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WATER

Today I'd like to talk about water as it will enable us to talk about Deleuze and Guattari's two preoccupations: ontology and politics.

ONTOLOGY

For Deleuze and for DG, being is production. The production process (intensive difference driving material flows resulting in actual or extensive forms) is structured by virtual Ideas or multiplicities or "abstract machines."[1] Thought, however, is vice-diction or counter-effectuation: it goes the other way from production. It is a matter of establishing the Idea / multiplicity of something – "constructing a concept" – by moving from extensity through intensity to virtuality.

Following water is a great way to think in the Deleuzean manner.

1. We can measure water *extensively* in its three forms: solid, liquid, gas: the thickness in feet of the Greenland ice shelf; the number of cubic kilometers of ocean water; the percentage humidity at one time and place, and so on.

2. We can follow water flows as *intensive* processes. Differences in temperature, density, etc., provoke material flows, for example, the manifold ocean currents: to name only a very important one, the Gulf Stream brings equatorial heat north, warming Northwestern Europe, and sinking off Greenland as temperature drops, density and salination increase, and the stream plummets to the ocean floor to join the sub-surface ocean currents.

3. And we can construct the *virtual* Idea of water. Among its dimensions would be that which governs the hydrological cycle: linked rates of change of difference-driven intensive processes of evaporation, precipitation, runoff with singularities marking phase transitions as events: from solid to liquid to gas. At all its points of transition, we see the "becoming" of water, its affects we can name: "to flow, to become denser, to expand while freezing, to float as ice, to boil, rain, snow, sleet," and so on.

But these physical affects are mostly of interest to us as they enter into bio-assemblages.

Thus we have to see how water is "perplicated" with Ideas of other natural cycles, involving all the "spheres" that contemporary geographers talk about: hydrosphere of course, but also lithosphere, atmosphere and biosphere.[2]

But as DG delight in saying after explaining some very complex point, "this is much too simple." The spheres are *de jure* distinct, but *de facto* mixed. Not only are they composed of immensely complex nested sets of coupled cycles at many scales, but their intersection zones – their "zones of indiscernability" – are intermixed. For instance,

the atmosphere is not a collection of gases, but is better thought of as “air,” and air has plenty of organisms [spores, microbes], minerals [dust] and water in it. Similarly, the hydrosphere is not just chemically pure H2O but is “water,” which has plenty of organisms, air, and minerals in it. The lithosphere in turn is not just minerals, but its top layer is “soil,” which has plenty of air, water, and organisms. Finally, the biosphere’s organisms are made of water and minerals and cycle air through them. In Louisiana, I can testify, the air you’re breathing is an unholy mixture of soil, water, and organisms, the vaporized bayou wafting into your lungs: sometimes you just don’t know if you’re breathing, drinking or chewing.

There are other linked cycles: calcium is a very important one (bones!), but let’s just talk about the carbon cycle: photosynthesis and respiration. Photosynthesis takes CO2 and H2O and uses solar energy to produce carbohydrates and O2. Respiration takes O2 and releases the energy used in the chemical bonds of carbohydrates, releasing H2O and CO2 back into their cycles. Bio-energy is just hydrocarbon-mediated solar energy.

So you can see the link of the water and carbon cycles. Organic life is just an eddy in the flow of these and many other elements. Organic life uses solar energy to tap into these elemental cycles, to capture and hold some of these flows in other, smaller and tighter cycles – the “organic syntheses make us up” (DR, Chapter 2, “first synthesis of time”). But that’s not a good formulation, “tap into the cycles,” as if life were exterior to the elemental cycles. No, life is part of the cycles: the hydrosphere, lithosphere and atmosphere are coupled with the biosphere: the Gaia hypothesis need not take the

extreme Lovelock organism position: Margulis's "ecosystem" perspective is much more defensible – and much more Deleuzean for that matter.

More detail on bio-water will help us appreciate water's amenability to Deleuzean thought. We'll shift here from DR to ATP.

DG give as an example of a line of flight: "When the seas dried, the primitive Fish left its associated milieu to explore land … now carrying water only on the inside, in the amniotic membranes protecting the embryo" (ATP 55). This is an exemplification of the principle that "an organism that is deterritorialized in relation to the exterior necessarily reterritorialized on its interior milieus" (ATP 54). This development is non-organic life: instead of staying in its habits, the fish folding water inside itself is forming new habits. Non-organic life is not always non-biological life. It can be simply change of living patterns: to use the terms of DR, organic life is locked into "bare" repetition while non-organic life is differenciation. But of course, returning to ATP and following one of the theorems of deterritorialization, it's always on the most deterritorializing factor that reterritorialization occurs.

We see an interesting illustration of this in the concept of "Hypersea," in which the environment of life on land is the deterritorialized sea.[3] In a memorable image, organisms are "lakes" of Hypersea, separated by membranes and connected by ingestion, sex, parasitism and other forms of communication: "The appearance of complex life on land was a major event in which a kind of mutant sea invaded the land surface…. The land biota represents not simply *life* from the sea, but a variation of the sea itself."

What's different about the Hypersea organisms is that they have to stick closely together in tightly bound systems enclosed by a membrane to replicate in an enclosed space the organic functions that are distributed in the sea.

> Organisms, which are all primarily water, can interact at arm's length, so to speak, only in water. On land, direct physical connections become essential. Overall, terrestrial organisms had to build for themselves structures and components that could perform the environmental services that marine organisms can take for granted.

Land life is physically bonded capture – organic land life is an "apparatus of capture" or more melodramatically put, we're all vampires: thus a notion of geo-hydro-political physiology underlies that of the organism. Because of this self-contained structure, "bodies of macroscopic terrestrial plants and animals are the setting for extremely active, if miniaturized, ecological interactions. … These interactions constitute Hypersea." The most elementary of those ecosystems, of course, is the eukaryotic cell: the serial endosymbiosis theory of Lynn Margulis: mitochondria as oxygen-using bacteria living together with the nucleus: remember the two strands of DNA! Are the mitochondria slaves or partners?

POLITICS

We could go on in this way exploring physiology as politics for quite some time, but let's shift to think politics as physiology: the body politic as a body, a system of material

flows. The State as apparatus of capture on top of organic apparatuses: the State as meta-vampire.

Because water is such a great solvent, it dissolves rock and picks up minerals. Thus, unfortunately for land plants and animals, most of the water on earth – that in the oceans – is too salty. Although we are "hypersea," we're much more dilute than sea water, so we need "fresh" water: we'll supply the minerals in carefully controlled doses.

How humans have directed fresh water from where there's a lot of it – rivers and aquifers – to where we can use it for drinking or feeding to plants and animals (agriculture) – the process of irrigation – is an important story about what I'm going to call hydro-litho-bio-politics.

The key figure here is Karl Wittfogel, who claimed that a particular form of social organization – "Oriental despotism" – came from state origination and control of massive irrigation. Deleuze and Guattari refer to Wittfogel at several points in *Anti-Oedipus* and *A Thousand Plateaus* concerning the State, the Urstaat, the apparatus of capture.[4]

The most superficial schizoanalysis show us that Wittfogel's libidinal investment was anti-communism when he left behind his geohistorical focus and tried to show that Stalinist totalitarianism could be traced to "cultural influences" via "contact" with Oriental despotism. He never traced the "total power" of the Nazi regime (no connection with irrigation), nor did he investigate power and stratification in American West water works (admittedly not "total" power, but power and stratification nonetheless).

Despite these failings, Wittfogel does point us to an important truth: aridity is the key to the connection of stratified societies and irrigation. Studies on the American West show how the large-scale state and federal investment in irrigation could only produce stratified societies in arid conditions, where control of water grants a key power position.[5] (Recall the plot of *Chinatown*!)

Although DG affirm that "there is no going back on Wittfogel's theses on the importance of large-scale waterworks for an empire" (ATP 363), they do acknowledge that some parts of Wittfogel's work have been "refuted" (19). Although they do not enter the details of this refutation, when we do, we find they affirm some of DG's central theses on the State.

Let's take the example of Egypt. Ancient Egyptian irrigation was basin irrigation rather than canal irrigation. In basin irrigation earth banks run parallel and perpendicular to the river, creating basins. Sluices would direct floodwater into a basin where it would sit for a month until the soil was saturated. Then the water would be drained to the next basin and the soil in the first basin would be ready for planting. This system sustained Egypt's remarkable continuity (the only ancient irrigated society to have a continuous existence). Once-a-year planting didn't deplete the soil, which was replenished by the next year's flood. Nor did basin irrigation result in salination, as the water table during the dry season was well below the root level, so that flood waters would push accumulated salts down into the water table, below the root level.

Karl Butzer has shown how basin irrigation using the Nile floods arose as a decentralized, locally controlled system, and was later overcoded by the apparatus of capture of the State. Butzer writes:

> All of the information that can be brought to bear on Dynastic land use in Egypt shows a simple pattern of winter agriculture, largely confined to the flood basins, with their crude but effective system of annual flood irrigation. Despite the *symbolic association* of the pharaoh with this inundation [my italics; read "overcoding"], Dynastic irrigation technology was rudimentary and operated on a local rather than national scale … Perhaps the only centralized aspect was the traditional link between tax rates and the potential harvest [State as "apparatus of capture"], as inferred from the height of each Nile flood … no form of centralized canal network was ever achieved in Dynastic times.[6]

We can also talk about Stephen Lansing's work in Bali, which also shows local, decentralized, control of canals in the mountains of Bali.[7]

With Butzer and Lansing, the contours of the bio-litho-hydro-political multiplicity begin to come into focus. There is more than one singularity and the role of chance is irreducible. The multiplicity behind the morphogenesis of political structure includes geological factors such as ground slopes, surface friction; biological factors such as type and strength of local flora and fauna; hydrological factors such as river currents, channels, and wave strengths; and social factors such as the speed capacity of available transportation assemblages, which are social / technical at the same time:

man – sandal – spear – shield assemblages; horse – man – stirrup assemblages; and all the assemblages formed with chariots, wagons, sailing ships, rowing ships, etc.

Wittfogel's mistake was seeing a single pathway – control of irrigation – in the morphogenesis of Oriental despotism.

This may actually have been the pathway for ancient Mesopotamian empires, which needed flat river valleys, for irrigation-intensive agriculture and to install garrisons in outlying towns which can be quickly supported: the *corvée* supplies labor for roads as well as for irrigation and monuments. Once past a certain threshold, we find a positive feedback loop: the bigger the territory under control, the more solar energy is captured in agriculture and the larger the bureaucracy and the army that can be fed with the surplus. These can then enlarge and administer the territory and put more peasants to work producing and funneling surpluses and building roads for more expansion, and so on.

Butzer, however, shows that in Egypt the key factor for Pharaonic absolutism was the ecological embeddedness of "nomes" or basic territorial / political social units.

> These primeval nomes appear to have provided the necessary political infrastructure for the military ventures that over several generations of strife led to the unification of Egypt. In this sense Pharaonic civilization remains inconceivable without its ecological determinants, but not in the linear causality model [sc. of Wittfogel] of stress → irrigation → managerial bureaucracy → despotic control.[8]

In other words, Butzer doesn't deny Egypt was united under a despot nor that its political structure was ecologically embedded. He just denies that irrigation control was the sole determinant of that imperial scale despotism. (Question of scale: the "nome" or local unit qualifies as a State – perhaps even a hydraulic state – but not as an empire.)

In fact, it's recently been argued that centralized national state control of Egyptian irrigation – based on a change from basin irrigation to a centralized canal grid system – is a 19th century phenomenon. But it was represented as a return to the supposedly centralized irrigation control of the Pharaohs. So the argument would be that with regard to Egypt at least, Wittfogel mistook modern propaganda for ancient reality.[9]

Butzer (and by extension Lansing) thus contradicts Wittfogel, who stresses the State as the origin of large-scale water works, and confirms DG's theses that the imperial State overcodes local arrangements.

We should recognize that the State has no monopoly on bio-hydro politics: "the hydraulic model of nomad science and the war machine … consists in being distributed by turbulence across a smooth space" [ATP 363]. We need to add to DG here in order to bring ontology and politics more closely together. The portable water container, the animal skin, is as fully a part of the nomad assemblage as the more famous stirrup; the machinic phylum had to encompass this technological supplement to Hypersea to allow the nomad occupation of the smooth space of the arid steppes.

WATER CRISES

In reading for this paper, I was reminded of several contemporary water crises: singularities at which the differential relations in the bio-litho-hydro-politics multiplicity might flip us into new and potentially disastrous systemic patterns.[10]

IRRIGATION – SALINATION. Rising water table from saturated land with poor drainage leads to salty water reaching the root zone. There, osmotic pressure of salinated water leaches water out of plants, killing them.

Irrigation can come from surface water (rivers and dams and reservoirs) or from groundwater (aquifers).

DAMS – SILTATION: river water is mix of atmosphere, hydrosphere, and lithosphere: silt as suspended solids: necessity of floods to deposit nutrient rich soil in alluvial river valleys and in river deltas: Mississippi River and Louisiana. Also, vast increases in Schistosomiasis or bilharzias in Nile after Aswan: lower levels of this disease may have contributed to political stability by weakening peasants. A key example of “political physiology.”

DEPLETION OF AQUIFERS: Ogalala: whatever happened to the Dust Bowl? That same land is very fertile now, but not for long. Depletion may never be reached if Peak Oil raises fuel prices enough. Why pump water from aquifers if the oil cost to run the pump outstrips value of agricultural product to be produced?

RESOURCE WARS: Kashmir between India and Pakistan; Israel, Jordan, Lebanon, Syria, and the Occupied Territories.

SOLUTIONS? Nuclear power for de-salination? Drainage for irrigation? Or return to rain farming? The real key is not technical but social: land ownership / cash crops / food production: *Food First*, Frances Moore Lappé, a classic critique of the oil-intensive "Green Revolution."

[1] Multiplicities are composed of mutually defined "elements" with linked rates of change ["differential relations"] with singularities. In mathematical modeling of physical systems, singularities are points at which the graph of a function changes direction. Singularities in models represent thresholds in intensive processes, where a system undergoes a qualitative change of behavior.

[2] Denis Wood, *Five Billion Years of Global Change* (New York: Guilford, 2004).

[3] Mark and Dianna McMenamin, *Hypersea* (New York: Columbia UP, 1994).

[4] Karl Wittfogel, *Oriental Despotism: A Comparative Study of Total Power*. New Haven: Yale University Press, 1957.

[5] Donald Worster, *Rivers of Empire: Water, Aridity, and the Growth of the American West* (New York: Oxford University Press, 1985); Marc Reiser, *Cadillac Desert: The American West and its Disappearing Water*, 2nd ed. (New York: Penguin, 1993).

[6] Karl Butzer, *Early Hydraulic Civilization in Egypt: A Study in Cultural Ecology* (Chicago: University of Chicago Press, 1976): 50.

[7] J. Stephen Lansing, *Perfect Order: Recognizing Complexity in Bali* (Princeton: Princeton University Press, 2006).

[8] Butzer, 111.

[9] Michael Kalin, "Hidden Pharaohs: Egypt, Engineers and the Modern Hydraulic," 2006 MA thesis, Wolfson College, University of Oxford. http://users.ox.ac.uk/~metheses/Kalin%20Thesis.pdf. Accessed 1 March 2007.

[10] Besides Reiser and Worster, other important books on bio-hydro-politics include Michael T. Klare, *Resource Wars: The New Landscape of Global Conflict* (New York: Henry Holt, 2001); Marq de Villiers, *Water: The Fate of Our Most Precious Resource* (Toronto: Stoddart, 1999); and Jared Diamond, *Collapse: How Societies Choose to Fail or Succeed* (New York: Viking,

2005).