

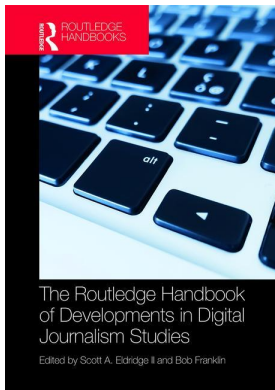
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### **Nature as Knowledge**

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## NATURE AS KNOWLEDGE

The politics of science, open data, and  
environmental media platforms*Inka Salovaara*

The year 2016 was the hottest on record, according to the National Aeronautics and Space Administration (NASA). In September 2016, when the U.S. presidential election race was in full swing, NASA's environmental data showed that the human species was living in the warmest era in modern temperature monitoring. This was followed by months of environmental anomalies. Later in 2017, President-elect Donald Trump ordered the elimination of all federally funded climate change research, as a part of his aim to eradicate "politicized science". Shortly afterwards, NASA's Earth Science Division faced funding cuts as the political priority moved from climate change to the exploration of deep space. Under the new U.S. political reality, climate change was a 'hoax', and the president mandated that all data from scientists should go through administrative review before it was released to the public.

With a rumor spreading that the Trump administration had started to delete climate files on NASA's platform, the global hacker community activated, working to save and restore the data. In April 2017, the *Guardian* reported that the U.S. Environmental Protection Agency's (EPA) climate change website was "being updated" and "undergoing changes" to better reflect "the agency's new direction" under Donald Trump. This act of data censorship evoked widespread political dismay and unrest in the US and beyond.

It is not surprising that Raymond Williams has defined 'nature' as perhaps the most complex word in the language (Williams, 1980: 221). This is especially apparent when a particular political or media allusion is made to nature that reflects the speaker's general ideological purpose. Hence, a reference to nature and environment often reflects a historical moment of human thought, political economy, or the current ideological climate, but very seldom nature itself. In public discussions, nature and environment are as much cultural concepts as they are a material reality.

Nature and environment are always socio-ideological categories, as well as instruments of social and political power. Therefore, when the discourse on nature and environment focuses on neoliberalization, privatization, marketization, and financialization, we can see this is not a novelty in political and media discourses. However, the recent transformation of how these discourses are presented to the public, with increased computerization and datafication in environmental media, has radically changed our perception of 'nature' and the 'environment'.

Pervasive computerization has improved technical and cognitive tools for displaying, manipulating, calculating, and reading environmental data. Moreover, computerization of environmental geo-data has enhanced our ability to produce detailed, interactive, and three-dimensional

visualizations – both for use in the sciences and in media. Computerized visualization has also increasingly contributed to ‘mentalist cognitive’ that understands visualizations, such as environmental mapping and data visualizations, as cognitive aids for the public, as well as for scientists. This databased cognitivism has given transformative, embodied, and performativity roles to visualization in knowledge production and mediatization of environmental knowledge. That is to say, visualization in the sense of ‘making visible’ is always constructing knowledge and facts (Carusi et al., 2015: 3), and this is now the case for knowledge and facts about the environment and nature.

From these developments, both environmental media and open data platforms, including the EPA’s, the *Guardian’s* Environment platform, and the InfoAmazonia (2015) journalism network, that produce data, maps, and visualizations on climate change have become a focal point for environmental knowledge production. These governmental, commercial, and community-based media platforms highlight a *datafactual turn* in environmental media, where data journalism can be seen as an interactive process of mapping complex ecological developments globally and within local communities.

This chapter explores environmental platforms, interfaces, and open data through their computational architecture, interactive affordances, and environmental knowledge production. In particular, the focus is on the use of digitally created open data, platform features, interfaces, and visualizations and the related digital affordances (Gibson, 1977). Within these, computational journalism can be seen in dynamic and performative interactions between journalists, scientists, communities, governments, and ecosystems.

Empirically, the chapter looks into three types of new digital platforms as environmental media: public governmental bodies, i.e., the Environmental Protection Agency (EPA) Earth Sciences platform; the *Guardian’s* environment platform; and the InfoAmazonia platform with its community-based participatory mapping. Analytically, the chapter applies Latour’s (2005) analytical method of reassembling environmental platforms by analyzing their digital affordances and actor-networks, as well as their roles in creating socio-technological assemblage while constructing digitalized nature (Salovaara, 2015, 2016).

## ENVIRONMENTAL MEDIA AS ASSEMBLED NETWORKS

Media-science-open data platforms have appeared not only as socio-technological phenomena but also as sites of the emergent digital spaces of public deliberation on the environment and climate change. The current digital media ecosystem has changed the epistemological basis of how the new digitally connected environmental public sphere is constructed. Instead of simply drawing from journalism, environmental knowledge networks include scientists, open data platforms, government units, mathematicians, developers, geo-data storages, politicians, and journalists. The governing metaphors of these activities have been those of assemblages and networks.

The concept of assemblage stems from Deleuze and Guattari’s work and refers to ‘multiplicity’ within a phenomenon, instead of seeing it as separate, bounded, stable, and structured (Deleuze and Guattari, 1987: 158). This mode of materialization of nature leads to transformative readings without definitive meaning, while different organizations produce knowledge on nature. Patton defines assemblage as “consisting of a multiplicity of heterogeneous objects, whose unity comes solely from the fact that these items work together” (Patton, 1994: 158). DeLanda outlines assemblage as “being wholes whose properties emerge from the interaction between parts” (DeLanda, 2006: 3). Therefore we can see nature as a constellation that depends on time, space, ideological climate, and media.

The *network* metaphor is adept at describing digital media ecosystems, as it stresses a non-hierarchical way of thinking how environmental knowledge and data are produced and offered to

the publics. Digital networks are also capable of constituting seemingly fluid but nevertheless complex “power geometries” (Massey, 1993), as networks create hubs of political and environmental agencies.

According to the actor-network view, environmental knowledge, visualizations, and data platforms have meaning or action specifically when they are part of an assemblage of people, discursive processes, and material things. According to this view, environmental visualization, participatory mapping, and multiple platforms have agency if they are deployed in the actor-network of practices. (Perkins, 2006; Salovaara, 2016). As media platforms and interfaces have the productive power to modify multiple publics’ information landscape, often they effectively form socio-technological assemblages, such as actor-networks binding the three open data platforms explored in this chapter.

Actor-network theorists (Latour, 2003, 2005; Serres and Latour, 1995) argue for politics of articulation (in both senses, as speaking and as linking) that direct attention to the heterogeneous practices of such platforms, where natures and cultures are continuously and mutually reconstituted. Here data visualizations and data journalism on climate change, temperature maps, and satellite pictures become embodied knowledge by constructing tangible facts.

In this chapter, new environmental platforms are analyzed as open-access data journalism platforms, as knowledge-producing actor-networks, and as territorial assemblages. The data analyzed consist of the data architecture of the platforms, their technical and semantic features, and the background information related to launching and maintaining the platforms. The methodological approach is inspired by Bruno Latour’s (2005) analytical method of reassembling the platform-space by analyzing (1) the technological web 2.0 affordances of the platform, (2) the features of the digital, participatory actor-networks, and (3) the roles of platforms as social and technological assemblages.

## ENVIRONMENTAL OPEN DATA PLATFORMS

The U.S. EPA data platform is a top-down, official, public data platform hosted by NASA. The EPA was established in December 1970 in the wake of elevated concerns about environmental pollution and the first signs of climate change. Its mission was to consolidate into one agency a variety of federal research, monitoring, standard-setting, and enforcement activities to ensure environmental protection. The EPA’s functions include: “environmental protection contributes to making American communities and ecosystems diverse, sustainable, and economically productive” (EPA, 2017a).

The EPA monitors and observes Earth systems with instruments, such as satellites, remote sensors, and data collection network nodes. The primary function of the agency is to widen scientific understanding and descriptions of Earth systems through research and analysis of collected data. The EPA’s current five “fundamental activities” are: evaluating and predicting the changes of these systems over time; “Engaging, advising, and informing the public and partner organisations with valuable information”; and finally “managing resources for the betterment of society, economy and environment” (EPA, 2017b).

The British daily newspaper, the *Guardian*, was established in 1821 as the *Manchester Guardian*. Today, the *Guardian* newspaper and its online platform are a part of the Guardian Media Group, owned by The Scott Trust Limited. The Trust’s ownership secures the financial and editorial independence of the *Guardian* against commercial and political interference, and its historical motto is “The Facts are sacred”. The *Guardian* is not known only for its investigative and data journalism, but also for scoops related to multiple data leaks. The *Guardian* online platform adopts an open and free approach to access that is supported by ads and crowdsourced funds

from volunteer *Guardian* supporters. The platform has been among the most widely read news providers in the world, reaching over 100 million readers daily. (*Guardian*, 2014).

The InfoAmazonia environmental platform was established in June 2012 as an environmental journalism network reporting on the Amazon delta. The rationale behind the InfoAmazonia data journalism platform was to activate environmental data journalism with the help of the local communities within the Amazon delta. InfoAmazonia contributes specifically to the debate for more sustainable development in this area of global importance. It provides news, reports, and data maps from a network of journalists that cover the nine countries that share the Amazon delta. The platform also provides open access to geo-referenced data and map templates for visualization on environmental changes within the region, in addition to tools to use and visualize these data for environmental reporting (Salovaara, 2016).

## ENVIRONMENTAL MEDIA AND PLATFORMIZATION

The three environmental and data platforms exhibit, to a certain extent, similar technological and user-specific characteristics. The first structural and common feature can be defined as ‘platformization’, which according to Helmond (2015: 5) refers to “the rise of the platform as the dominant architectural, infrastructural, and economic model of the web 2.0” (Helmond, 2015: 5).

Technologically, this means the platforms analyzed provide mark-up language for creating native applications that make them ideal platforms to attract user interaction. This type of computational architecture explicitly opens up websites by enabling their programmability with software interfaces for third parties.

Platformization entails the extension of networked affordances of media and data platforms “reaching to the rest of the web 2.0 through making their external data platform ready” to enhance platform content circulation and brand leverage with the help of users and developers (Helmond, 2015: 5). The platform architecture, according to Gillespie (2011: 352), contributes to the democratizing power of web 2.0, and breeds user-generated content (UGC), including amateur contributions, producer’s creative input, mash-ups, peer-level social networking, online community networks, and online expert feedback (Benkler; 2006; Bruns, 2008, 2012; Bruns and Schmidt, 2011; Burgess, 2007; Jenkins, 2006).

Platformization is also a way to create more sustainable and robust business models, as media platforms can offer diverse content (data, documents, interactive maps, and journalism) online, mobile format, and paper format. As many environmental platforms grow larger and become visible, they start to attract attention, not just from their users, but from broader and more diverse publics, which makes them politically and ideologically vigorous actors (Helmond, 2015; Gillespie, 2009).

However, the new and hybrid platforms are not considered platforms only because they allow coding and data usage but also because they also allow communication, interactivity, and commodification of user data (Gillespie, 2011: 351). This gives environmental media and data platforms a voice and an agency in the global, networked public sphere. Hence Gillespie (2009) argues that various online platforms are becoming more akin to traditional media than they would want to acknowledge.

### Environmental platforms as discursive interfaces

While platformization turns the chosen environmental platforms into web 3.0 actors, they communicate through their visual interfaces with multiple geo-located publics. All three platforms have a global reach with English speaking/reading publics (based on English as the

international lingua franca). The platform interfaces refer to coded places of interaction and intercommunication between publics and platform, where there is a shared space or juncture between two parties or systems. That is an interface by definition; whenever two interactive actors come into contact, human or nonhuman, and they interact, an interface exists. Discursive interfaces reflect and help establish a common cultural sense about what users can, cannot, and should do. Hence interfaces produce the possible and normative action frames rather than acting on any particular individual. Environmental platform interfaces have the same logics as any media. They guide and herd users to act according to the interface's content priorities and enhance interactivity with the interface while also collecting data on users.

Environmental platforms communicate and allow interaction through their interfaces. Interfaces simultaneously assist and restrict and modify communication, and this can take both concrete and abstract forms. Typically, interactive texts or data-mapping templates function as sub-interfaces that promote certain forms of interaction with the platforms. Through these forms of assistance and restriction, the interface defines the potential interactions that are available: reading, uploading, downloading, and navigating.

The navigational architecture of the interface itself leads and pushes users to interact with a platform in the ways preferred by that platform (November and Camacho-Hubner, 2010; Holmes, 2002). Interactive documents, for example, are the points of contact with the narrative as an object, with the content as ideas, and with the author as a "constructed ethos" (Carnegie, 2009: 167). Regarding computer-mediated communication, the notion of interface as a constructed ethos covers a range of issues including the physical, social, political, cultural, technological, and ergonomic configurations of computer systems, screens, software, and human-computer interaction.

For environmental interfaces, the constructed ethos also gives these interfaces productive power, as their web interfaces both reflect and reinforce informational, political, and social logics (Stanfill, 2015). Moreover, interfaces have productive power as they govern the hierarchies of information and data, visibility, and navigational practices. Interfaces can be seen as discourses in that they are "practices that systematically form the objects of which they speak" (Foucault, 1972: 49). They are places where thought and action are structured by sets of knowledge assumptions about what are right or correct environmental phenomena (populations, territories, and resources) that have given environmental media a political agency of revealing processes.

### **Environmental platforms as open data providers**

Open data, by definition, refer to data that are accessible to anyone for use, reuse, and distribution, with the responsibility to attribute the source of the data (Pollock, 2006; Kitchin, 2014). Open data also often include the absence of technological restrictions, though they sometimes includes integrity clauses, often stipulating that the modified version of the datasets should be presented with a different name than the original version (Kitchin, 2014: 15).

Open 'big data', or content data in media platforms, have four features. According to Abernathy (2017: 7), they are volume, variety, velocity, and veracity. Volume in 'big' data simply concerns the large datasets that are produced daily, often in real time, where it is almost impossible for many to capture even a tiny portion of it. The data variety refers to the diversity and heterogeneity of data from social media content, Google searches, websites, emails to satellites, and remote sensors to smart Internet of Things appliances. Velocity as a big data feature reflects how computer users not only produce data, but they amass it faster than ever. As Abernathy (2017: 30) notes, in an "internet minute", users produce a staggering number of yottabytes of data (1 yottabyte equals one trillion terrabytes, or  $10^{24}$  bytes). Finally, data veracity considers the accuracy, correctness, and truthfulness of the data. In an age of disinformation, the validity and reliability of data increasingly require criticality about its authenticity and preciseness (Abernathy, 2017: 7–9).

All three examples of data platforms studied here provide Open Application Programming Interfaces (APIs) for developers and users to explore platform data. From a user's perspective, an environmental platform such as InfoAmazonia enables communities, sharing of content, and other socio-informational network features. InfoAmazonia also has an open-source Word-Press theme, which has been developed specifically for using the MapBox API and allowing journalists and the public to post and geo-locate stories directly on the platform Amazon maps (Salovaara, 2016). Also, InfoAmazonia Content Management Systems allow integration with the data layers hosted by MapBox, and the maps are now highlighted according to specific demands (Salovaara, 2016).

The EPA offers its Developer Guide, and the "Linked Open Data" exposed through this platform is available for developers to then build their applications. This guide outlines how the data is accessed and shows some example coding. Therefore, their platform architecture is open and facilitates egalitarian participation and being part of the participatory web. The EPA API is available for people to build queries to retrieve the data for an area of interest. The data can be tailored to, or even selectively to, a specific need, such as for mobile devices. The EPA also provides an interactive tool to make it easier to use the API and build the necessary parameters to retrieve the data. The how-to guide is attached to the tool (EPA, 2017b).

The *Guardian* online provides 'Open API' for its journalistic content. Its climate platform provides both a developer API for free, as well as a commercial API that enables the customer to explore the platform affordances. As with some of the big news providers, such as the *New York Times*, National Public Radio (NPR), *USA Today*, and the BBC, the *Guardian* has also embraced the open and free web approach by providing Open API as part of their economic and developmental approach in the engaging audience in new ways.

According to Aitamurto and Lewis (2013), Open API brings multiple benefits for media organizations. Through a content API, both the media and public organizations can, for example, offer content in multiple ways on all platforms with the innovative applications that wouldn't have been done in-house. Simultaneously, Open API gives a new life to content and serves niche audiences. An additional benefit for the organizations is the quest for retooling in-house Content Management Systems (CMS) that are both easier to use in-house and for external developers' data mining. Additionally, the development teams in news organizations learn to focus on the user experience. Opening gates to external developers accelerates development, cuts costs, and enhances collaboration between tech and editorial teams on media platforms. Commercial Open Data media platforms also gain revenue from the APIs, driving traffic to platforms while spreading content across the web; they gain improved brand leverage (Aitamurto and Lewis, 2013).

### Analyzing new environmental media as actor-networks

The aim of understanding environmental data and journalism as an actor-network is to explain how 'ordering effects' – such as devices (remote sensors, satellites, computers), organizations (laboratories, newsrooms), agents (scientists, journalists), and even knowledge (climate change as empirical phenomena) – are generated within the network. Analysis of actors-networks has its primary focus on investigating how different actors (platforms, scientists, journalists) and entities (organizations) are performed and kept stable (Perkins, 2006; Dodge et al., 2009; Hassard, 2013; Salovaara, 2015, 2016). The actor-networks are built around nodes and actors (both human and nonhuman) but also composed of embodied knowledge or competences that keep precarious actor-networks together.

The first feature in actor-networks, such as new types of environmental media, is *boundary objects* that refer to objects such as technical standards that enable the sharing of information across networks. A boundary object is simply the organizational knowledge ecology of the platforms. These technological knowledge-management techniques are relatively similar on all three

platforms, i.e., on the EPA platform, *Guardian* Environment platform, and InfoAmazonia. All three rely on the circulation of their content and push their content out for digital and public circulation. They all have an open and free approach within the structures of web 2.0, whether as a public service platform (the EPA), as open journalism (the *Guardian*), or in InfoAmazonia's community-based participatory data-mapping and journalism networks.

*Centers of calculation* within the platforms refer to locations, such as platform agencies, where observations accumulate, are synthesized, and are analyzed. At the *Guardian* and InfoAmazonia, the observations accumulate in the international journalism network nodes and newsrooms as well as in participatory mapping templates with the interaction between data analysts and journalists. InfoAmazonia also relies on local communities in the Amazon delta that act as centers of calculation and produce observations, collect data, and generate environmental mapping in real time. In the EPA, scientists collect the data from remote sensing devices and publish knowledge based on those observations, as well as the raw data.

*Inscription devices* and geo-data concern technical artifacts that record and translate information, such as tables of coordinates or satellite imaginary. The EPA and InfoAmazonia use technological devices to accumulate data, such as satellites, remote sensors, and remote sensing devices, as well as infrared space telescopes, spectrometers, and ambient pollution sensors.

*Obligatory points of passage* signify sites in a network that exert control and influence. They can be such things as a U.S. governmental department or indeed the president, such as in the case of the EPA and its Open Data platform. In news media, the point of passage refers, for example, to an editorial unit, the editor-in-chief, media regulators, and financial supporters.

*Programs of action* (the resources required for actors to perform certain roles) refers to different sets of practices and strategies that allow the networks to remain viable and robust in order to function as a node in broader networks of business models, funding strategies, and resourcing workforces, as well as engaging multiple audiences and other actors that are involved in the action programs.

*Trials by strength* concern a process where different visions and processes within the network compete for the superiority of being the knowledge or data provider. As actor-networks, they create newly connected and global networks of information sources and news producers. Again, here the platforms are growing politically visible and can be censored or harnessed when competing visions and processes arise on the platforms that are not supported by the controlling actors within the network.

*Translation* refers to the work through which actors modify, displace, and translate their various and contradictory interests. Translation is a mechanism by which things take form through 'displacements' and 'transformations' – such as when actors' identities, the possibilities of their interaction, and the limits of their maneuvering are negotiated and delimited (Hassard, 2013). In this case, an example of 'translation' was when the EPA was translated as a political agency instead of a scientific research unit and had to go under review before publicizing its research.

The affordances of the environmental data and knowledge platforms such as the EPA, *Guardian*, and InfoAmazonia are relatively similar. They have an open and free web approach, enabling communities, and sharing of content, as well as other social network features. They provide platforms as they afford a (global) discursive place from which to deliver, to speak, to be heard, and for their content to be mediatized. They provide computational affordances, such as Open APIs, for the developers and users to explore the platform data. Their architecture is open and facilitates egalitarian participation through being part of the participatory web.

In so doing, through actor-network-theory, one can identify different actors within the new environmental media sphere, including official intergovernmental agencies, such as the Earth System Governance Project; governmental agencies such as the European Environment Agency and the EPA; nongovernmental organizations, such as Greenpeace and the World Wide Fund for nature; and participatory mapping platforms, such as The Rainforest Foundation's Participatory



Mapping Programme in the Congo Basin, Forest Peoples' Participatory Mapping Programme, and Water Aid Participatory Mapping.

By extending agency to the nonhuman (such as technological and digital devices, data, and embodied knowledge in the forms of data-created artifacts), nature inhibits the production network of strong social constructivism. In this way, bringing together human and nonhuman actors, the construction of nature and of the environment exist only through knowledge that is produced continuously, made and remade, and repeatedly performed so that the complex and precarious networks will not dissolve (Hassard, 2013: 5–6).

### **Environmental media and nature as assemblage**

'Your Planet Is Changing. We're On It'.

NASA uses the vantage point of space to increase our understanding of our home planet, improve lives, and safeguard our future. We monitor Earth's vital signs from land, air, and space with a fleet of satellites and ambitious airborne and ground-based observation campaigns. NASA develops new ways to observe and study Earth's interconnected natural systems with long-term data records. The agency freely shares this unique knowledge and works with institutions around the world (NASA, 2017).

While writing this chapter, on its platform NASA still promises to improve lives and safeguard our future on this planet. However, the EPA is expecting budgets cuts of one-third, and the Trump administration said in 2017 it wanted to eliminate a quarter of the agency's employees. President Trump has just finished his first visit to Europe, where he discussed the Paris climate agreement with the G7 leaders, after which he announced he was pulling out of the Paris agreement on climate change. There is increased concern within the European Union, and his visit and subsequent announcement have left many EU leaders shaken. As Trump pulls back from the Paris agreement, the US still tops the list of carbon emissions producers in the first world, a situation that is untenable, with even major energy companies, such as ExxonMobil and Shell, seeking to persuade President Trump not to abandon the global climate agreement reached in Paris.

It is not surprising that considerable attention has been paid to environmental neoliberalization in news media. Environmental and economic liberalization are still uneven, spatially differentiated, and include contradictory processes. Global interests in processes of deregulation and reregulation of environment enable the refiguring of nature regarding 'services' and 'natural capital'. The effects of such processes and policies on communities and ecologies are often fatal. The notions of neoliberal readings of environmental information and the rise of nondeterministic understandings of nature have occurred in conjunction with the neoliberalization of climate change governance (Braun, 2015; Bakker, 2005).

Contemporary environmental media and data platforms are becoming simultaneously more than information and science. Environmental knowledge has expanded to include geographic databases, mapping software, geo-coded cartographies, interactive interfaces, and algorithms for automated map analysis. When reassembling 'nature' on environmental platforms, constellations consist of things, technologies (software, tools, satellites, data structures), practices, competences, networked flows of information, organizations, agencies, and digital ecologies created by ubiquitous computing (interfaces, servers, platforms, data clouds, code).

Instone (2004) rightly argues that the co-construction of environmental knowledge (as well as political decisions) blurs the boundary between politics, science, and technology and extends agency to heterogenic collectives and networks – both natural and artificial. Haraway (1991: 297) contends that our environment is a co-construction "among many actors, not all of them human, not all of them organic, not all of them technological". This becomes very clear when platforms are recognized as actors within the public discussion of climate change. This view emphasizes

multiplicities and articulation of information, heterogeneous collectives, networks, assemblages, and material-semiotic entities – envisioning the environmental knowledge is co-constructed by multiple agents.

Bruno Latour (2005) calls this the “Janus face” of science. When nature is produced once by measuring, picturing, politicizing, observing, and constructing, it is considered to be always and already true. Hence nature turns into “assemblage” (Delanda, 2006). In the environmental media platforms, discursive interfaces create their own category of ‘nature’ depending on their political bending. As an assemblage, nature becomes a temporary structure dependent on time, space, and ideological climate (Thrift, 2007; Bennett, 2010; Harris and Hazen, 2009).

Though publics mostly agree that climate change is not a hoax, there remains a fast-growing distance between the environmental space where climate change has an impact and the political space where such issues are managed. These complex and common problems are the source of the distinct political crises that affect the institutions of global and regional governance (Castells, 2008). Specifically, the crisis of efficiency is critical as it concerns complex issues, such as climate change, where ethical issues are intertwined with corporate capitalism and international politics and hence cannot efficiently be solved. The crisis of identity signifies the transferring of political power to supra-national actors, such as the EU, UN, and World Bank, and leaving the ‘organic’ democracies feeling powerless, played by stronger agencies and securing the assets of the strongest states (Castells, 2008).

The crisis of legitimacy hits nation-state democracies that are not built for dealing with supra-national challenges, as territorial democratic systems that are too restricted to deal beyond their borders. Finally, according to Castells (2008), there is the crisis of equity at the geopolitical level in relation to climate change that relates to the global political system where there are strong nations and groups, that will always be more powerful, more able to push other players with economic, military, or political threats and sanctions.

Climate change and global warming are objects that cut through the field of these crises, sciences, politics, geography, technology, security, defense, and political ecology. This sees environmental changes as meta-objects of political discussion, as they exist everywhere, have an impact on everyone and everything, but do not have a specific location.

Epistemologically, therefore, ‘nature’ and ‘environment’ are particularly difficult objects for knowledge production, and especially for journalism. This is pronounced when there is no society out there to which scientists respond as they build their theories, nor is there nature to constrain them to a unique telling of their stories. Rather, both scientists and journalists stand between nature and society, as well as between politics and technology.

Considering the digitalization of nature, we must further explore how human and nonhuman knowledge contributes to the production of knowledges, networks, and social assemblages around environment. Computational knowledge delivery causes ontological changes about the ways in which technologies have inspired the new and flourishing study of embodied experience and technology that nest between boundaries of techno-science, activism, and communities.

As digitalized nature(s) can be seen as products of globalization produced through computerization, datafication, and visualization, they are productive of their forms, gaining distributed, post-human agencies and, as such, they exhibit emergent features of digital environmental globalism. Hence new environmental media and digitalized nature create new moral geographies of action where affect and engagement create new dynamics around nature(s).

### Further reading

This chapter has benefited remarkably from Bruno Latour’s *Reassembling the Social: An Introduction to Actor-Network-Theory, Politics of Nature* (2005), as well as his *Science in Action* (1987). *Rethinking*

*Maps: New Frontiers in Cartographic Theory* (2009), edited by Dodge Martin, Kitchin Rob, and Chris Perkins, is a fantastic book from human geographers on how nature and environment are constructed as maps and visualizations. In addition, Manuel DeLanda's *A New Philosophy of Society: Assemblage Theory and Social Complexity* (2006) is a clear and systematic presentation on assemblage theory.

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