

## Amphibious Worlds: Environments, Infrastructures, Ontologies<sup>1</sup>

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### Abstract

Presently, we are witness to a global intensification of water-related disasters related to flooding, sinking erosion, and drought, reflecting changes in global water circulation, rising sea levels and changing weather patterns. Indeed, water is often the medium through which the message of climate change is delivered. Conventionally, water-related engineering projects have managed amphibious spaces through terrestrial approaches premised on removing or controlling water, for example by land reclamation and drainage. They can be contrasted with amphibious approaches that take water flows as a given and organize life around it—as exemplified by living in floating villages or houses on stilts, using water as a primary mode of transportation, or growing crops *in* water. Yet, the amphibious is gaining new life, as water seems to be increasingly *flowing back into land*, everywhere giving rise to emergencies that call for creative response. Thus, urban planners, engineers, and architects devise new infrastructures and models adaptive to environments that are becoming amphibious once again, or for the first time, and people living in watery environments everywhere find ways of adapting to increasingly amphibious circumstances. Doing so, they are contributing to the ongoing ontological transformation of amphibious worlds. This introduction to the thematic collection on “Amphibious Worlds: Environments, Infrastructures, Ontologies,” outlines some of the key issues facing STS and anthropological studies of such worlds, and introduces the papers that follow.

### Keywords

amphibious worlds; environments, infrastructures; water management; ontology

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## Introduction

Over the last several years, it has become increasingly normal to find Copenhagen flooded by summer rain beyond the coping capacity of existing infrastructure. Mundane images of water-filled basements and canceled trains are interspersed with dramatic stories of drivers almost drowning in their cars. The social and economic costs of these events are increasing. The situation is similar in other European countries, and insurance companies, homeowners, and politicians are scrambling for solutions.

12,900 kilometers to the east, Thailand has suffered far more devastating floods over the last decade. In Bangkok, skyscrapers rise up far above the river-scape, their height providing apparent protection against the threats of water. However, Bangkok is rapidly sinking into the marshy ground and some predict it will be more or less uninhabitable before the mid-century. Just south of Bangkok, in Samut Sakhon, coastal erosion swallows 20 meters of land per year due to the destruction of mangrove forests. Return to Europe, and coastal erosion is a similarly pressing issue (see Empson, this thematic collection). Across the world, examples could be multiplied indefinitely.

Presently, we are witness to a global intensification of water-related disasters related to flooding, sinking erosion, drought, and pollution. Many of these problems reflect changes in global water circulation, rising sea levels, and changing weather patterns, and thus with climate change. Indeed, water is often the medium through which the message of climate change is delivered. Hence, the question of how to develop environmental infrastructures (see Blok, Nakazora and Winthereik 2015; Jensen 2015) capable of solving water problems has become increasingly urgent for engineers, urban designers, hydrologists, and policy makers.

Conventionally, coastal and water-related engineering projects have managed amphibious spaces through “terrestrial techniques” (Zwarteveen 2015). Premised on removing or controlling water, these solutions leave little room for (often traditional) practices or modes of living on rivers or islands, or in deltas (e.g. Lahiri-Dutt and Samanta 2013; Morita and Jensen 2017; Pauwelussen and Verschoor this thematic collection). Thus, we can contrast terrestrial responses that center on land reclamation, drainage and defense projects—basically aiming to remove water or keep it out—with amphibious responses that take water flows as a given and organize life around it—as exemplified by living in floating villages or houses on stilts, using water as a primary mode of transportation, or growing crops *in* water.

After a few Centuries where terrestrialization was in the ascendant, the amphibious is gaining new life. In many parts of the world, water now seems to be *flowing back into land*, submerging coastal areas on a semi-permanent basis or creating recurrent floods, making the insufficiency of terrestrial responses increasingly apparent. In response, urban planners, engineers, and architects devise new infrastructures and models adaptive to environments that are becoming amphibious once again, or for the first time. Meanwhile, bureaucrats, scientists, technological innovators, and people living in watery environments everywhere find ways of adapting to increasingly amphibious circumstances.

This thematic collection presents a series of empirical studies of such amphibious worlds,

attending in particular to the question of the kinds of conceptualization they require of STS. Amongst these, avoiding the nature-culture dichotomy as an analytical baseline is central, for reasons outlined below.

### **Orienting to the Amphibious**

Recently, a range of social studies has used water as a lens for understanding social and political situations and changes (Bakker 2010; Barnes 2012; Carroll 2012; Carse 2012; Linton 2010; Swyngedouw 2004). To situate this thematic collection, I begin by unpacking some of the assumptions of these studies and indicating some of their conceptual lacunae.

In 2010, the anthropologists Benjamin Orlove and Steve Caton (2010: 402) argued that because water influences multiple domains of social life, it must be treated as a “total social fact.”<sup>3</sup> In a 2012 special issue of *Social Studies of Science* on “Waterworlds,” Jessica Barnes and Samer Alatout (2012: 484) proposed that STS could add to Orlove and Caton’s perspective by considering water as an object with “multiple ontologies” and seeing the “social realm...as being built...in and through engagements with water.”

While Barnes and Alatout specified the distinctiveness of an STS investigation of waterworlds through contrast with Orlove and Caton’s approach, a few years later, the anthropologists Kirsten and Frida Hastrup (2015) differentiated *their* anthropological interest in waterworlds from that of STS. While their concern with how “water and humans co-configure social worlds and values” (2) appears influenced by STS, they saw the key question as “how people refashion their lives according to their understandings of water’s course and force” (Hastrup and Hastrup 2015: 2).

For Hastrup and Hastrup (2015: 6, citing Strang (2005)), water is located “at the heart of human life, sensory experience, and cultural meanings.” Yet, this only goes for some kinds of water, since they depict modern water, for example, as “harnessed in hydrology...and converted into a scientific, measurable entity” as “abstracted from the ecological and social relations that surround it” (Hastrup and Hastrup 2015: 6) and thus exempt from having a social life.

From the standpoint of STS—a hallmark of which has always been to show that technoscience and its effects are thoroughly social—the distinction between water as meaningfully socialized in lived worlds, on one hand, and “scientific” water, on the other, has little purchase. Once the assumption that science deals neutrally with the realm of objects is loosened, it is clear that the supposedly “abstract” water of hydrological models is as socially and culturally complex as the comparatively nonmodern water drawn from wells in Burkina Faso or used in Thai coronation rituals.

Seeing water as a total social fact, Orlove and Caton (2010: 402) were also critical of the

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<sup>3</sup> The notion of the total social phenomena was used by Marcel Mauss (1990 [1925]: 3) as a description for entities or processes that found simultaneous yet different expression in numerous institutions—for example, religious, economical, juridical, educational or scientific.

reduction of water to its biological properties, arguing instead that water is integral to numerous “domains or institutions of society.” Yet, they also insisted that “the materiality of water” was integral to its existence as a “total social fact” (403). Rather than cordoning off scientific water from anthropological inquiry, they proposed that certain of its properties—such as “transparency... odorlessness and tastelessness...an ability to exist as a gas, a liquid, and a solid” constrain or determine what people are able to make of it. The emphasis on water’s material properties creates an uneasy alignment between Orlove and Caton’s analysis and prominent currents in contemporary theory, including “new materialism” (Coole and Frost 2010) and Jane Bennett’s (2010) studies of “vibrant matter.” While Hastrup and Hastrup focus on (non-scientific) forms of water, which they assume to be truly social, the new materialists, reversely, might search for material properties, which would truly *not* be social. Evidently these are mirror images. By imagining a zero-sum game, in which either people (culture) or water (nature) are somehow diminished by recognition of their mutual relations, each installs a pre-analytic distinction between nature and culture (Helmreich 2011: 138).

Orlove and Caton did not go that far. By arguing for an “intertwined” analysis of materiality (the physical attributes of water as given by science) and social construction (understood as the meanings and values people ascribe to it) (403), they nevertheless also kept in place the nature-culture dichotomy. Assuming this dichotomy inhibits analysis of how the distinction between nature and culture *itself* emerges, and is given variable form, in and through amphibious worlds.

To enable such exploration, Helmreich encourages social scientists to treat water and social theories as reciprocally shaped. While water is routinely socialized (*pace* Hastrup and Hastrup), he thus notes that social theory and practice are presently also often assumed to be fluid (Helmreich 2011: 139; see also Pauwelussen and Verschoor this thematic collection). Indeed, quoting Michael Taussig (2006: 99) he writes that water has “disappeared into our heads” (Helmreich 2011: 139), where it has transformed into multiple imaginative and conceptual devices for making sense of society and culture—as exemplified by notions like global flows and liquid modernity. Along these lines, while the following studies agree with Barnes and Alatout (2012: 484) that: “water is not a singular object for epistemology” but is rather enacted as various ontologies, they also illustrate a lateral movement between water *as empirical data* and as *ingredient in new concept formations* (Gad and Jensen 2016).

### Changing Environments

Indicating how the agency of storms and waves interfere with the question of what holds together a community, Rebecca Empson’s article, which focuses on the changing coastal landscape of Pagham in Southern England, demonstrates the interplay between water and social values, forms of equity and knowledge, and of governance and politics, to which Orlove and Caton’s (2010: 402) treatment of water as a total social fact called attention. Doing so, it also demonstrates how experiences particular to life on the coast engender specific forms of political subjectivity.

Different from Orlove and Caton, however, a politics of emergent “nature-culture” composites is at the heart of Empson’s analysis. In Paghham, the rise of a new landmass (“spit”) out of the sea has had various problematic consequences, including coastal erosion and blocking of the local harbor. That much is clear. Yet there are widely different views of what has caused this situation and what is an adequate mode of response.

Local residents see the emergent seascape as threatening. Yet the threat they perceive has little to do with environmental change *per se*. Instead, they view environmental changes as due to the withdrawal of public efforts to protect the existing landscape. As far as villagers are concerned, coastal erosion is thus as much a social as a natural fact. Coastal engineers, however, insist that the build-up of the spit is not due to their negligence. Their image of the sea rather resembles Kenneth Burke’s description of an “ultimate order” (Burke 1969: 219), which exceeds human comprehension. Some engineers argue that, far from abnormal, the build-up of the spit might signal that the coastline is returning to its normal state after a few unusual decades.

Akin to a “space that is constantly withdrawing” (Brown and Capdevila 1999: 36), the sea eludes even the best predictive efforts, and it is therefore moot to take preventive measures. Instead, the only feasible solution is to let nature take its course (cf. Jensen and Markussen 2008). In a surprising alignment with Andrew Pickering (2008), who insisted that since nature cannot be controlled, people need to learn to “go with the flow,” these coastal engineers thus resist the demands of local residents that they act as modern engineers are supposed to do, by taking responsibility for controlling nature (McPhee 1992). As Empson’s case makes abundantly clear, decisions about how to respond to changing amphibious worlds thus have everything to do with one’s assumptions concerning the relations between “nature” and “culture,” and the relative ontological fixity of their boundaries.

### **Modeling Flows**

Atsuro Morita’s contribution elucidates the surprising entanglements of histories of delta infrastructure and drainage basin modeling in the Thai Chao Phraya delta. The scientific conceptualization of the drainage basin was enabled by data collected from river discharges and rain gauges located within an existing network of sluice gates and dams. At the same time, Morita shows the similarity of irrigation engineers’ and hydrological modelers’ conceptual aesthetics, which in both cases centered on the gravity-driven flow of water.

Over time, hydrological modeling and management practices have begun to shift. Previously focused on capturing water and making it available, the present emphasis is how to use available resources “without compromising future availability and the functioning of ecosystems” (Zwarteveen 2015: 5). As Margreet Zwarteveen (2015: 6) argues, this transformation relates to the “closure of river basins—meaning that all available water is allocated and no single drop flows out of the basin.” Akin to cases described by Pickering (2008) and Empson (this thematic collection), these efforts illustrate changing strategies for dealing with environmental change. Rather than imposing social order *on* nature, the ambition is to build different orders in which rivers “have room.”

Steve Brown and Rose Capdevila (1999: 36) have argued that repetition is key to the emergence of order. What is repeated gradually becomes a “basic element, a rhythm which is discernible as such and not as noise.” Philip Steinberg and Kimberley Peters (2015: 48, see also Anderson and Peters 2014) similarly argue that amphibious worlds are characterized by a “*rhythmic* turbulence...a dynamic pattern of repetition...that provides stability and texture in an environment of underlying instability.” These authors see territories as formed by rhythmic repetitions that create stable patterns among heterogeneous elements.

Along similar lines, Morita draws attention to a distinctive pattern of repetition that emerged *out of* the original focus of the drainage basin modelers on interactions between water and land. Originally concerned with mapping water flows at the scale of the delta as a whole, over time these models have gradually been refined. Currently, downscaled models have become sufficiently sensitive to deal with microscopic water flows in urban environments. These models are now used to make visible the rhythms and flows of water in urban micro-ecologies, referred to as patchworks, and their significance for the ecological health of urban spaces.

Dealing with the rhythms and repetitions of water flows, Morita’s analysis shows drainage basin models to form an important link between delta worlds and amphibious cities. As micro-flows of water are gradually taken into account by scientific models, planning practices and infrastructure design, they begin creating new urban rhythms and forms of order.

### **An Amphibious Parliament**

Gaston Bachelard (1983) argued that there is an intimate relation between water and dreams. Among other things, this connection is exhibited as bureaucrats and engineers imagine ways of taming water flows through technological prowess, testifying to state capacity in the same process. Thus, for example, Chandra Mukerji (2007: 169) has described canal engineering projects as “sites for displaying knowledge” and power. Reversely, deltas and rivers also exhibit the capacity of water to create new geographical, social, and ontological patterns (Morita 2015).

Such forms of entwinement are central to Jakkrit Sangkhamanee’s contribution, which takes exhibits at the Royal Irrigation Department (RID) Museum for Heavy Engineering as an entry point for tracing the assemblage of Thai water engineering. Depicting the museum as an example of a Latourian parliament of things that also exceeds it, Sangkhamanee pays close attention to historically intimate relations not only of bureaucrats, engineers, and excavators but also of divine stones, serpent (*Naga*) boats and tractors, and divine kingly powers. The museum, he concludes, performs water engineering as a nonmodern, ontological assemblage that ties together technology, politics and myth, and testifies to a blurring of nature, society, and divinity at the heart of the amphibious Thai state.

Similar to Anna Tsing’s (2000: 348) argument that scales are *made* not found (also Callon and Latour (1981); Jensen (2007)), which led her to query how “varied regional geographies” are made real, Sangkhamanee’s tour of the museum shows how the irrigation department, its men, and its machines have each been instrumental in scaling delta landscapes, the lives of people, and the Thai state. Crucially, terrestrial strategies gradually came to hold the upper hand in Thailand

over the last century, while amphibious lives and landscapes were increasingly pushed to the margins. However, the increasingly violent floods that have hit Bangkok in recent years may be catalyzing a form of reversal of this long-term trend. Currently, the amphibious appears to be reemerging—not only in government strategies that aim to protect Bangkok against coming floods but also in the activities and imaginations of activists, artists, designers, and engineers who strive to imagine the future co-existence of the capital and the delta. At issue is a reconfiguration of delta ontologies (Morita and Jensen 2017).

### **Coral Enactments**

Far from specific to Bangkok's flood preparation schemes, the question of world-making, and thus ontology, is currently raised in multiple registers. Not least, it has recently come to the forefront of debate in both science and technology studies (Gad, Jensen and Winthereik 2015; Woolgar and Lezaun 2013) and anthropology (Viveiros de Castro 2011). Seeing ontologies as emergent and open-ended relational patterns, these approaches are equidistant from perspectives that prioritize purely social relations and from those that search for analytical ground in the natural properties, or affordances, of objects. In a different register, a proposal for ontological reorientation has also been made by the philosopher Peter Sloterdijk, who argues that an "amphibious anthropology" would be able to suspend with the terrestrial bias of Western thinking (ten Bos 2009: 74).

These two foci meet in Pauwelussen and Verschoor's contribution, which explores how "coral" is enacted as part of different ontological configurations along the coast of the Kalimantan, Indonesia. Similar to Sloterdijk, Pauwelussen and Verschoor describe the world of the Bajau as amphibious and ontologically fluid. Yet rather than promoting amphibious anthropology from a philosophical perspective that centers on the speculative possibility of becoming "an aquatic being again...[taking] up with dolphins and mermaids" (ten Bos 2009: 73), Pauwelussen and Verschoor show us in ethnographic detail the actual amphibious being of Bajau people and their coral worlds. These worlds are now threatened with collapse.

The threat to coral is the key concern of NGO conservationists working in the area. But while foreign experts see coral as biological-ecological entities, Bajau people see themselves as spun in relational webs *with* coral, alongside other things, like spirit ancestors, kinship, fish, and money. The conservation outreach program is the site where these two very different ontological constellations meet.

A conventional conservationist approach to environmental degradation in developing countries is to teach local people the real causes of current problems. The outreach program described by Pauwelussen and Verschoor also tried to enroll local people as brokers or translators between different worlds. Relying on a mode of collaboration without consensus that resembles the one outlined by Susan Leigh Star and James Griesemer (1989), the outreach program could be described as an experiment in turning coral into a boundary object. Yet, this effort ran into a series of problems, until the approach was finally abandoned. Perhaps, then, Bajau and conservationist ontologies are really so different as to make translation between them

impossible?

Yet this is not the conclusion drawn by the authors, who instead try to locate possibilities at the center of this translational failure. Similar to Helen Verran (2002), who argued for the possibility of bridging apparently insurmountable ontological differences in micro-worlds of collaboration, Pauwelussen and Verchoor instead develop the notion of *amphibious translations*, which move not only from conservationists to islanders but also in the opposite direction (cf. Viveiros de Castro 2004). Coral, they argue, might come to operate as a partial connector between different worlds.

### **Creative Emergencies**

In his discussion of amphibious anthropology, Rene ten Bos (2009: 81) drew attention to a distinction made by Gilles Deleuze between two kinds of islands. Whereas “continental islands” have lost “contact with the earth as a result of the eroding effects of sea water,” “oceanic islands” emerge due to “geological activities on the bottom of the sea.” While the former “presupposes that water lies on earth,” the latter “presupposes that earth lies on water.” While the former has erosion as generative principle, the second is the result of “creative emergency.”

Despite its marked orientation to what is geologically given (that is, to material affordances), there is a clear resonance between Deleuze’s argument and the guiding distinction between terrestrial and amphibious strategies for dealing with water flows that I have highlighted in this introduction. In fact, as the contributions show, the question of whether the changing patterns and behaviors of water is a natural process or an emergency *calling for* creative response has become a practical and political problem not only in Pagham, UK, (Empson) but also in the Chao Phraya Delta (Sangkhamanee, Morita) and on the Bajau Islands (Pauwelussen and Vershoor). Such emergencies, and the responses they induce, all play parts in the ontological transformation of amphibious worlds.

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