huge freedom. The bird-ringing program, under the leadership of Bernhard Freemann, had played a signifi-

cant role in the development of bonds between human inhabitants and their natural environment. The schoolteacher Freemann had involved his pupils in gathering data. Equipped with sandwiches and crates of fizzy drinks provided by Freemann himself, teams of young volunteers went out on cutters to catch and ring individual birds.[30] They were frequently assisted by youth groups who had travelled both from within Germany and from further afield, and thus Knechtsand became a seasonal site of intercultural cooperation. These summer days on the Wadden Sea coast became a crucial part of the identity of these young people. They enjoyed themselves, could prove themselves adept at stalking and catching the flighty birds, were working for an important scientific mission, and returned home covered in sand, exhausted, and full of their experiences.

They were part of something bigger. Their accounts, characterized by their sensual experience of the Wadden Sea, reflect a rite of passage in which the hard physical work for the protection of the colorful duck was just as much a marker as the unique camaraderie of the sea trips.[31]

The accounts of Hans Fricke, an activist in the peace and environmental movements from the city of Bremen, can be considered representative of many of the activists who originally joined the Knechtsand protest for pacifist reasons. The Wadden Sea had hitherto been for him a featureless expanse of mud, his experience of it rather limited. But his meeting with the campaigners for the common shelduck and his engagement with the lives and habitat of these creatures expanded his horizons considerably: the grey nothingness turned out to be teeming with life. It's no coincidence that this veteran campaigner is still an active member of a Greenpeace group.[32] While these experiences were critical in the formation of individual attitudes to the

[30] The activities were accompanied by extensive photographic documentation. Bildarchiv der Stiftung Naturschutzgeschichte, Königswinter, under "Frels".

[31] Conversation with eyewitnesses in Wremen, 30 May 2001; "Früher Einsatz für die Natur", *Nordsee-Zeitung*, 31 May 2001.

[32] Conversation with H. Fricke, 8 April 2008. P. Willers, another former peace and anti-nuclear activist from Bremen, describes a similar experience in an oral history project on the Wadden Sea, interview on 26 March 2013.

natural world,[33] Knechtsand lost its status as a site of media attention once it became a protected area. However, it was still a milestone in the developing perceptions of the whole Wadden Sea coast.

Meanwhile, local research had become institutionalized. Systematic observation and data collection took place under the auspices of Hans Oelke, Professor of Biology at the Zoological Institute of the University of Göttingen, and it had long lost its exclusive focus on the common shelduck population, with research extended to include the unique botany and also the less conspicuous insect populations of the area. An observation tower and living quarters were constructed and provided accommodation in the summer months for biologists equipped with the necessary authorization.[34] But the merciless *Blanker Hans* – the old local name for the hungry, foam-crested sea – swept the building away. The site itself became unstable. The Wadden Sea is an incredibly dynamic habitat, permanently in a state of flux. The few areas of higher ground and vegetation on the sand bar were gradually eroded. The bird conservationists had tried to work against the erosion in the 1950s by planting bushes and constructing sand-trapping fences. Volunteers arrived, along with members of the German Armed Forces and the Federal Agency for Technical Relief, the *Technisches Hilfswerk,* to help with the island defenses, but this proved useless in the long run.[35]

But the most important change was in the perception of the sandbank. For, since the island's importance as a site of political interest had given way to ethical and moral arguments for its protected status, it became increasingly regarded as a developing habitat and thus the domain of biologists. As early as 1971, with the signing of the Ramsar Convention, large parts of the Lower Saxon

[33] The change in the environmental and ecological perception of the Wadden Sea from a "grey wasteland" to a habitat of highest biodiversity is described in "Erst stirbt der Seehund, dann der Mensch", *Der Spiegel*, 32, 1983, pp. 34-55.

[34] H. Oelke, "Die Brandgans (Tadorna tadorna) im Mausergebiet Großer Knechtsand", in *Journal of Ornithology*, 110, 2, 1969, pp. 170-175; *Beiträge zur Naturkunde Niedersachsens*, special issue on Knechtsand, 34, 4, 1979.

[35] "Immer noch das Paradies der Seevögel", *Nordsee-Zeitung*, 16 December 1964.

Wadden Sea coast had been designated wetlands of international significance for the protection of migratory birds, thus raising the global profile of the area. At the same time, a final clumsy local attempt was underway to call the exclusively ecological designation of the island into question, and bind Knechtsand more closely into the economies of the coastal communities that could claim ownership. The district branch of the conservative Christian Democratic Union (CDU) party, together with the Dorum Tourism Office, proposed a drastic reduction in the size of the protected area and the opening of the remaining space as a tourist site. The other coastal communities on the Weser estuary, which were increasingly coming to depend on tourism, were painfully aware of the fact that Knechtsand had something they did not: white sandy beaches. The first plans drawn up for this future vision of a modern seaside resort showed a dense complex of apartment blocks beside the Dorum Sands and a pillared concrete construction on the sandbank with a restaurant, showers, and toilets. Transport between the docks and the beach dunes was to be provided via an overhead railway, flanked with shuttle services by cutters and motorboats. The costs – the cable-car project alone would have cost investors a projected 2.7 million German marks – didn't seem to put proponents of the project off. According to them, the seaside resort would pose no threat to Knechtsand's conservation area – "quite the opposite, this project would serve to anchor the idea of conserving the natural environment", in the words of local CDU chief Dr. Döhner.[36] But the conservation authorities quickly torpedoed the dazzling projections of a cable car taking holidaymakers to a beach bar on the sandbank. The head of the ornithological research institute "Vogelwarte Helgoland" in Wilhelmshaven was not going to give tourism an inch: The opening up of even just a part of Knechtsand would, in his words, "not just damage the reputation of the Federal Republic of Germany, but also [...] give a signal to sell out of nature conservation".[37] Evidently, the diverse habitats

[36] *Nordsee-Zeitung*, 16 April 1971.

[37] Goethe, quoted in "Freigabe des Knechtsandes würde den Ausverkauf des Naturschutzes einleiten", *Wilhelmshavener Zeitung*, 10 July 1971.

on Knechtsand had not succeeded in anchoring themselves as assets in the public mindset. Tourism had awakened vested interests. It promised an income for peripheral and "underdeveloped" regions, yet the national agenda and interests had already shifted towards a new reading of unspoiled areas as hot spots of biological diversity. The early icons of the protection campaign, the common shelducks – themselves uninterested in occupying the higher dunes, preferring the shallow waters at their feet – now became an enemy. One vitriolic newspaper article wrote: "The sands are a protected habitat, and almost no one has seen them with their own eyes. Those who have seen them will have to admit that there can be no justification in this day and age for not allowing the public to access these beaches, which offer a perfect bathing location. Humans cannot be considered less important than common shelducks." Local political opinion, though, which had played such a key part in the fight to protect the sandbank, could not accept the rebranding of this site as anything different, even to provide the local authorities with a new source of income.[38] While memories of the rebellion of the 1950s were fading, there was no doubt that Knechtsand was a site of ecological significance for the nation as a whole.

In light of the ecological revolution that followed, the focus on small-scale protection measures that characterized the 1950s turned out to be increasingly obsolete. Knechtsand was soon absorbed into a larger project that was much discussed on both a regional and national level: the Wadden Sea National Park, which finally became reality in 1986 after several years of planning. In one of history's small ironies, this was exactly the moment that the research base on Knechtsand had to be abandoned because the sandbank had shifted, leaving it without any foundation in the most literal sense. The local government in Lüneburg not only decided that this site had been sufficiently researched, but also rejected the idea of providing the sandbank with any defenses against the onslaught of the sea. For by now, the idea of the Wadden Sea itself as one of the last bastions of

[38] "Zehntausende von Brandgänsen zur Zeit am Großen Knechtsand", *Nordsee-Zeitung,* 18 August 1971.

German wilderness, one that couldn't be tampered with, had taken root.[39] The common shelducks had shown themselves well able to adapt to this dynamic landscape. Since 1978, the number of shelducks returning to Knechtsand in the molting season had been dropping at a steady rate – only for the population of shelducks on nearby Trischen Island to rise.[40] The shelducks had chosen a new stronghold for their period of seasonal vulnerability and had taken up temporary residence elsewhere.

It wasn't until the 1980s, when the German republic was engaged in a process of ecologization under the influence of Green Party successes, that the chronicles of environmental protests were updated – including the story of Knechtsand. The leftwing German organization that promotes access to and enjoyment of the natural world, *Naturfreunde* (literally "Friends of Nature"), had hitherto been one of the few environmentalist groups on a national level to keep the memory of the aerial bombardment of Greater Knechtsand alive.[41] Within the SPD, the participation of its "friends" in the *Naturfreunde*, who until then had been regarded by Party members as nothing more than hippies and rather wayward stepchildren, had not been utilized. Now, however, with increasing public and political interest in the SPD's green credentials, the Knechtsand campaign was rewritten into the history of the Party.[42] In 1983, *Spiegel* magazine published a long feature about the threatened "wonder of the world", the Wadden Sea, maintaining

[39] Compare *Cuxhavener Nachrichten*, 2 May 1985; *Nordsee-Zeitung*, 12 August 1985.

[40] G. Nehls, "Brandentenmauser im Wattenmeer", in *Umweltatlas Wattenmeer*, Vol. II: *Wattenmeer zwischen Elb- und Emsmündung*, Nationalpark Niedersächsisches Wattenmeer, Umweltbundesamt (eds), Ulmer, Stuttgart 1999, p. 86f.

[41] Compare H. Fricke, "Begegnung mit Tadorna", in *Naturfreunde Kinderpost*, 41, 5, 1989, pp. 8-11; J. Zimmer, W. Erdmann, *Hundert Jahre Kampf um die freie Natur: Illustrierte Geschichte der Naturfreunde*, Klartext Verlag, Essen 1991; U. Grober, "100 Jahre Rot-Grün", *Die Zeit*, 4 August 2005. Many documents of the *Naturfreunde* and the Knechtsand campaign were preserved in the Eco-Archiv, which has since been transferred to the Archiv der Friedrich-Ebert-Stiftung in Bonn.

[42] "Die ersten Grünen", *Der Spiegel*, 3, 1985, pp. 39-42; see also J. Zimmer, *Mit uns zieht die neue Zeit: Die Naturfreunde; Zur Geschichte eines alternativen Verbandes in der Arbeiterkulturbewegung*, Pahl-Rugenstein, Cologne 1984.

that society and politicians should protect the sea from increased exposure to chemical residue, waste, and general pollution. The article shows that the fight for Knechtsand had certainly not been forgotten. *Spiegel* was quick to criticize the uninterrupted use the military had made of delicate ecosystems – and Greater Knechtsand served as a case in point. Admittedly, it was no longer used for bombing target practice, as it had been in the 1950s, "but practically everywhere apart from the seaside resorts are subject to the whine of NATO bombers coming in low across the bird breeding sites and seal habitats". Knechtsand was once again in circulation as the site of memory; it exemplified the misuse of a non-military natural landscape. In 1988 the newspaper *Die Zeit* printed a report by the ornithological warden of Trischen Island, Peter Todt, that dealt with the consequences of weapons testing by the German military and by arms manufacturers in the Meldorf Bay area. Here too the author recalled the successes of the activists in preventing the British government from dropping bombs on Knechtsand, only to conclude bitterly that "today, where we have control of our own territories, and politicians all pay lip service to the idea of nature protection, we are apparently unable to afford to heed the habitats of animals, even though the animal kingdom is recognized on paper by laws on animal protection, nature conservation, and protected natural area law".

1987 – the year that research on Knechtsand was ended – marked the beginning of a new historicization of the site: An extensive exhibition entitled "Knechtsand – The Story of a Sandbank" opened at the Lower Saxon Wadden Sea Information Center (Informationszentrum Niedersächsisches Wattenmeer) in Dorum. By then, environmental historians had also uncovered the dramatic narrative of this rebellion[43] – thanks in no small part to the diverse visual documentation that exists. There is a section on the fight for Knechtsand in the permanent collection of the Museum for the History of Conservation in Königswinter.[44] This has breathed new life into the

[43] J.I. Engels, *Naturpolitik in der Bundesrepublik: Ideenwelt und politische Verhaltensstile in Naturschutz und Umweltbewegung 1950-1980*, Schöningh, Paderborn 2006.

[44] http://www.naturschutzgeschichte.de/5_museum/museum.html (accessed 9 April 2013).

memory of Knechtsand, in part because it allows a wider public to reinterpret events anew in the wake of the popularizing of peaceful but radical environmental protests by Greenpeace. But it is also because the Knechtsand protests gave us the human figures that were so sorely needed to narrate the story of nature conservation and the environmental movement.

Ducks and World Natural Heritage

A literal test site, Knechtsand also represented a figurative test site for fundamental political, social, and ecological debates. The military practice area served the West German state as a means of gaining access to the ranks of sovereign states. The subsequent protest served as a practice run for social activism in relation to pre-ecological (and in particular ethical) debates about the protection of animals and nature. The transnational nature of the common shelduck highlighted the potential for cooperation between political and civilian actors on a European level, which in turn proved that the broad consensus provided by animal and nature protection could serve to shore up peacetime society. But this case also showed that the German conservation authorities still had to learn to coexist with local and/or autonomous agencies. Greater Knechtsand also tested the structures that bound together the federal government, the *Länder*, and the administrative districts – and Lower Saxony in the end was able to show that, as a *Land*, it was perfectly prepared to promote its conservation expertise even in foreign policy debates. Finally, Greater Knechtsand was a test case for Germany's relationship with its almost entirely vanished wilderness. That first generation's experiences on Knechtsand undoubtedly shaped their ecological awareness and civil engagement, yet they were eventually driven out of their personal site of memory. The many students who spent summers on the island as ornithological wardens were at the mercy not just of the fluctuating tides of the Wadden Sea but also of the new politics of wilderness. Ultimately, they were forced not just to take leave of their private site of nostalgia but to give it up entirely.

The mosaic of protected natural areas, of which the shingle of Knechtsand was by far the largest part, soon proved too fragmented for the burgeoning ecological understanding in the decades from 1970 onwards. People began to think in global contexts. A sandbank was just a sandbank, yet it became a part of a network of internationally important wetlands, then a national park, and ultimately a biosphere reserve. It came to be described in the terms of the Birds Directive and the Habitats Directive laid out by the EU. Knechtsand was one of the historical keystones of the expanding conservation regime and had been in the vanguard of the augmentation of the Wadden Sea ecosystem, but its specific significance became hidden from view, overlaid with an accumulation of other ecological highlights.

The jewel in the crown, at least for now, is the Wadden Sea National Park's integration in the global system of UN World Heritage sites. Its nomination was dependent not just on extensive scientific review, but also on the agreement of people and local authorities in three different countries. More crucially, the conservation scene had in a certain sense to change course, as one active participant in the process, biologist Karsten Reise, described it. For many years, everyone had repeated the litany of threats to the Wadden Sea, but now they had to reconsider its advantages: in what way was the Wadden Sea "still, despite it all, the best of its kind?" For the label *world natural heritage* is in part an award for successful conservation measures: "The recognition of world natural heritage is not just an objective evaluation of a natural site's worth, but also rewards the human effort that has gone into preserving it".[45] The Wadden Sea's admittance into the conservation aristocracy was accompanied by a historicization of the space, as is indicated by the word "heritage". World natural heritage is most definitely not the expression of nature that has been forgotten and preserved by chance, but of a landscape that is actively remembered, and thus protected.

[45] K. Reise, "Denkanstösse", in *Weltnaturerbe Wattenmeer*, M. Stock, U. Wilhelmsen (eds), Wachholtz, Neumünster 2009, p. 32.

In this process of historicization, the Knechtsand site of memory is well embedded on many different levels, but is also liable to get lost in diverse meandering narratives. The world natural heritage perspective will perhaps allow a new and more complex memory to surface – one that highlights Knechtsand's astonishing anticipation of civilian activism, its Europeanization of nature conservation, and the numerous, often very contradictory motives offered for protecting this particular landscape. In the course of this process, the Wadden Sea area was able to acquire a rather more personalized narrative, because it highlights so simply the main crystallizing moments in the web of ecological memories. And because its icon, the common shelduck, is a visible and significant reminder of not just the ecological, but also of the historical process of adaptation.

Shortly before Knechtsand's UN status was announced, something happened that showed that the security of even a high-ranking UN-decorated conservation area remains fragile. In this age of dwindling natural resources, the energy company RWE Dea AG remembered the putative oil reserves close to Knechtsand, which had already been mentioned in the Knechtsand Treaty of 1952, and pushed forward with projected test drilling. Indeed, in the nomination for world natural heritage status, this projected drilling was even noted and approved. It was however decided that any oil drilling would only take place outside of the borders of the national park. But even this external drilling, which used miles of drilling systems and pipelines, drove the conservationists onto the barricades.[46] In 2008, the company announced that, apart from the oil platform "Mittelplate", which had gone into production in 1987 in spite of widespread protests, it would not anchor any further drilling platforms in the Wadden Sea. But this doesn't mean that these plans have been shelved forever. Who knows – perhaps another alliance

[46] Greenpeace, "Keine Ölbohrungen im Nationalpark Wattenmeer", press release 21 January 2008, www.wwf.de/presse/details/news/erster_erfolg_im_streit_mit_der_oelindustrie/printer.html; www.greenpeace.de/themen/meere/nachrichten/artikel/keine_oelbohrungen_im_nationalpark_wattenmeer/ (accessed 5 April 2013).

of activists from the now-global community of conservationists will need to occupy Knechtsand again in the future. If they do, they will be occupying not just a sandbank, but a part of humanity's natural heritage.

What Should We Remember? A Global Poll Among Environmental Historians

Compiled and introduced by Frank Uekötter

"If you could suggest one event for entry into the collective environmental memory of the world, what would it be?" In the spring of 2013, scholars from around the world found themselves confronted with this pointed question, and many of them – 22 in all – sent a reply. The original idea was that, in a volume dedicated to the merger of memory studies and environmental history, such a poll would broaden our perspective beyond the individual articles. The result is a colorful mix. It includes animals and bombs, dust and climate, organic and mineral resources, the old conservation movement and the new post-1970 environmental movement. From a geographical per-

spective, events spanned the entire globe. It is a selection that proved highly revealing concerning both our historical imagination and the discipline of environmental history. These introductory remarks seek to highlight some of the findings.

Respondents were given as much room as possible so as not to prejudge their choice. They were invited to take a liberal view of "event" in this project, including individuals, books, studies, or anything else that would be specific enough to qualify as an event. Scholars were also free to suggest well-known events or events that, in their judgment, *should* be well known. Of course, there were no chronological or geographic limitations, and scholars were expressly invited to suggest events from their region of study and events that they have discussed in a monograph.

The one requirement was that scholars needed to offer a brief explanation for their choice. A rigid space limit forced them to get to the point without lengthy deliberations about possible counter-arguments and alternative choices. We discouraged footnotes and bibliographies, as scholars were obviously offering a subjective opinion. Since no entry is superior to another, it would probably have been best to put entries on a world map, but because the written text asks for a sequence – one of the more subtle limitations of memory studies in the humanities, and one of the most ignored –, time appeared as the least intrusive organizing principle. The reverse chronological order serves as a reminder that the rationale of memory studies differs from that of history.

It would be an understatement to say that the temporal span of responses is wide. The events discussed in the poll move beyond the confines of human history, on both ends. The earliest event is the asteroid that killed the dinosaurs 65 million years ago; at the other end, we are moving into the future, as Greg Bankoff speculates about a future mega-earthquake in the Tokyo Bay area.[1] Big history has clearly left an imprint on the collective imagination of environmental historians, as three responses lie beyond the common chronological limitations of historical scholarship: the Yucatán

[1] In a tribute to the fictional nature of this event, we have put it at the very end – outside the historical chronology, but within our realm of collective imagination.

asteroid, the crossing of Wallace's Line by prehistoric humans some 50,000-60,000 years ago, and the Neolithic agricultural revolution.

That some scholars went so far back in time is no less remarkable than what follows: a yawning chronological gap. Scholars proposed exactly one event between the end of the Neolithic Age and the nineteenth century – the dust veil event of 536 CE. This probably reflects scholarship: it is no secret that the Middle Ages, antiquity, and all other pre-modern eras have been a backwater of environmental history, with most scholars devoting their attention to the nineteenth and twentieth centuries. But maybe this provides us with a more fundamental insight into our collective imagination: citizens of the modern age are having a hard time connecting intellectually to pre-modern events. They probably give us a shiver when we recognize how ephemeral great civilizations can be, but lessons rarely go deeper, at least when it comes to the environment. Those who have seen the dawn of modernity as a fundamental watershed of environmental history will find support in this poll.

Looking closer at the chronological distribution, two clusters emerge: the late nineteenth century and the years after 1970. The present author was not completely surprised, as he has identified a similar distribution in his previous reflections on turning points of environmental history. That endeavor suggested that the crisis years of Europe from 1914 to 1945 represented "something of a hiatus" for turning points in environmental history, and it is interesting to see that only one of the following events, Andreas Stihl's invention of the chainsaw in 1929, falls into the interwar years.[2] The nuclear bombs on Hiroshima and Nagasaki could technically fall into this time span, too, but Martin Melosi's rationale for the event is mostly looking forward into the postwar years where people encountered, in a phrase coined by Allan Winkler, "life under a cloud".[3]

[2] F. Uekoetter, "Thinking Big: The Broad Outlines of a Burgeoning Field", in *The Turning Points of Environmental History*, F. Uekoetter (ed.), University of Pittsburgh Press, Pittsburgh 2010, pp. 1-12, 9.

[3] A.M. Winkler, *Life Under a Cloud: American Anxiety about the Atom*, University of Illinois Press, Urbana 1999.

Reflecting on the first cluster in the late nineteenth century (which by historical convention ends in 1914), we can find a certain emphasis on environmental management. This is most evident in the US Bureau of Reclamation that was responsible for irrigation and hydroelectric power and ended up shaping economic and urban development all over the American West. However, environmental management is also an issue in the Big Blowup (which influenced fire management), phylloxera (which changed the wine industry), mass destruction mining (which revolutionized the extraction of minerals), and the invention of nitrogen fixing techniques.

In contrast, management is much more muted for the postwar years. The one event where it is front and center – the rhino relocation project – is also the earliest. In the rest, it is a more tacit theme, fittingly illustrated in the Chico Mendes reserve in Acre, as the human being is far better known than the legal concept of extractive reserves. None of the post-1969 events had consequences that even remotely qualify as solutions. The Santa Barbara oil spill has recurred in locations from Alaska to the Gulf of Mexico; the Stockholm Summit was a catalyst for awareness and policies in some countries, but not the birthplace of a global environmental policy regime; Chernobyl did not end nuclear power; and in spite of Chico Mendes' heroic activism, the rainforest is still under threat. There is a message in this for environmental management in the twenty-first century.

As discussed in the introduction to this special issue, the intellection tradition of *lieux de mémoire* grew out of an eminently nationalist tradition of historiography. That makes it all the more gratifying to note that the scholars' choices turned out to be eminently transnational. Events either ignored national boundaries altogether – as in pollution traveling from China to Japan –, or they had effects far beyond the confines of nation-states. Earth Day was born as a US celebration and is a global event nowadays, and the Bureau of Reclamation shaped water development beyond the American continent through the power of its expertise. As memory studies move increasingly towards transnational perspectives, there is ground to hope that environmental perspectives will gain more attention.

Looking at the issues that captured the scholars' attention, one top-

ic stands out: natural and man-made disasters. In this poll, the earth is an eminently unsafe place: we see an asteroid hitting the planet, volcanic eruption curbing global sunlight, a global pandemic, and a huge forest fire. Two nuclear bombs, one oil rig, and one atomic power plant explode, and the one individual who was designated as memorable gets killed. And we have not even witnessed the Tokyo earthquake yet. All in all, these events mirror the extent to which our environmental imagination has been shaped by catastrophes.

We can also see the link between the current environmental discourse and our historical imagination in the prevalence of climate issues. Two scholars nominated anthropogenic climate change: Susan Flader did so directly, and Richard Tucker focused on the world's first oil well as a site that mirrored the fateful shift in our energy base. We can also see the climate issue behind the dust veil event of 536 CE, the Yucatán meteor, and the pollution that Japan receives from China. It is unlikely that climate issues would have received so much attention in a poll before the 1980s.

Organic resources are another prevalent theme. In this collection, the modern era starts with the plowing up of grasslands all over the world, the ecological downside of the advancing frontier in the nineteenth century. The chainsaw, synthetic nitrogen, and industrial-scale irrigation (courtesy of the US Bureau of Reclamation) were all technologies that boosted the transformative capacities of humans about their environment; phylloxera and the crossing of Wallace's Line highlight the biological unification of the world. Organic resources become less visible after 1945, however – though it is worth recalling that Chico Mendes was a rubber tapper before he became a global environmental icon.

The prominence of organic resources is particularly remarkable given that glaring gap in this list, the Industrial Revolution. No one nominated the steam engine, the factory system, or Karl Marx – an omission that will surely come as a shock to scholars in the post-1968 tradition. It almost looks as if respondents were engaging in a collective effort at tiptoeing around the Industrial Revolution by focusing on energy. They highlighted oil (with two entries), hydroelectric energy, and nuclear power in both its destructive and its

civil-turned-destructive incarnation, along with anthropogenic climate change as the cumulative result of the shift towards fossil energies. Of course, the hesitation may mirror the fact that economic history has cast doubts on the concept of the Industrial Revolution over recent decades; but then, the colossal transformative powers of industrial capitalism are painfully clear all over the world in the twenty-first century. At the risk of offending our kind respondents, there is probably a warning sign here for our discipline. An environmental history that focuses on energy rather than industrialism is dangerously close to mistaking symptoms for causes.

However, what impressed the present author the most was the overwhelming negativity of our environmental imagination. No scholar suggested a natural treasure for this list: in the following, national parks are mentioned just once – as the site of a chainsaw demonstration. We have Earth Day, the Stockholm Summit and the saving of the rhinoceros, but other than that, there are few events that environmentalists can recall with a sense of pride. Even when the event was not an imminent catastrophe, events usually had disastrous outcomes, and it is gratifying to note that scholars make no bones about this negativity. Decades of deconstruction have not eaten away our ability to be moral critics. But then, what does the overwhelming presence of negative events in the following list mean?

There are probably two interpretations, with choice being one of worldviews rather than evidence. The turnout may reflect the extent to which environmental historians, and environmentalism more generally, has become infatuated with dystopian thinking.

Or it may just say who we humans are.

Memories of Pollution from the "Outside", 2013

Osamu Hattori, Doshisha University, Kyoto, Japan

In the spring of 2013, the Japanese media produced dramatic reports on the high volume of dust coming from China. Air pollution in large Chinese cities was already well-known from the 2008 Beijing Olympics. However, it is now being more frequently report-

ed because in spring the dust is carried westward from the Chinese mainland. Many Japanese people are worried about pollution from China because they have a collective memory: agricultural products and groceries from China have often contained dangerous preservatives and chemical additives. Japanese people tend to view China as a developing country – a fact that, for the Japanese, explains why China's government and citizens have less environmental awareness and are less health-conscious.

Through history, the Japanese have often feared being polluted from the "outside". Epidemics such as cholera, typhus, and bird flu can also be understood as a cause of environmental pollution. Similar thought processes can be seen all over the world. If we analyze the historical discourse on the danger of pollution from the outside, we discover the cultural ethnocentric mindset of the nation in question. That's a form of cultural environmental history. If we can organize an international comparative research project or exhibition, we will deepen our understanding of each other.

Assassination of Chico Mendes, 1988

José Augusto Padua, Federal University of Rio de Janeiro, Brazil

The event I would like to suggest could be considered, at first glance, a local one: the murder of the union leader and environmentalist Chico Mendes in December 1988. The killing happened in the state of Acre, a poor and remote part of the Amazon region, close to the frontier between Brazil and Bolivia.

My choice is based on two main reasons. The first one is personal. We became friends in 1986, when I took part in a group that supported what was called "forest peoples". The historical background was the growth of the Brazilian economy since the 1970s and the strong push to open new frontiers for timber production, ranching, and farming in regions previously covered by tropical forests and other native ecosystems. This push generated conflicts with local communities who started to resist and to defend the ecosystems from which they took their livelihood. I was very impressed by Mendes'

willingness to risk his own personal security for the sake of what he considered a greater value: the continued existence of his people and the forest where they lived. His commitment and intelligence made this simple man a very special human being in my mind. His killing by local landlords was a personal shock and exposed to me in a very concrete way all the injustices and violence that were taking place in the Amazon region.

My choice also has a global dimension. The killing of Chico Mendes became a symbol of what was later called the "environmentalism of the poor". In Brazil, as well as in many other parts of the planet, communities of rubber tappers, plant and nut gatherers, small fishermen, and other poor people were leading social and environmental resistance to the invasion of their spaces, which were seen by developers as frontiers of exploitation of natural resources. An important aspect is that these movements were able not only to resist but also to make innovative proposals for conservation. Such was the case of the "Extractive Reserves" that were proposed by the National Council of Rubber Tappers (created in 1985) as a new kind of protected area that would combine protection of ecosystems and protection of the livelihood and cultural practices of the traditional communities living in the area. The first extractive reserve was created in 1990: the "Chico Mendes" reserve in Acre. Brazil now has 87 reserves of this kind, with a total area of around 14.3 million hectares. From a broader perspective, the national and international scandal produced by Chico Mendes' assassination was one of the turning points in the political attempt to halt the destruction of the Amazon forest, an attempt that has been producing very concrete results in the last decade (deforestation was reduced by more than 70 percent since 2004).

For me, besides the personal loss of a friend, Chico's assassination demonstrated that environmental problems could not be isolated from a complex network of social and ecological interactions and from broad historical patterns of land occupation. My later career as an environmental historian was marked by this perception.

Chernobyl, 1986

John R. McNeill, Georgetown University, USA

On the grounds that I can't remember anything before I was born, I will choose Chernobyl in April 1986. I choose it because it remains memorable for me as the first major nuclear catastrophe not kept secret; because its scale and scope were great enough to make it a significant event at the time; because its clumsy handling by Soviet authorities contributed (although we can't say how much) to the demise of the USSR, a major political event; and because its memory still affects debates over nuclear power a generation later.

Stockholm Conference, 1972

Bao Maohong, Peking University, China

I think the event should be the UN Conference on the Human Environment in Stockholm in 1972. The conference changed environmental consciousness around the world and encouraged environmental movements. China in particular acknowledged its environmental issues and developed environmental policies after that conference.

Earth Day, 1970

Adam Rome, University of Delaware, USA

The first Earth Day was a transformative event in the United States, and it subsequently became the inspiration for important days of environmental protest, education, and celebration around the world. Though Earth Day 1970 is well known, the basic facts still are amazing. In September 1969, Wisconsin Senator Gaylord Nelson vowed to organize a nationwide environmental teach-in in spring 1970, and his call to action inspired thousands of events across the country. Roughly 1,500 colleges and 10,000 schools held teach-ins. Earth Day activities also took place in hundreds of churches and

temples, in city parks, and in front of corporate and government buildings. Millions of Americans took part.

But the sheer scale of Earth Day 1970 is only part of the story. The inaugural event had a freshness and intensity that are difficult to imagine today. Because Earth Day 1970 was unprecedented, the organizers had to plan everything from scratch, and the effort often was life-changing. Tens of thousands of people spoke on Earth Day, many of whom had never spoken publicly about environmental issues before. The discussions at Earth Day teach-ins sometimes were soul-searching: Many participants truly were struggling to get to the roots of "the environmental crisis". Thousands of Earth Day organizers, speakers, and participants decided to devote their lives to the environmental cause. Earth Day also built a lasting eco-infrastructure – national and state lobbying organizations, environmental-studies programs, environmental beats at newspapers, eco sections in bookstores, and community ecology centers. Earth Day helped to give birth to the first green generation.

The Santa Barbara Oil Spill, 1969

Jeffrey K. Stine, Smithsonian Institution, Washington, DC, USA

In most parts of the world, television's ability to shape and intensify public awareness found few rivals during the latter part of the twentieth century. The world's collective memory was likewise influenced by this pervasive medium. If ever an environmental calamity was ready made for television coverage, it was the oil-well blowout in Southern California's ecologically vibrant Santa Barbara Channel.

The blowout occurred six miles offshore on 28 January 1969. Workers on Union Oil's Platform Alpha had just completed the drilling of a 3,500-foot-deep well when the build-up of extreme pressure shattered the well's inadequately reinforced casings, releasing a torrent of oil and natural gas that spewed freely for 11 days. Capping the wellhead stopped the undersea gusher but failed to stanch the flow completely. Pressurized gas and oil ripped five seams through the ocean floor, allowing smaller amounts of oil to escape for several more weeks.

Ultimately, the three-million-gallon spill coated 800 square miles of ocean and blackened over 35 miles of the state's scenic coastline.

The spill's visual nature – and its proximity to Los Angeles's well-staffed television stations – worked like catnip on the news media. Within days, heart-wrenching images of oil-soaked birds and marine mammals and beaches despoiled with thick crude oil were being broadcast into living rooms across the country and beyond. Newscasters pitched the oil-well blowout as a story of trouble in paradise. Indeed, Santa Barbara's mediterranean climate, the stunning beauty of its mountain-framed beaches, its Spanish-inspired architecture, and its cultured and relaxed social atmosphere had made it a world-renowned resort location. The idyllic coastal community had seemed immune from the environmental problems plaguing so much of the industrialized world. The oil spill broke this illusion of invincibility; if such a disaster could happen there, it could happen anywhere.

Improvised citizen protests – many of them intended to attract the voyeuristic eyes of television cameras – amplified the impact of the blowout on public opinion. The Santa Barbara oil spill soon became a visual metaphor for the global environmental crisis, dramatizing for the world the substantial risks of offshore oil development. Within the United States, the spill helped bring environmentalism into the political mainstream, where it became a major public policy concern. The organization of Earth Day the following year and the enactment of a flurry of environmental legislation during the next three years further contributed to a sensitized sociopolitical climate and fueled expanded environmental news coverage.

Television producers continued to use still and moving images of the Santa Barbara oil spill to provide historical background and comparative perspective for subsequent environmental disasters, such as 1989's 11-million-gallon *Exxon Valdez* oil spill in Prince William Sound and 2010's 210-million-gallon *Deepwater Horizon* oil spill in the Gulf of Mexico. Television's oft-repeated references to – and oft-rebroadcasted images of – the 1969 oil-well blowout reinforced its sordid position within the world's collective environmental memory.

"Operation Rhino", Kwazulu-Natal, South Africa, 1961

Jane Carruthers, University of South Africa, South Africa

In 1961, in what is now the South African province of Kwa-Zulu-Natal, white rhinoceroses were first successfully tranquilized, thus enabling their translocation throughout the subcontinent and indeed around the world. This timely intervention rescued this remarkable species from the brink of extinction to become the world's most common rhinoceros. Behind that abundance is an event that warrants entry into the collective environmental memory of the world. The current, well-publicized large-scale rhinoceros poaching in South Africa is thus doubly tragic because of the remarkable story of the recovery of this species from near-extinction.

Because it was not aggressive, inhabited open country, and was easy to shoot, the white (square-lipped) rhinoceros was a favored quarry of African and colonial hunters. Its hide was sought after for whips and its horn was exported to the Middle East for dagger handles and to the Far East for medicine. Once market and sport hunters had taken their toll, settler-farmers in the Zululand area lobbied the government to exterminate all wild animals in order to control the tsetse fly, vector of a fatal cattle disease. By the early twentieth century, the once abundant and widely distributed rhinoceros was one of the rarest large mammals in Africa. A few – around 25 – managed to survive at the junction of the Black and White Umfolozi Rivers in Zululand.

This was the site of the Umfolozi Game Reserve where, with strict protection in the 1940s and 1950s and a growing national conservation ethic, rhinoceros numbers grew while remaining extinct elsewhere. In the late 1950s and early 1960s a remarkable partnership developed between London-trained veterinary physiologist Dr. A.M. "Toni" Harthoorn and dedicated South African game rangers including Ian Player, John Clark, and Maqubu Nthombela. In East Africa in the late 1950s, Harthoorn had begun to experiment on African mammals with sedative drugs. At around the same time, Player and his fellow rangers, who were familiar with rhinoceros biology and behavior, began to appreciate that there were sufficient animals

in the reserve to consider relocating some of them elsewhere. But how to do so was the challenge: it had not been done before.

Harthoorn's work seemed promising, and the veterinarian arrived in Natal in December 1960. The history of attempts to concoct the correct drug cocktail to tranquillize such a large animal without damage or unnecessary trauma, as related by Player in *The White Rhino Saga* (1972) and by Harthoorn in *The Flying Syringe* (1970), is fascinating. Equally interesting is the role of the game rangers, especially Nthombela, the Head Game Guard and Player's mentor. Using their knowledge of the veld and experience of animal behavior, this team eventually devised the most suitable holding pens and transportation and other technical equipment, some of which is still standard procedure.

"Operation Rhino" was important in enabling rhinoceroses to repopulate their original range, but it also meant that other large mammals could be safely relocated. The technology developed in KwaZulu-Natal not only saved the rhino but also revolutionized wildlife conservation; it led to the creation of many game reserves in southern Africa and thus spawned the sustainable eco-tourism industry.

Bombing of Hiroshima and Nagasaki, 1945

Martin V. Melosi, University of Houston, USA

The event I would choose is the bombing of Hiroshima and Nagasaki in August 1945 (they are separate events, but certainly linked).

I find this choice, unfortunately, to be a very simple one. The explosion of the first atomic bombs in wartime (Trinity was of course the first experimental bomb to be exploded) had massive significance. From an environmental perspective, the immediate impacts were the nature of the human and urban destruction – not only the scale, but also the long-term impact of radiation. Atomic bombs helped to redefine total war, changing the course of World War II in particular and future warfare in general. Because of the long-term lingering effects of radiation, the atomic bomb and its successors introduced a new source of large-scale human and environmental

impacts, from genetic mutations to almost perpetual transformation of the physical landscape where the bombs were utilized. The risks associated with atomic bombs made it like no other weapon devised by humans, a type of warfare that threatened future generations as well as their habitats. The introduction of intense radiation into warfare has to be considered one of the most important environmental events in human history. The further development of nuclear weapons even threatened the very existence of the human race itself. Nuclear warfare became the ultimate apocalypse, an Armageddon.

The Chainsaw Begins to Chew Through the World's Forests, 1929

J. Donald Hughes, University of Denver, USA

Andreas Stihl's development of the gasoline-powered chainsaw in 1929 heralded a period of greatly accelerated worldwide deforestation that continues to the present day. He foresaw its major purpose from the first and named it the "tree-felling machine". With improvements, it would increase the efficiency of forest removal by more than an order of magnitude. With a six-horsepower, two-stroke internal combustion engine, the new model weighed 46 kg (101 lb) and still required two operators but was fully portable in the woods.

Stihl's company, founded in Stuttgart, Germany, in 1927, began to mass-produce these saws; it exhibited them at the Leipzig Trade Fair, sold them widely in Europe, and exported them to North America and the Soviet Union. Loggers resisted the chainsaw because they thought it would deprive them of jobs (a reasonable fear). Between 1950 and 1990, the output of Austrian loggers increased tenfold and the numbers of employees declined by 80 percent.

The Nazis made Stihl's the standard German chainsaw, but the export business disappeared with the war. American and British bombs destroyed the Stuttgart plant.

Meanwhile, chainsaw design and manufacture accelerated in America because of the demands of the war. Joseph Buford Cox of Portland, Oregon, developed a "chipper chain" model light enough

to be carried by one person in 1947. Its chain had improved teeth, a design Cox adapted from his observation of a timber-beetle larva the size of a forefinger, which easily chewed its way through wood grain with alternating sweeps of its curved jaws. The design he invented is still widely used.

Stihl developed similar models. In 1950, his company was producing machines light enough to be operated by one man. I saw such a chainsaw in a firefighting demonstration in Yosemite National Park in 1952. By that time the 11 kg (25 lb) models were in use. Philip Thöny says the use of chainsaws helped transform lumberjacks from day laborers to skilled machine operators.

Before the chainsaw, loggers used hand-drawn crosscut saws, with handles at both ends so that two men could work together. Bronze saws of similar design dating from 2750 BCE have been found in Mesopotamia. Ancient Minoan saws from around 1500 BCE have set teeth, with longer teeth curving outward in alternate directions. These were used to prepare wooden columns for palaces and temples.

Iron replaced bronze in Europe from the Greek Archaic Period onward. Leonardo da Vinci sketched saw teeth that would work in both directions: pulling and pushing. For felling trees, however, the saw did not replace the axe to a significant extent in Europe until the mid-eighteenth century, when Empress Maria Theresa of the Holy Roman Empire commanded its use. We still used hand-drawn saws in 1950 when I worked in Willamette National Forest, Oregon. It could take two hours to fell a tree that a chainsaw could take down in little more than two minutes.

Chainsaws have almost entirely replaced simple man-powered saws in forestry. Now in use around the world, legally or illegally, chainsaws are accelerating the deforestation of the Earth's landmasses. Large wood products companies adopt them as customary tools. As Michael Williams points out, "Now the individual settler/logger with a bit of cash or credit to purchase a saw and truck could wreak high-tech havoc". Not only that, but timber thieves could do their dirty work much more rapidly, although they sometimes avoided chainsaws, fearing that the loud noise would reveal their location. Now almost no forest in the world is too remote for exploitation.

Invention of Nitrogen-Fixing Techniques, 1913

Hugh S. Gorman, Michigan Technological University, USA

One of the most significant changes in human interactions with the rest of nature occurred when societies freed themselves from their dependence on nitrogen-fixing bacteria. The event most representative of this change was the introduction in 1913 of an efficient, industrial-scale process for transforming inert atmospheric nitrogen into ammonia – that is, for fixing nitrogen. Developed by Fritz Haber and Carl Bosch for the German company BASF, this industrial process not only freed societies from an ecological constraint but also placed human activity at the center of a fundamental biogeochemical cycle.

For most of human history, societies had to live within an important ecological limit. Protein is about 16 percent nitrogen, and farmers in all agricultural societies relied on nitrogen-fixing bacteria to replace whatever nitrogen the annual harvest removed from the soil. Over the long term, the quantity of food that a society could produce depended on how fast bacteria could replace that nitrogen. The recycling of nitrogen-rich human wastes helped, but that recycling tended to be minimal. The net result was a limit on the amount of food available for urban growth.

By the end of the nineteenth century, scientists recognized two important things: first, that bacteria were the only organisms capable of fixing nitrogen, and second, that industrial society's demand for nitrogen had outstripped the capacity of bacteria to place more into circulation. European leaders spoke of an impending nitrogen crisis. At the time, the cities of western Europe were importing large quantities of nitrogenous material – mainly in the form of food, fiber, and Chilean nitrate – from distant places. These imports not only allowed the nations of western Europe to feed a larger urban population than otherwise would have been possible; they also provided nitrogen compounds for the manufacture of explosives and other chemicals. However, this strategy of tapping into the nitrogen supplies of other regions could not keep up with demand. Cities, and the demand for nitrogen, continued to grow. Furthermore, Eu-

ropean leaders realized that, in a war, the flow of nitrogen-rich imports could be interrupted.

The introduction of the Haber-Bosch process put an end to the nitrogen crisis of the late nineteenth and early twentieth centuries. Today, through the production of ammonia using the Haber-Bosch process and the unintentional fixing of nitrogen through combustion processes, societies fix nitrogen on the same scale as the world's bacteria, resulting in (from a human perspective) too much nitrogen entering circulation rather than too little. Concerns in which the accumulation of these compounds plays a role include increased levels of nitrate in ground water, the formation of hypoxic dead zones at the mouths of rivers, photochemical smog, acid rain, the formation of fine particles in urban areas, and increased emissions of the greenhouse gas nitrous oxide. In addition, the availability of inexpensive nitrogen fertilizers has heightened the challenge of securing other agricultural resources, most notably water and phosphorus compounds. Given the potential coupling of biogeochemical cycles, scientists are now studying how changes in the cycling of nitrogen might be affecting the cycling of carbon. The forms of governance that societies have put into place to address such concerns are now an integral part of the nitrogen cycle.

The Big Blowup, 1910

Stephen J. Pyne, Arizona State University, USA

The Big Blowup of 20-21 August 1910 climaxed with the "Great Fires" of 1910 that, on a large scale and in a savage fashion, swept the northern Rocky Mountains of the United States. They were the first great wildland fires fought by the fledgling US Forest Service. Some 78 firefighters died in six separate incidents, the service went deeply into debt, and the experience traumatized a founding generation – three future agency chiefs were personally on the firelines. The fires occurred amid a national debate about how the country should manage fires on its reserved forests, and helped skew that discourse into suppression, or more broadly, fire exclusion. The US is still re-

covering from the shock. Through professional forestry, articles in scientific journals, and sheer force of example, it disseminated the lessons of the Big Blowup around the world.

Such were the practical consequences. But the fires have symbolic heft as well. State-sponsored conservation on reserved lands, notably parks and forests, was one of the lasting legacies of European colonization. These lands continue to hold considerable ecological value and have been the focus of much modern environmental legislation. More generally, good management of fires is among the most immediate and universal policies that can be implemented, the one thing that overseers must get right yet are still struggling to achieve. The management of fire is humanity's unique ecological signature, the expression of a species monopoly, the one thing we do that no other creature can. The Big Blowup can thus stand for all the other choices humanity has made regarding its control of combustion, including the Big Burn of fossil fuels that is informing the Anthropocene.

The United States Bureau of Reclamation, 1902

William D. Rowley, University of Nevada, Reno, USA

Over the course of the twentieth century, the United States Bureau of Reclamation drastically changed water and land environments and, at the same time, produced hydroelectricity for the industrialization and urbanization of the American West. In 1902, Congress passed the Reclamation Act, directed at irrigating crop lands in arid portions of the American West. First named the US Reclamation Service, the organization established through this act changed its name to the Bureau of Reclamation in 1923. During its first two decades, the organization built irrigation or reclamation farm projects in arid states of the American West with the purpose of settling small farmers on the land. Damming streams and rivers for water storage provided both water and hydroelectric power to the projects. Soon, larger dams and larger hydroelectric facilities with multiple turbines and dynamos produced electricity on a scale that supplied vast power networks over great distances in the West.

The Reclamation Service won world-wide attention for its expertise in building major dam structures whose reservoirs altered rivers and fisheries, irrigated arid land, and created supplies of hydroelectric power for farms as well as for urban-industrial cities.

Although efforts at settling people on arid land had been largely unsuccessful up to the 1920s, the Bureau of Reclamation stood on the threshold of a new era. The Great Depression of the 1930s led to the economic recovery programs of President Franklin D. Roosevelt's New Deal. An immense dam on the lower Colorado River received congressional approval as early as 1928, and with the New Deal came a flow of funding to the Bureau of Reclamation to begin an era of large dam building that far overshadowed its earlier efforts. The new dams included the Hoover Dam on the lower Colorado River, the Grand Coulee Dam on the Columbia, and the Shasta Dam in northern California, completed in the 1940s. These large dams and others provided hydroelectricity and water to growing western cities, and power for the United States during the war years. Power from the Grand Coulee Dam was used to produce plutonium for the development of the first atomic bomb, subsequently used in the Pacific war against Japan. After the Second World War, in an effort to support "world rehabilitation", the Bureau of Reclamation contributed to dam building in war-torn lands. The Bureau of Reclamation was the first to draw up initial plans for the damming of the Yangtze River in China even before the end of the war. In the underdeveloped world of postcolonial nations, the United States and its Bureau of Reclamation engineers competed with the Soviet Union during the Cold War to build river-basin economic development projects similar to those planned and implemented in the United States.

In conclusion, not only did the Bureau of Reclamation alter the river and land environments of the American West during the twentieth century; its expertise also became one of the United States' chief exports, with the US helping other countries pursue similar strategies in the post-WWII era.

The Invention of Mass Destruction Mining, 1899

Timothy James LeCain, Montana State University, USA

On the eve of a modern new century, 18 September 1899, the Americans Daniel Jackling and Robert Gemmell first proposed that humans annihilate an entire mountain to extract copper. The two engineers argued that the low-grade ore in a mountain near Salt Lake City, Utah, could be profitably removed by using coal-powered steam shovels operating in an immense open pit. At the time, many other mining engineers and executives dismissed the plan as laughable. For centuries miners had extracted copper ore through careful underground mining, taking only the best ore and leaving the waste. But Jackling and Gemmell proposed instead to dig up everything – a whole mountain of rock – and then grind it into dust to extract the one or two percent of copper. This was not mining. Rather, it was a process of mass destruction, a revolutionary idea that was closely related to the system of mass production that Henry Ford pioneered at roughly the same time. As with Ford's assembly line, the key to mass destruction was speed. Jackling and Gemmell had to dig in an open pit because it allowed them to use powerful coal-fired steam shovels to rapidly extract the lean ore. In essence, the two men realized they could draw on the power of millions of years of sunshine stored in coal to move mountains.

It would be almost a decade before Jackling finally convinced the Guggenheims to invest the millions needed to make the 1899 plan a reality. In 1908, eight steam shovels set to work stripping the overburden of grass, trees, and soil to expose the hard rock beneath. For the first few decades, workers spoke of going to work on "the Hill". Less than a quarter of a century later, however, much of the hill was gone and had been replaced by a rapidly growing hole in the ground that everyone now called "the Pit". For the first time in history, humans had done what earlier generations had thought only gods could do. When Jackling died in 1956, his Bingham Canyon Pit was the largest human-made excavation on the planet. Today it is more than half a mile deep, two-and-a-half miles wide, and is still growing.

Mass destruction mining stuffs huge portions of the natural

world into crushers, concentrators, and smelters that winnow out tiny amounts of copper. The rest of the mountain of rock is released as immense amounts of often toxic pollutants like sulfur, arsenic, cadmium, and lead, creating some of the most devastated environments in the world. Yet, because the system is so efficient, the technology has become the principal means by which humans around the globe extract vital industrial minerals. Experts estimate that by 1990 world open-pit mining operations moved twenty billion tons of rock each year, making it a more powerful topographical force than natural erosion. Jackling and Gemmell's 1899 idea helped give the world abundant supplies of copper and other metals, but only at a severe cost to the environment. If global demand for metals continues to grow, the pressure to expand the use of their mass destruction technology will likely grow with it.

Anthropogenic Climate Change, c. 1880

Susan Flader, University of Missouri, USA

If I had to suggest just one event for entry into the collective environmental memory of the world it would be anthropogenic climate change, together with its implications and related political and cultural responses. Like all memories, it differs greatly among individuals and cultures. Some display grave concern and suggest an array of often-contradictory remedies while others deny its existence or abjure any responsibility for dealing with it. It challenges our understanding of history, our vision for the future, and our sense of possibilities and limitations in shaping that future.

The Beginning of the Global Career of Phylloxera, 1864

Andreas Dix, Bamberg University, Germany

The phylloxera (*Viteus vitifolii, Phylloxera vastatrix*) is a pest of commercial grapevines originally native to eastern North America. In

its adult stage, it is an insect measuring around one millimeter with a whitish or yellowish color. It has a complicated life cycle, with at least 19 stages below and above ground. As the roots and leaves of the vine are infested by the phylloxera, the vine stock finally dies. Phylloxera was discovered by the American entomologist Asa Fitch in 1856.

Wine growing has been affected since the beginning of time by a large number of diseases and pests. New pests caused significant damage; the worst crisis was experienced by European winegrowers from the 1850s with the appearance of mildew. Mildew arrived on ornamental vines imported from America and subsequently appeared in many European countries. Finally it was discovered that a few American vines were resistant to mildew.

This discovery led to a rapid increase in the importation of American vines. But these vines carried phylloxera. The first indications of phylloxera infestations in Europe were observed in southern France in 1864. Only 20 years later, all wine-growing regions of France were infested with phylloxera. Nor was the crisis restricted to France: The importation of infected American vines caused devastation in nearly all other wine-growing countries of the world. Phylloxera was observed in Portugal in 1871, in Austria in 1872, in Switzerland and Germany in 1874, in Spain in 1877, in Italy in 1879, in South Africa in 1886, in Peru in 1888, in New Zealand in 1890, and in Lebanon in 1910. In the USA, California was affected around 1873.

Many attempts were made to find measures that would protect vines against phylloxera, including the application of sterile sand or the flooding of vineyards by water. Another method involved treating the vines with chemicals like petroleum or carbon disulfide (CS_2). But just a few remaining insects are sufficient to establish a new and fast-growing colony of phylloxera. All of the proposed treatments thus proved useless.

Another method of pest control involved intensive monitoring of the vineyards, control of the vine trade, and restriction of exchange of information. Regulations were proposed by an international phylloxera convention in 1878 and were finally established in 1881. At the beginning of the 1880s a growing number of experts argued that the best solution was the grafting of vines to American rootstocks,

which are resistant to phylloxera. As a consequence, many of the vineyards all over the world had to be replanted with grafted vines. Other areas, especially on marginal locations and at the northern frontier of viticulture in Europe, were abandoned and subsequently became orchards or woodland.

Because the reorganization required a lot of capital, a socioeconomic concentration occurred. Many wine growers have had to look for a new workplace. Particularly in France, this process caused social tensions between the larger and smaller wine-growing estates. As a result, phylloxera can be seen as one of the earliest global pests, with enormous economic and social consequences in all the wine-growing countries of that time.

Drilling of the World's First Oil Well, 1859

Richard Tucker, University of Michigan, USA

For years I confidently assumed that Hispaniola was the place and 1492 was the year when the world changed more fundamentally than any other time or place. What else could compare with the almost tectonic collision of the Eurasian and American gene pools? Not even 1348, when the bubonic plague conquered Europe with unimaginable force. In 1492 the character of the biosphere began to change and deteriorate inexorably, as different ecosystems began to interact. From then on, species diversity and something approaching stability was threatened; that was the moment when globalization truly began. Tracing back from Columbus's landing for any other event of equal importance, I sometimes considered one alternative: the day the first metal weapon was used, making all other human aggression possible, including Europe's conquests.

Yet perhaps none of that is fundamental, after all. More recent and more truly global, though less a matter of purposeful human action, is climate change. The demonic capacity of humanity broke out in the summer of 1945 in New Mexico, when the first nuclear weapon exploded. During the Cold War we lived with the imminent possibility of nuclear winter, the ultimate climate disaster. But nuclear annihila-

tion hasn't happened yet, and there's reason to think that it won't happen. Climate deterioration is happening, and it is truly global.

How can we mark that change? If we could establish the first day and place when humans deliberately harnessed the energy of coal for their purposes, we could mark that each year. Instead, there's a strong case for the day in 1859 when the first oil well was drilled, in western Pennsylvania. By now, whether it's the marshes of the Gulf Coast of Mexico, the delta of the Niger River, the Aramco sands of Arabia, the Baku fields in Azerbaijan, coastal Sumatra, or the tar sands of northern Alberta, sensitive regions have been severely damaged by our industrial and military appetites. In consuming these reserves we tap millions of years back into Big History; even more important, we project forward into the immediate future. In my more apocalyptic moments I admit that we are disrupting not only a specific ecosystem, but Gaia as a whole.

Changes in my course syllabi reflect that shift of perspective. The twins, energy history and climate history, are taking charge of our agenda as environmental historians. Their presence in our midst, and in the world our students are inheriting, urges us to re-vision the implications of our work. Our efforts may become an important tool for mitigating the worst future. And it all "began" in an obscure corner of Appalachia a century and a half ago.

Plowing up the World's Grasslands, c. 1850

David Moon, University of York, UK

One of the great transformations in global environmental history has been the plowing up of the world's grasslands to grow grain. The process began at the western end of the Eurasian steppes, in present-day southern Russia and Ukraine, in the second half of the eighteenth century. In the nineteenth and twentieth centuries, the great plow-up spread to vast areas of the prairies and Great Plains of North America, the pampas of South America, the veldt of southern Africa, lands in Australasia, northern India, and north Africa, and the plains of Hungary and Romania. Grasslands in Kazakhstan and southern Siberia, towards the eastern end of the Eurasian steppes, were also

broken by the plow. States with settled, agricultural populations in more humid regions conquered the grasslands. They encouraged arable farmers to move to the grasslands to create new agricultural lands. From the mid-nineteenth century, the movement of people and transport of the grain they grew were aided by the construction of railroads, cargo ships, ports, and grain elevators. Facilitated by domestic and international markets, the grain was consumed by the globe's burgeoning urban population. Farmers and agricultural scientists, meanwhile, wrestled with the problem of how to grow grain in the fertile soils that had formed on the grasslands in conditions of relatively low and unreliable rainfall.

The conversion of large parts of the world's grasslands to arable fields was achieved at the expense of the indigenous populations and their ways of life, which were based on herding or hunting livestock. Crucially, living off livestock that grazed on the grasslands supported far smaller populations than replacing the wild grasses with cereals. Condemned to settle or leave, the pastoral nomads of the steppes, the Plains Indians, and native peoples elsewhere lost their land, mobile lifestyles, and cultures. The Indian Wars of the late nineteenth century and wars on the Eurasian steppes, over many centuries, between states based on farming and pastoralism, opened the way to the plow.

The plowing up of the grasslands was achieved at the expense of the environment. In some grassland regions, the endless seas of grass were natural. In others, such as the prairies and parts of the steppes, the indigenous population had promoted the growth of grass at the expense of other plants, including trees, through regimes of burning and grazing livestock. Everywhere, the plowing of the deep, fertile soil that had formed over many centuries under the grass disrupted the grassland ecosystems. Some grassland ecologists have gone so far as to term plowing "ecological genocide".

The plowing of the fertile soil to grow grain, moreover, was followed by ecological disasters. Around the globe, grasslands are prone to periodic droughts. The flat landscapes of the plains are swept by strong winds. In times of drought, the high winds whipped up dried-out topsoil into dust storms, destroying the crops and ruining the farmers. The Dust Bowl on the southern plains of the USA in the 1930s and

the similar phenomenon on the Eurasian steppes, in particular Kazakhstan, in the wake of Nikita Khrushchev's "virgin lands campaign" of the 1950s and early 1960s, are the best known examples.

Scientists, environmental historians, and the governments and farming populations of the afflicted regions debate the causes of such disasters: some blame natural fluctuations of the climate while others blame ill-advised plowing up of grasslands with levels of moisture that are marginal for grain cultivation. We are left with a bifurcated understanding of the plowing up of the grasslands: a foolhardy venture into marginal environments that was bound to lead to disaster, or a development of highly productive, even sustainable, agriculture (interrupted by periodic shortfalls) that has put vast amounts of food made from grain into the homes of the globe's ever-growing population.

The Dust Veil Event, 536 CE

Jan Oosthoek, Brisbane, Australia

In recent years, questions of human-environmental interaction, and particularly the cultural impact of natural disasters, have become more prominent in humanities research. It has become clear that natural disasters do not necessarily result in the collapse of societies but act as catalysts for social, political, and economic transformation. One such event with a truly global influence was the dust veil of 536 CE. This event resulted in the transformation of societies around the globe including China, the Mediterranean, Scandinavia, and the American Southwest. It signaled the dawn of the Middle Ages in Eurasia. Because of its scale and importance, this event should be part of humanity's collective environmental memory.

Between 536 and 551, tree-ring growth was very low throughout Eurasia and many other parts of the world. Contemporary writers in southern Europe described what modern climate scientists call a "dust veil event" that sharply reduced the amount of solar radiation reaching the earth's surface. Although scientists have sought to explain the dust veil in terms of a comet hitting the earth, it has recently become clear that we are dealing with one or more huge

volcanic eruptions in the tropics. These eruptions put enough dust into the atmosphere to affect the earth's climate for years.

The resulting depressed temperatures and disrupted weather patterns reduced biological productivity, including that of food crops, resulting in famine and social disruption around the globe during the sixth century. In a contemporary report, Michael the Syrian wrote that "the sun became dark and its darkness lasted for one and a half years . . ." John of Ephesus and Procopius of Caesarea described the same events. In Britain, the period 535-555 saw the worst weather of the sixth century. In Mesopotamia there were heavy snowfalls, and in Arabia there was flooding followed by famine. In China, there was drought and famine, and yellow dust rained down like snow. It has also been suggested that the occurrence of the Justinian Plague, a pandemic that affected the Byzantine Empire in the years 541-542, is linked to the climatic events five years earlier.

In Sweden, archaeological evidence indicates that 75 percent of villages were abandoned in the mid-sixth century. Scandinavian narratives also seem to refer to the events of 536 CE. The epic *Edda* includes a reference to "Fimbulwinter" (the "mighty" winter) and describes terrible cold and snow in years without a summer. It has been suggested that the sharp agrarian decline and demographic disaster in Scandinavia may have been the catalyst for the social, religious, and political change that led to the Viking diaspora.

In contrast to many other climatic events, the 536 event seems to have struck all regions of the globe. Evidence indicates far-reaching consequences for all advanced societies at that time, although the various regions were almost certainly affected differently by the dust veil. For this reason, the 536 CE event is an important test case for comparing the environmental resilience of different societies.

Neolithic Agricultural Revolution, c. 10,000 BCE

Edmund Russell, University of Kansas, USA

I nominate the Neolithic agricultural revolution. It revolutionized the way people interacted with other species, which revolutionized

the way people interacted with each other as well. Almost everything historians study has been a byproduct of the agricultural revolution.

Crossing of Wallace's Line, c. 60,000 BCE

Libby Robin, Australian National University, Canberra, Australia

Perhaps one of the crucial moments in the Big History of the world was the crossing of Wallace's Line by modern humans some 50,000-60,000 years ago. The sea barrier between Bali and Lombok (in Indonesia, in today's geography) had isolated biological evolution, and the extraordinary endemism of this part of the world still reflects its isolated evolutionary history. The species of the large Sahul continent (Australia and its continental plate, which included New Guinea and Tasmania) never met any primates other than fully modern humans, so never had the opportunity to adapt or evolve ways of dealing with less technologically advanced primates.

The continent was biogeographically isolated, and its biota had evolved independently of other places. Then, in the words of environmental historian George Seddon, "it had a radically new technology imposed upon it, suddenly, twice". The two waves of human arrivals each brought major technological shocks to the ecosystems. Aboriginal people hunted and modified the landscape with fire. The British settlement brought simultaneous agricultural and industrial revolutions.

New Zealand shared the shock of British settlement, but its "first shock wave", the Maori, arrived from the east only one millennium before its second came from the other direction. Its "double shock" history was much more compressed and its island biota much more limited – indeed its "people and environment" story is more like that of other islands, including the Galapagos and Hawaii.

Australia, so often portrayed as a "new land" because of its recent settler history, is actually an ancient geological land, with a long odyssey northwards from its Gondwanan parent. Its extraordinary indigenous history is still being discovered. This ancient continent of Sahul has thus captured an exceptional joint history of people and environments, and its biodiversity and environmental catastrophes

(it leads the world in mammalian extinctions in the twentieth century) are part of the history of people as well as plants and animals.

Chicxulub, c. 65 Million BCE

Christof Mauch, Rachel Carson Center, Munich, Germany

There are few events that humans around the globe owe more to than the incident that occurred in Chicxulub on Mexico's Yucatán Peninsula some 65 million years ago. At that point in time a huge asteroid hit the earth, releasing over a billion times more explosive energy than the atomic bombs that hit Hiroshima and Nagasaki. The crater that resulted from this event is 100 miles in diameter and is visible from space. The impact of the asteroid created a huge ball of fire, global firestorms, earthquakes, landslides, and tsunamis. Materials that were ejected into the atmosphere blocked sunlight, shrouding the earth in darkness; this caused a cold period and eventually led to global warming. To be sure, even before the Chicxulub event, the earth had not been the most comfortable place for dinosaurs to live and survive. Volcano eruptions in India and earlier asteroid strikes had contributed to an unstable climate and to fragile ecosystems. But the strike in Yucatán dealt dinosaurs the final blow and made room for our primate ancestors.

What happened in Mexico was not observed by humans, of course. However, it left a memory in stone and in dust, one that all humans share. The cataclysm helped humans to evolve and multiply and take over the planet, and the site in Yucatán reminds us that Big History and environmental history are, indeed, intertwined.

Future-quake: The Tokyo Bay Mega-Quake of 20-Something, Undated

Greg Bankoff, University of Hull, UK

The earthquake struck just before dawn on Monday. Measuring more than 8.4 on the Richter scale, it was not the largest earthquake

to hit Japan in the past half-century, but then none of the others had had an epicenter so close to one of the largest urban conglomerations, Tokyo-Yokohama, in the world. Most people were asleep when the first shockwave hit, jolting the lucky ones awake; the less fortunate did not wake up at all. Downtown buildings incorporating shock absorbers, sliding walls, and Teflon foundation pads fared better but they, of course, were largely empty at that time; many residential blocks, on the other hand, simply crumpled in on themselves. People said later how lucky it was that the quake had not happened during the rush hour when the capital's 11 million daily commuters fill the subway trains and highway overpasses to capacity.

There had been many devastating earthquakes in Tokyo before: in 1855, the Great Ansei earthquake killed over 7,000 people and destroyed 50,000 houses, and in 1923 the Great Kantō earthquake left 140,000 dead and 447,000 houses uninhabitable. Over half the world's population is now urban, as people throng overcrowded cities located in often risk-prone coastal areas. Present-day Tokyo was one such site, with a population in excess of 12 million. The damages, therefore, were proportionately greater, making the earthquake a worldwide mega-catastrophe, the first of the twenty-first century with a death toll in excess of one million people and infrastructural losses of over $500 billion. Even Japan's well-trained and equipped emergency services were completely overwhelmed by the sheer scale of the disaster, while government direction was temporarily paralyzed by the loss of so many head offices and key personnel. The devastation was especially extensive in the reclaimed and alluvial deposits along the capital's rivers and bay-shore areas. Here landfilling had been underway for decades in an attempt to meet the insatiable demand for more space on which to build everything from residential houses to shopping malls and factories. As in past events, extensive fires raged through certain parts of the city and adjacent areas. Rumors, later shown to be unfounded, had it that the imperial family had been injured, perhaps even fatally when the roof of their private residence in the Fukiage Gardens collapsed.

Even as the city was struck by repeated aftershocks, news of the disaster spread across the globe through both formal news chan-

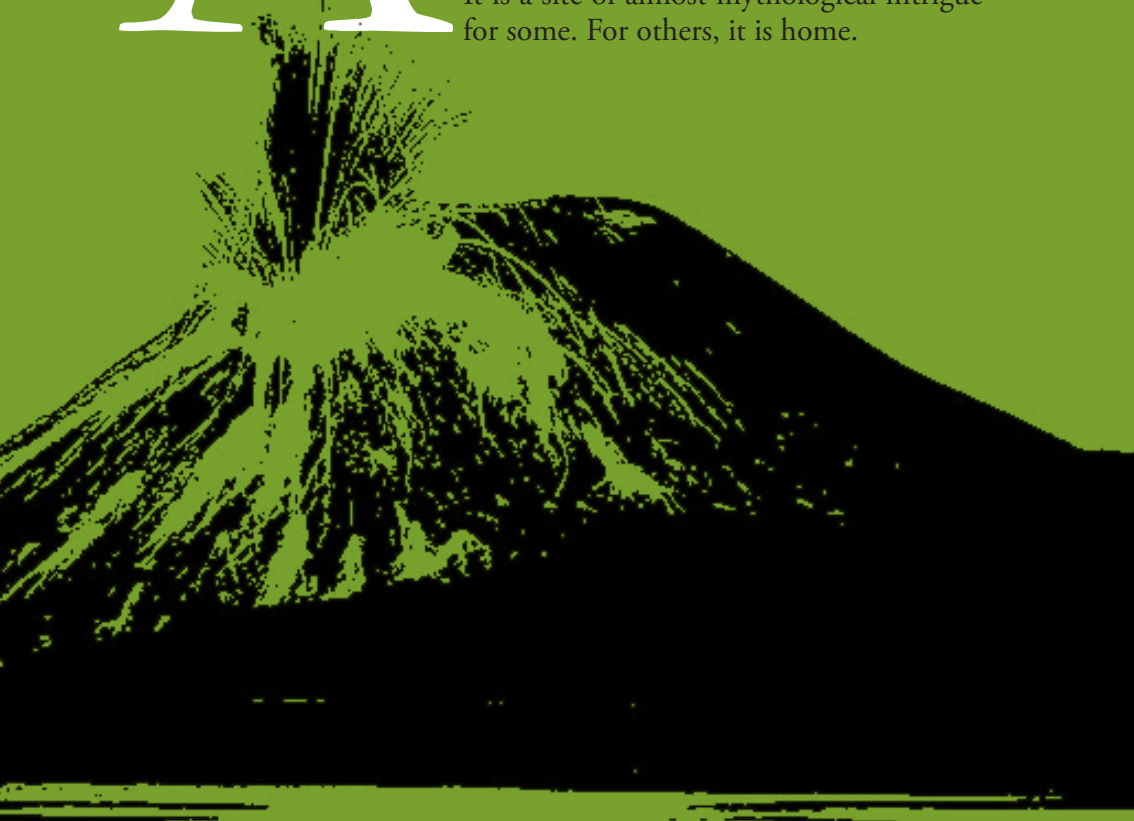
nels and social media networks. Within minutes, graphic images of death and destruction were uploaded onto the internet and were being viewed by millions. Share prices dropped precipitously, first in East Asia and then around the world. The Hang Seng Index that monitors the largest companies on the Hong Kong stock market fell 15,000 points, finishing the day under half its starting value. The Tokyo Stock Exchange, the third largest in the world, did not open at all. As government ministries and boards of multinationals sought to stem the panic that gripped world markets, and the United Nations agencies, Japan's principal allies and the world community mobilized their resources to come to the aid of the millions of injured and homeless citizens of Tokyo, the leadership of the Democratic People's Republic of Korea chose this opportunity to launch an all-out desperate attack on their southern compatriots, plunging the world into a military crisis that rivaled the financial and humanitarian one. Clearly disasters of this magnitude were no longer confined to any one country or even region; their effects had become truly global. Some pundits warned that Tokyo was only the beginning and that other mega-catastrophes might be expected, perhaps even more than one at the same time. Unfortunately such predictions have proven only too prescient, with the subsequent earthquakes in Tehran, Mexico City and Los Angeles.

In 2013, of course, all this is still science fiction.

Volcanic Cultures of Risk: Photographing Sites of Memory[1]

Richard Roscoe

A volcano is intrinsically linked to memory. It shapes the memories of those who visit it, those who study it, and especially those who inhabit its surroundings. For all involved, it has a tripartite role: It can act as the archivist, the effacer, or the object of memory – or, sometimes, as all three at once. It is a creator and destroyer of land. It is a site of almost mythological intrigue for some. For others, it is home.



A volcano contains within its magma chambers the power to archive. Volcanic eruptions do not have the precision of a library archivist filing dusty volumes; however, in burying entire cities volcanoes create historical records of their own. An eruption of the Santorini volcano 3,600 years ago, for instance, buried and preserved the Minoan settlement of Akrotiri. This occurred at the time the Minoan culture was thriving in the eastern Mediterranean and the eruption has been linked to its decline (although this theory is somewhat disputed today). The Italian city of Pompeii, meanwhile, is probably the most famous volcanic archive. After the eruption of Vesuvius in the year 79 AD the city remained preserved beneath the ashes, capturing in time what is effectively a snapshot of contemporaneous local culture. In these instances, the volcano as archivist shapes our historical knowledge and memory of these two societies.

As well as preserving memory, though, the volcano can efface the memory of both place and society. The destructive nature of the volcano curates sites, selectively scarring and destroying land, erasing history just as easily as it might preserve it. After massive or long-term eruptions, surrounding land may become uninhabitable or unusable. The Mexican volcano of Paracutin, for example, inundated its surroundings with thick lava flows after forming in the middle of a local farmer's field in 1943. No longer amenable to agriculture, the area has become the domain of the volcano. Evacuations of volcanic areas are often brief, but it is not uncommon, as in the case of Montserrat's Soufrière Hills volcano, for an evacuation to extend for an indefinite period of time. In such cases, communities are at first displaced, then later resettled in fragmentary form. Communal identity is destroyed. Cultural memory can disappear with it.

In addition, the volcano is the object of memory. It is, by virtue of its often spectacular nature, an interesting and memorable site. The volcano attracts tourists, photographers, and filmmakers; it provides a living space for many communities, offering fertile agricul-

[1] This essay is based on a speech given by Richard Roscoe. It has been adapted for *Global Environment* by Maeve Storey.

tural land, tourism related employment, and energy resources. The cultural memory (or lack thereof) that these communities retain of past volcanic activity can play a crucial role in their decision to live in such high-risk areas; volcanoes may not be considered dangerous or the hazards presented by volcanoes may not be recognized. Many volcanoes have not erupted in recorded history and may not even have an easily recognizable volcanic form due to erosion or forestation: Pinatubo volcano in the Philippines, hardly distinguishable from the surrounding terrain and covered in forest, produced the second biggest eruption of the twentieth century. Over 800 people were killed. A certain mode of *non-memory* encouraged people to settle around the volcano, the eventual eruption of which led to their displacement, even their demise.

Many forms of natural disaster, especially those with relatively short-lived initial devastation, slip quite easily from the pages of history.[2] A volcano has the ability to shape both the memory of culture and the culture of memory; its effects, moreover, are often long lasting and even terminal. And yet, despite all this, the volcano's place in memory is never assured – especially for those who live at a distance from it. This is where photography can play an important role.

Photography is a memorial art, offering a means to remember the volcano. In some respects, the camera performs many of the same roles as the volcano. "Photography has become one of the principal ways of experiencing something", Susan Sontag once noted, "for giving the appearance of participation".[3] Photography preserves time while reconciling space. It is a static art, and yet volcano photography presents a moment of flux. A landscape, and often a society, is in the process of changing; a place that has survived through millennia is about to be altered. A photograph of an erupting volcano can

[2] C. Mauch, "Phönix und Mnemosyne: Katastrophenoptimismus und Katastrophenerinnerung in den USA: von der Johnstown Flood bis Hurricane Katrina", in *Katastrophen machen Geschichte: Umweltgeschichtliche Prozesse im Spannungsfeld von Ressourcennutzung und Extremereignis*, P. Masius, J. Sprenger, E. Mackowiak (eds), Universitätsverlag Göttingen, Göttingen 2010, pp. 133-151.

[3] S. Sontag, *On Photography*, Picador, London 2011.

Figure 1. Night-time eruption of Sakurajima Volcano, Japan

therefore offer a double snapshot: one of past and of future, of what we remember and what is to come.

The following photographs, drawn from my exhibition at the Rachel Carson Center, illustrate different aspects of volcanic sites of memory; they record eruptions and their consequences and display differing cultural responses to volcano sites. These photographs are, in themselves, visual "sites of memory", capturing the interactions between humanity and the geological spaces we inhabit.

The Japanese volcano Sakurajima (figure 1) has erupted spectacularly on several occasions in recent years. Here, innovative defense systems, built on the flank of the volcano, have allowed a substantial population to settle in its shadow. These defenses, known as Sabo dams, channel *lahars* (potentially devastating mudflows) to the sea during the rainy season, keeping the growing population safe.

Sakurajima, which can be translated into the rather tranquil sobriquet of "Cherry Blossom Island", earned its place in historical memory

after its 1914-1915 eruption – one of the most violent in Japan since records began.[4] Powerful tremors alerted the local authorities to the imminent risk of an eruption; the evacuation of the island's population of over 20,000, and of many of the 70,000 inhabitants of the nearby city of Kagoshima, was nearly complete when the eruption began two days later. This represents an early example of an orderly evacuation, and subsequent relief operation, in the face of volcanic hazards.

In the following weeks, a blanket of heavy ash and a series of voluminous lava flows destroyed nearly 2,500 buildings. Due to the associated loss of farmland, much of the original population was permanently displaced. Lava flows also significantly reshaped the landscape on a larger scale by bridging the 400-meter-wide channel separating Sakurajima from the Oosumi Peninsula to its east. Future generations will no longer remember Sakurajima as an island.

One city abandoned after a volcanic evacuation – at least by the government – is the city of Chaitén in southern Chile. Much of the population did not know there was a volcano near the town since no historical records of an eruption existed and the volcano was covered by a dense forest. Cultural memory of the volcano simply did not exist. In 2008, magma rose to the surface at an astonishing pace: tremors were first noticed by the local population less than 24 hours before the eruption. The eruption began with the expulsion of a 20-kilometer-high ash cloud, leading the authorities to order an evacuation.

Initially the town was smothered in ash but was otherwise not significantly affected. The Rio Blanco River, however, winding past the volcano's base and forward through the town, was rapidly filling up with volcanic material. Ten days later it began to overflow, sweeping nearby properties away and carving out a new river bed in the center of the town.

Meanwhile a lava dome was gradually growing and the perceived threat of its collapse led the government to cease support for Chaitén and to start construction of a new town several kilometers

[4] T.A. Jaggar, "Sakurajima, Japan's Greatest Volcanic Eruption", in *National Geographic*, 45, 4, 1924, pp. 441-470.

Figure 2. Graffiti protesting the evacuation of Chaitén and the planned relocation of the town

to the north. This was met with resistance (figure 2), since residents were unsatisfied with the new location. As the eruption waned, some inhabitants returned to the empty, ash-covered "zona cero" and several small stores even reopened. The government, however, did not re-establish water or electricity supplies. Refusing to abandon their homes, some locals made a generator-based electricity network and a freshwater system with the help of willing local officials.

Current generations are not the first to be lured to volcanic sites. Aristocratic tourists marveled at Vesuvius in the mid-eighteenth century; Thomas Cook first took a tour there in 1864; Volcano House was built overlooking the mighty Halemaumau crater in Hawaii in 1846; and Yellowstone, the first largely volcanic national park, was established in 1872.

Figure 3. Tourists watching eruptions of Yasur Volcano, Vanatu

Today, Yasur volcano (figure 3) is a popular volcano tourism destination in the Pacific archipelago of Vanuatu. Visitors are almost guaranteed the memorable experience of witnessing an eruption first hand, due to the mild but persistent Strombolian activity (small but explosive eruptions).

Although more haphazard than restrictions around the similarly active Stromboli volcano in Italy, after which this type of small eruption is named, access to Yasur volcano is becoming increasingly limited as authorities become more risk averse in view of the volcanic rocks regularly blasted onto the flanks of the volcano. The memory of danger is vivid: in the recent past, tourists have been injured or even killed at the volcano. Just 48 hours after this image was captured, a hail of volcanic "bombs", up to two meters in width, landed on the area from which the photograph was taken.

Volcano tourism can involve observing volcanic activity, geothermal features, or spectacular volcanic landscapes. Such tourism can, of course, boost local incomes. At Yasur volcano, the entrance fee

Figure 4. Agricultural land smothered in ash from Bromo Volcano

to the crater area benefits the local community, as does the money made from housing tourists in lodges near the volcano.

This image shows agricultural land smothered by ash at Indonesia's Bromo volcano (figure 4). Bromo has erupted over 50 times since historical records began in 1804. Whilst this level of ashfall will destroy only a single harvest (and may indeed make the land more fertile in the long run), it may still have a hugely negative impact on local populations, who rely on farming for both nutrition and commerce. In fact, the vast majority of people killed by volcanic eruptions in the past died as a result of the effects of eruptions on agriculture.

The 1783-84 Laki fissure eruption in Iceland was not particularly violent but released huge amounts of hydrofluoric acid and sulfur dioxide into the atmosphere over a period of eight months. This caused 50 percent of Icelandic livestock to die off. Approximately 25 percent of the population subsequently starved. Beyond Iceland, climatic effects attributed to the eruption have caused crop failures

Figure 5. Aerial view of ash clouds rising from Eyjafjallajökull Volcano, Iceland

in Europe and parts of Asia that are thought to have resulted in the deaths of several million people.

At least 70,000 people are believed to have died following the eruption of Tambora in 1815, the most powerful eruption in recorded history. Again, most died from starvation. In Europe and North America, the "year without a summer" was experienced in the wake of this eruption, with the most severe famine of the nineteenth century. The spectacular sunsets resulting from the volcanic material in the atmosphere were captured in paintings of British artist William Turner.

Aside from highlighting the consequences of volcanoes on agriculture, the Bromo site is interesting from a cultural perspective, since the local Hindu population maintains a temple, Pura Luhur Poten, at the foot of the volcano. It is the focal point of the annual month-long Yadnya Kasada festival, the climax of which involves a procession from the rim of the Tengger Caldera to the Pura Luhur Poten temple, where a ceremony is held. After this, sacrificial wreaths

and bundles are thrown into Mount Bromo. Most of the sacrificial goods are retrieved by poor people from the local Muslim community waiting inside the crater.

Most people don't live in the vicinity of volcanoes. However, volcanoes may exert their influence over great distances. The relatively recent eruption of Eyjafjallajökull volcano (figure 5) is a good example of this. While the eruption did not cause a single fatality (with only moderate damage in surrounding areas), the volcano, combined with risk-averse politicians, was responsible for an unprecedented disruption to air traffic in Europe. Millions of travelers were grounded, and airlines sustained heavy financial losses.

In high concentrations, volcanic ash can abrade aircraft surfaces. Furthermore, the high temperatures in modern jet engines can melt the ash and cause it to accumulate inside, ultimately leading to engine failure. This was demonstrated in 1982, when a British Airways Boeing 747 unwittingly flew into an ash cloud emitted from Mount Galunggung volcano at night, resulting in temporary failure of all four engines and severe sandblasting of the cockpit window and all leading edges. Fortunately, the engines could be restarted in time to perform an emergency landing at Jakarta. The incident played a significant role in the establishment of volcanic ash warning systems for aviation.

Ash concentrations over Europe during the Eyjafjallajökull eruption were, however, not comparable to the dense ash cloud encountered by the British Airways flight, and no problems were noted during test flights with commercial airliners in the closed airspace.

The image above was taken from a small aircraft during a brief flight over the crater several weeks after the onset of the eruption.

Plymouth, Montserrat's capital city, was built at the foot of Soufriere Hills volcano. The island was small and entirely volcanic in origin, but with no memory of volcanic activity for hundreds of years, it seemed like a suitable place to establish a settlement. However, in 1995 the volcano started to erupt and has been active up to the present day. Phases of increased activity have been interspersed with phases of little or no visible activity.

Figure 6. Plymouth Court House buried in lahar deposits, Montserrat

The initial eruptions caused no fatalities in Plymouth. Based on scientific advice, from April 1996 onwards the town was evacuated several times before a more permanent exclusion zone encompassing the town was established, effectively leading to abandonment of the site. Living in the shadow of such a volcano was considered a totally unacceptable and unmanageable risk by local government. Since then, the abandoned town has been gradually buried by lahars (mudflows), when material deposited on the slopes of the volcano is washed down during episodes of heavy rainfall. The partially buried courthouse, shown in figure 6, was originally two stories high. It is now completely buried.

Abandonment of the island's capital meant that 80 percent of the island's population had to relocate. The rapidly constructed shelters were cramped and the population was suffering economic hardship. Many of the areas encompassed by the exclusion zone had not been affected by the volcano, so many people were unofficially spending

time in their homes or working their land in spite of the danger. The fact that nobody had been killed by the volcano in living memory also tempered people's fears. In June 1997, 19 people were killed when unexpectedly large pyroclastic flows spilled out of a valley and inundated farming settlements north of the volcano.

Since this event, enforcement of the exclusion zone has become stricter, causing conflict between local authorities and inhabitants, and also between local authorities and the photographers seeking to document the volcano.

Abstracts

An Impure Nature: Memory and the Neo-Materialist Flip at America's Biggest Toxic Superfund Site

Timothy James LeCain

In 1995, more than 300 migrating snow geese perished after landing in the flooded Berkeley Pit, a toxic open pit copper mine in the northwestern United States. Many commentators subsequently saw the snow geese as symbols of a pure natural world destroyed by the impure artificiality of humans and their technologies. In this essay, however, I avoid such oppositions by drawing on new materialist theoretical approaches that reject anthropocentric thinking and instead emphasize the powerful materiality of cultural phenomena, both for humans and snow geese. This "neo-materialist flip" suggests that industrial artifacts like the Berkeley Pit defy modernist categories of natural and artificial, or pure and impure, because they are simultaneously both material and cultural. Hence the enduring material reality of the pit persists as a site of memory that will both create and embody the culture of snow geese, humans, and countless other living things for centuries to come.

GAU: Nuclear Reactors and the "Maximum Credible Accident"

Joachim Radkau

This essay traces the history of the nuclear risk discourse and policy in West Germany from the first use of the term GAU in the 1960s to the present. A close examination of the term reveals that it is in fact ambiguous, oscillating between support of nuclear energy and criticism of it. GAU, which stands for "größter anzunehmender Unfall", is a translation of the English "maximum credible accident", the greatest possible accident that was conceivable under realistic conditions and one that reactors were supposedly designed to be able to withstand. However, from the beginning it was a fictional construct used by the nuclear industry to receive permission for building; it was not the result of either safety-related experiments or theoretical discussions by the experts. Over time the word

underwent a shift in meaning and was used by the anti-nuclear community to refer to a worst-case scenario – an accident that could no longer be controlled. This change in meaning reflects a hidden "revolution" within the community of American and West German reactor safety experts during the 1960s who challenged the validity of the concept.

Environment, Memory, and the Groundnut Scheme: Britain's Largest Colonial Agricultural Development Project and Its Global Legacy

Stefan Esselborn

In the late 1940s, the British state embarked on an attempt to convert about 12,000 square kilometers of bush land in remote regions of colonial East Africa into a peanut monoculture. The project, which became known simply as the "Groundnut Scheme", constituted one of the largest colonial agricultural development initiatives in history, as well as possibly the most spectacular failure in this field. While the technical reasons for this are relatively well known, this article focuses chiefly on perceptions and memories of the Scheme, trying in particular to trace the different functions that were assigned to the social and ecological landscape of Tanganyika. As the Scheme was from the outset targeted as much at Western discourses and representations as at the actual situation in Tanganyika, three layers of context are distinguished, corresponding broadly to different geographical scales as well as specific groups of actors. On the imperial level, the project's entanglement in British politics tended to obscure its geographic and historical specificities, transforming the transformation of Tanganyikan landscape into sets of statistical numbers, and ultimately into a largely decontextualized political buzzword. Secondly, in the framework of the international expert community, technological enthusiasm depicted East Africa as an "empty" region formable at will, despite scientific evidence to the contrary. Ironically, the mistakes and miscalculations resulting from this were so numerous and at times grotesque that they allowed a more general questioning of the basic tenets of agricultural development to be avoided. At a "local" level, the Groundnut Scheme should be understood in the context of attempts to reform the (post-) colonial social order through the modification of agricultural practices and the refashioning of the physical and ecological environment. In this sense, the project became a forerunner of the even larger Tanzanian "villagization" campaign in the 1970s. Different strands of memory of the Groundnut Scheme persist today, although their connection to the physical site(s) of the project is often tenuous. On the other hand, the Scheme did transform the social, physical, and biological landscape of Tanganyika, albeit in very different ways and in a much more limited fashion than intended.

Fossilized Memory: The German-Russian Energy Partnership and the Production of Energo-political Knowledge

Jeannette Prochnow

The German-Russian energy cooperation on the natural gas market began with the discovery of the Urengoi gas field in 1966. Both German states invested heavily in the Russian natural gas market. This partnership has continued long after the collapse of socialism and today is more relevant than ever. These bilateral economic relations were accompanied by extensive media coverage in both German states as well as in the unified state, with the result that, today, the cooperation is referred to as a "tradition" of 40 years. Over the past decades German energy companies, politicians, and the media have fashioned a communicative field that turned the import of Russian gas into a res publica, the particularities of which are examined in this paper. The case exemplifies how the flow of resources across political borders has gravitated around the historicity of social memory. However, the exploitation and use of natural resources occupy a precarious place in public collective thought. Firstly, because the media coverage of German-Russian energy politics is connected to Germany's past, the discourse has tended to show regional characteristics specific to the history of divided Germany. Secondly, the patterns of interpreting the extraction and trade of natural gas display various shifts. Nonetheless, the German-Russian energy partnership on the natural gas market was a recurring topic in newspapers (and audio-visual mass media) of the East and the West.

This essay discusses methodological difficulties of the established concept of social memory for the analysis of energo-political discourse. Drawing on System Theory and Actor-Network-Theory, I argue that the concept of memory in terms of a collective narrative has to be abandoned in favour of an understanding that conceives of memory as recursive communicative operations of the media. Furthermore, I attempt to re-embed the materio-realities of natural gas trade into the analysis of the mass media's discourse. This analytical approach leads to the proposition that the public discourse around the German-Russian Energy partnership is a mediated representation of an assemblage that comprises relevant human and thingly members that in their specific association created an interactive stability among participants of that assemblage rather than a consistent narrative.

Radiation and Borders: Chernobyl as a National and Transnational Site of Memory

Karena Kalmbach

The public debate about the consequences of Chernobyl is of particular political relevance because each interpretation of the event also involves a judgment

about the danger of low-level radiation exposure. Thus, statements about Chernobyl and its aftermath are also claims about what it should teach us about the non-military use of nuclear energy. Commemorations of Chernobyl, such as those that occur on its anniversary, are therefore inherently political: the forms of language and the "facts" used to talk about it are an attempt to influence public perceptions about the risks connected with this type of electricity production. Furthermore, the narratives created by various participants in the Chernobyl debate demonstrate how different the perceptions of risk really are.

This essay starts with an overview of the accident and its evaluation. It subsequently examines different forms of remembering Chernobyl, from both a national and transnational perspective. It discusses national and transnational carriers of memories such as literature and photography, and elaborates on the implications of the contesting narratives interpreting Chernobyl in "apocalyptic" versus "radiophobic" ways. Furthermore, the essay sheds light on the implications of Chernobyl as a national site of memory in Germany, France, and Belarus. The comparative perspective reveals the importance of underlying structures such as national (nuclear) politics, elite and expert culture, environmentalism, and the role of individual agency. These factors condition the emergence of a specific narrative of the accident within a specific discursive field, and, furthermore, determine the meaning attributed to "Chernobyl" in a given national context setting. The essay concludes with some reflections on the future of Chernobyl as a site of memory and the reshaping of the Chernobyl discourse through Fukushima.

Knechtsand: A Site of Memory in Flux

Anna-Katharina Wöbse

On 9 September 1952, what was known as the Knechtsand Treaty came into force. It codified a barter agreement that the German chancellor Konrad Adenauer had negotiated with the Allies. The Knechtsand, a sandbank in the estuary of the Weser, would from now on serve as a bombing range for the British and American air forces stationed in England. Soon, however, objections were made by local fishermen, politicians, and bird-lovers. These objections gained support from European networks of conservationists as the victims of the bombing – molting shelducks – were migrating birds. The subsequent protest served as a practice run for civil society activism in participating in pre-ecological and in particular ethical debate about the protection of animals and nature. In the long run the sandbank would turn into one of the historical heartlands of the national park and today's World Natural Heritage Wadden Sea. Knechtsand was a multifaceted test site for the exploration of fundamental political, social, and ecological debates. By approaching this location and its feathered inhabitants historically and sketching out a topography of memory, this article uncovers strands of tradition that are hugely significant for our understanding of the Wadden Sea and the expanding conservation regime.

Biographies

Stefan Esselborn is a PhD student with the University of Munich (LMU) and the Rachel Carson Center's doctoral program "Environment and Society". He was awarded a BA in history from the Université Paris IV – La Sorbonne in 2005 and an MA in history and political science from the LMU in 2009. He worked as a Research Assistant at the Rachel Carson Center from 2009 to 2010, starting work on his doctoral thesis. This thesis deals with the emergence of an "Africanist" social science, late and postcolonial development policies, and questions of transnational and transcultural knowledge transfer and translation through the lens of the history of the International African Institute (IAI), founded in 1925 in London. He currently holds a dissertation fellowship from the Studienstiftung des deutschen Volkes, and has been awarded research grants by the German Historical Institute in London and the Deutscher Akademischer Austauschdienst (DAAD).

Karena Kalmbach started her research on Chernobyl in 2008. As a scholar at the École Normale Supérieure Paris, she wrote her master's thesis on the "French debate on the impact of Chernobyl"; the thesis was later published as a book in 2011 under the title "Tschernobyl und Frankreich" ("Chernobyl and France"). After receiving her MA in history, political science and communication science in 2009 from the Free University of Berlin, Kalmbach continued her work on Chernobyl at the European University Institute in Florence. For her PhD dissertation she is conducting a comparative study on the debates concerning the health impact of Chernobyl in France and Great Britain, as well as a study on the transnational history of Chernobyl debates in Europe. Her research deals with the question of how national nuclear politics have influenced the debate on the health effects of the accident in the respective countries (and vice versa) and how the commemoration of the accident has been used to underpin political arguments. Recently, Kalmbach was a visiting researcher at the Center for Science, Technology, Medicine, and Society at UC Berkeley.

Timothy James LeCain is an associate professor of history at Montana State University in Bozeman, Montana. His 2009 book, *Mass Destruction: The Men and Giant Mines that Wired America and Scarred the Planet* (Rutgers University Press, 2009), won the 2010 George Perkins Marsh Prize, an award conferred by the American Society for Environmental History for the best book in environmental history. In 2010, he was appointed a Senior Research Fellow at the Rachel Carson Center in Munich, a European center for the academic study of environmental history and the history of technology, where he was in residence from 2011 to 2012.

Professor LeCain has published numerous academic articles, book chapters, and book reviews in academic journals and popular venues, and he is currently completing work on two new books. He is an active member of the American Society for Environmental History and the Society for the History of Technology, and he has given more than two-dozen conference presentations in both domestic and international venues, including invited presentations in Germany, South Africa, England, and Chile. In 2003, he was awarded a major and highly competitive $306,000 grant from the National Science Foundation to develop a comparative environmental history of American and Japanese copper mining in cooperation with his colleague, Professor Brett Walker. At MSU he teaches graduate and undergraduate courses in American history, environmental history, and the history of technology.

Jeannette Prochnow is a sociologist with an interest in the analysis of interaction and communication, discourse analysis, and the sociology of knowledge. She has worked on post-socialism and the transition process. Her current research deals with the production and dispersion of energo-political knowledge, with a special focus on the German-Russian cooperation on the natural gas market. In 2012 she received her PhD from the Bielefeld Graduate School in History and Sociology at the University of Bielefeld. The revised dissertation "Erinnern als Interaktion - Die Gemeinschaft ostdeutscher Trassenerbauer im Transformationsprozess" ("Memory as Interaction: The community of East-German Pipeline labourers in the transition process") will be published in 2014. The monograph studies community building practices of pipeline workers from the former GDR after their return from the working sites in Russia and Ukraine to Germany. The thesis offers a critique of the concept of memory as a narrative and introduces an interactional approach to commemorative communities. Prochnow received her MA in Cultural Anthropology from Georg-August-Universität Göttingen in 2005 with a thesis on the impact of national symbolism for Slovakia's accession to the European Union. Her doctoral studies were funded by an Excellence Initiative Scholarship, provided by the German Federal Ministry of Education and Research and the Deutsche Forschungsgemeinschaft (DFG). In the academic year of 2008/2009 she was a Marie Curie Fellow at the Institute of Ethnology at the Slovak Academy of Sciences. Since April 2012 she has been a lecturer at the Faculty of Sociology at the University of Bielefeld.

Joachim Radkau spent most of his career at Bielefeld University, retiring in 2009. He wrote his dissertation on German refugees after 1933, a work subsequently published as *Die deutsche Emigration in den USA* ("German Emigration to the USA"). Since then, he has written on the history of nuclear technology, the connections between forest history and technology, and the history of psychology. He has also written a major biography of Max Weber. Among other notable breakthroughs, he contested the argument that a "wood famine" in the eighteenth century led Germans to switch to coal for the generation of energy. His writings on nuclear technology were highly influential during the 1980s, par-

ticularly in the aftermath of Chernobly, when he published articles assessing the risk of a similar accident in Germany. His latest book, *The Age of Ecology*, will be published in November.

Richard Roscoe is one of only a handful of photographers around the world specializing in volcanoes. He studied biological sciences at the University of Leicester in England, following this with a PhD in microbial genetics. He currently works in Munich as a patent examiner. He has contributed to publications in the field of volcanology, and his photography has featured in numerous magazines, as well as in an exhibition at the Landesmuseum für Vorgeschichte in Halle entitled "Pompeii – Nola – Herculaneum, Katastrophen am Vesuv" (09.12.2011-08.06.2012). His work was recently exhibited at the Rachel Carson Center.

Frank Uekötter is Reader in Environmental Humanities at the University of Birmingham (UK) and director of the "Environment and Memory" project at the Rachel Carson Center for Environment and Society in Munich, Germany. After studying history, political science and the social sciences in Freiburg, Bielefeld, Baltimore (Johns Hopkins University), and Pittsburgh (Carnegie Mellon University), he received his PhD from Bielefeld University in 2001. He moved to Munich in 2006, where he worked at the Research Institute of the Deutsches Museum, taught at the Ludwig Maximilians University, and served as deputy director of the Rachel Carson Center from 2008 to 2011. His interests include the history of environmentalism, resource history, and memory studies in a global context.

Anna-Katharina Wöbse works as a freelance environmental historian in Bremen, Germany. She earned her PhD at the University of Bielefeld in 2011 and has published extensively on media and the environment, human-animal relations, and the history of environmental diplomacy. Her book Weltnaturschutz, Umweltdiplomatie in Völkerbund und Vereinten Nationen 1920-1920 (published in 2012) explores the role of the League of Nations and the United Nations in the making of global environmental regimes. Currently, she is co-editing a book on the history of the Hohe Tauern National Park in Austria and is involved in a research project on the international history of the Wadden Sea National Park.