PRESERVING THE FLOW

NATURAL DISASTER IN IGNORANCE

by JORG SIEWEKE

How can we advance recent ecological concepts from a human-centric towards an eco-centric perspective without wandering off into the spiritual world? Ecological concepts have been evolving as we learn to appreciate an eco-centric perspective embracing change beyond the concept of equilibrium.

The comparatively recent history of modernization and its effects become tangible if one faces the regulation of rivers. The juxtaposition of the vivid nature of the water relative to built structure intuitively reveals the project's implicit mindset of control and order. How can we begin to address the subdued animate nature of a river today?

How can we begin to understand what is " playing out " in southern Louisiana? How can we comprehend the inevitable drama of the lower Mississippi, aka "Old Man River", an ecological disaster that may soon be followed by an economic disaster to then be misnamed a natural disaster.

Delta landscapes are among the most productive ecosystems of all: in terms of productivity they exceed tropical rainforests. Their rich metabolism provides an abundance of seafood as well as the most fertile agricultural land in the floodplains. The typical deltaic metabolism provides and maintains structures for ecosystems to thrive.

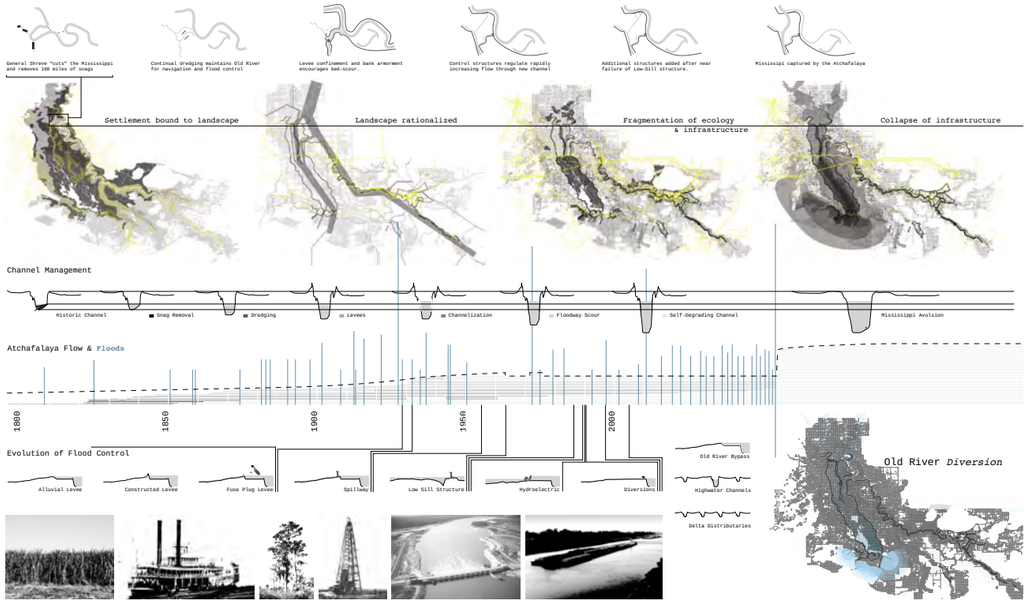
At the same time, this landscape of abundance is ephemeral. It does not remain stable in its local place for long, so nothing can be considered permanent except change itself as a defining parameter. The River will always alter its course, yet it will remain in the alluvial delta-fan. In Louisiana this principle was understood by the Native Americans, who adapted to the swampy ground with light and mobile

forms of settlement on the natural levees or with subtle elevations such as heaps of oyster-shells.

Since the aftermath of the 1927 flood, the management of the Mississippi River and Tributaries Project (MRTP) has regulated the surrounding environment along a paradigm focused on averting change. The side effects of this regulation have now been acknowledged as quite significant, as the entire project's integrity is being questioned. Formerly marginalized externalities of channelizing the River surface have emerged today as unintended consequences at the scale of the entire project. A range of problems have developed, notably a) the loss of the Louisiana Delta landscape due to wetland erosion, b) an increased exposure of New Orleans to storm surge due to loss of deltaic cypress forest buffer, c) growing hypoxia dead zones of algae bloom along the Gulf Coast due to excess nutrient discharged by the River and d) the risk of loosing the youngest part of the MRTP itself , the Rivers navigable pass in the Bird-Foot Delta

The hinge point of the Delta fan is located at the confluence with the Red River; here the Mississippi would prefer to jump channels to a shorter and steeper path to the gulf. If it were for the River to decide, it would divert westwards into a lush cypress forest basin known as the Atchafalaya. The Mississippi River is tired of flowing past New Orleans; it has gone this way for too long. The sediment has elevated its own bed, and its levees have become the highest ground in the Delta. The River would rather follow gravity again and wander all around the Southern Louisiana Delta, building the most fertile land of sediment and nutrient by breaking through a levee occasionally. It would also want to push back the Gulf's salinity gradient of encroaching brackish water with its own volume of freshwater.

The nascent ambition of the River to shift had not been accounted for – quite the opposite. It has been conceptualized in static fashion as fixed in place, needing to accommodate industry and settlement. Great quantities of steel and concrete structural engineering have been brought in to turn the River's stability into stagnation. In the meantime, global trade and commerce of national and international reach rely on the river to stay where it is. In fact, a United States Congressional decision set in place since the 1950s prescribes not only its delineation, but the flow rate of the Mississippi as fixed to 70/30 in an attempt to prevent the river from following the entropic path into the Atchafalaya. All multi-faceted investment, reinsurance networks and economic tangents at stake require the stream to be



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ParadoXcity _Mapping Atchafalaya: Mississippi Delta and Old River Control 2011

reduced to a channel - a plumbing system or a discharge problem to use the current terminology of its managers.

As one consequence of channeling the adjacent Louisiana Delta is starving from being cut off from further sediment replenishment as the land erodes into the sea at increasing rates. The land subsides faster since the River is no longer allowed to supply its sediment deposit over the levees into the delta landscape. Instead, the accumulating sediment in the river clogs the shipping channel. Dredging the River for navigation can barely keep up today and will not be able to accommodate post-Panama class shipping drafts. Excess nutrients from agricultural run-off throughout the Mississippi watershed channeled to the Gulf is creating algae blooms. The decomposition of algae by bacteria consumes large amounts of oxygen and leaves barely any for other creatures. The Dead Zone in the Gulf of Mexico is turning an increasing area of the coast along the continental shelf into an oxygen-depleted Hypoxia Zone.

The Mississippi carries numerous neglected properties. The River's hydrologic regime, its sediment regime and its salinity regime, to name a few, have either been overlooked or knowingly marginalized in favor of mandating the Mississippi river as a shipping channel. The late consequences of this denial surface today in a scale that exceeds human control by far. The entire "plumbing project" commissioned by priorities of flood protection and navigation and shipping will no longer be able to provide for either of the two purposes. The project begins to bite its own tail.

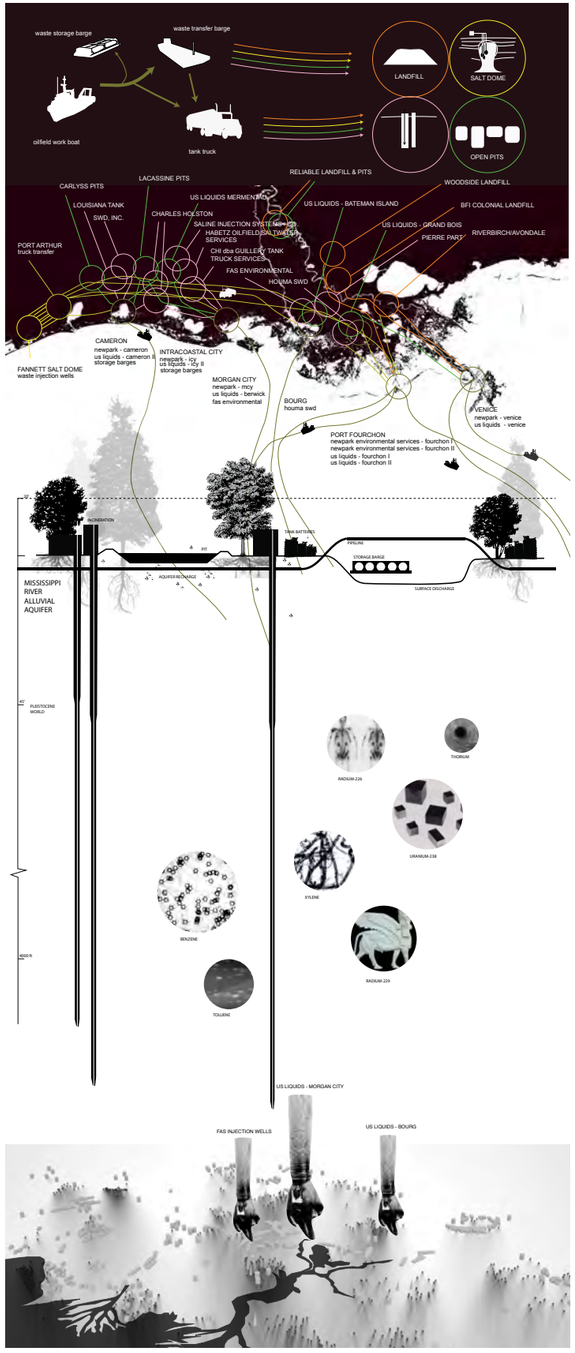
The Lower Mississippi River and Tributary Project (MRTP) fails at precisely the scale of its misconduct with economical implications going far beyond it. The potential loss of the Delta, as well as the MRTP itself, may threaten the city of New Orleans and the Port of Southern Louisiana. Consequently we ultimately arrive at the most basic question: What would the river do?

Despite the trillion dollars spent to avert change, the River will not be tamed. We therefore may need to reconsider our paradigm in facing intrinsic principles of change in landscapes, relative to the mandates projected on managing the river. How can we better understand landscape change and the intrinsic patterns of resiliency and adaptations to be smarter in making civilized infrastructures that better fit with riverscapes?

Alternative concepts for managing the Mississippi have been suggested in the past, as John Barry lays out descending voices in his epic narrative *Rising Tide*. More recently, a 1987 EPA study suggests that, instead of forcing the River and the Delta to freeze in its 1953 flow rate of 30/70 between the Atchafalaya and the Mississippi, a pro-active strategy would assume to collaborate with the River's dynamic trajectory and the deltaic transition. The next inevitable shift of the River would be guided in a gradual and controlled fashion utilizing the "Old River Control Structure" to avoid increased risk of catastrophic failure. The flow towards the Atchafalaya would be shifting at a rate of one percent a year, allowing the ecosystem and the economy to accommodate the transition incrementally. (EPA 1987 p. 42-41)

Preserving the flow

Measures taken to regulate the environment have assumed a state of stability but must more accurately be addressed as homeostasis or stationary stability. In contrast, most riverine regimes and ecosystems are more accurately characterized by the principle of homeorhe-



sis or evolutionary stability, a preservation of a system's characteristic flow processes (Waddington 1955).

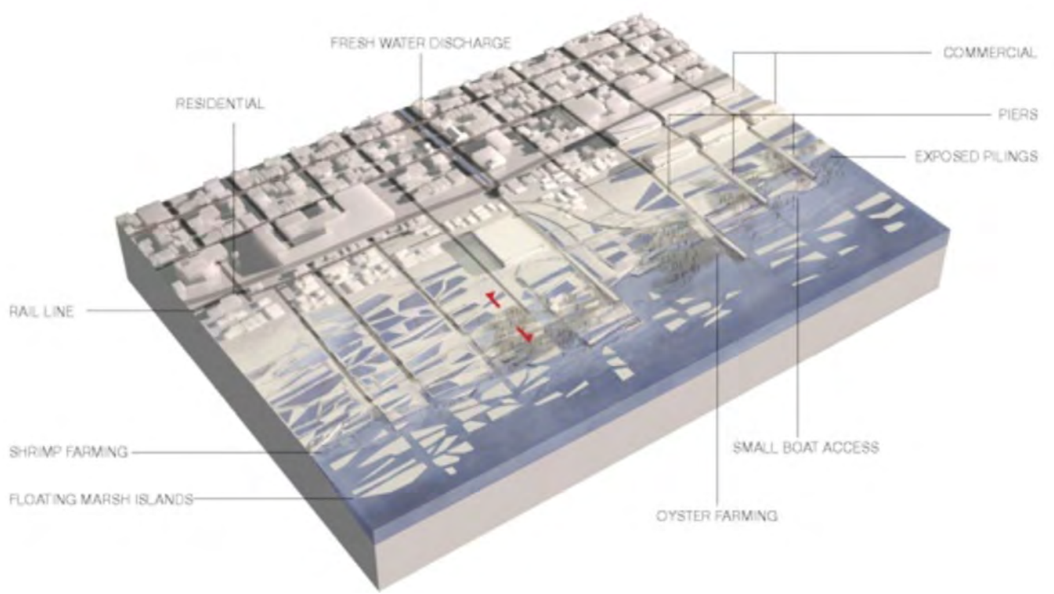
Ecologists since Holling (1973) have expanded the notion of non-equilibrium ecosystems to the concept of resilience: a system's capacity to absorb changes and to persist in a globally stable dynamic regime far from equilibrium. Waddington expanded the concept of resilience building on catastrophe theory emerging at the time. He argues that every system is potentially moving towards moments of bifurcation where irreversible change occurs "catastrophically".

He applied catastrophe theory to multi-factorial development in biological morphogenesis. Waddington used topological 3D models of attractor surfaces occupied by the innumerous variables simultaneously altering these dynamic processes. His surface models are represented as folded planes indicating paths for an imagined sphere to follow, *aka chreod* (Greek for necessary path). In their topologic quality they appear very similar to a basic delta fan condition showing multiple distributary pathways. The points of bifurcation result from altering pushing and pulling variables in the surface, creating an epigenetic landscape. This concept assumes both a producing and a produced condition represented in the same surface.

If we translate the topological principle of folded surface into a delta fan landscape we would think of the bifurcations as distributaries or crevasses (natural diversions). The beauty of Waddigton's epigenetic surface interpreted for the delta analogy is that, instead of running one pass through this model, we would think of the deltaic fan running multiple iterations until eventually the next necessary shifting occurs as an outcome of the River's own alteration to the system, namely the River silting up its bed, natural levee building and barrier island formations. The layered geological survey provides evidence of this pattern.

Waddington developed this topological diagram of an epigenetic landscape to communicate embryonic development studies. Although he did utilize the topological surface model to visualize his theory, he had no actual interest in rendering landscapes. Paradoxically in doing so he provides the meaningful abstraction of deltaic environment as a topology and the contingencies that are carried in it.

The ParadoXcity research on DeltaCities becomes instructive since deltas are by definition reassembled by ongoing dynamic geomorphological processes. As in a petri dish one may perceive ecosystem change in real time. Another emblematic condition of deltaic environments is the river as an identifiable driver of change. The rivers in pre-modern times were referred to as a subject or a god like entity. In the process of the secularization of nature that has occurred in modernity the river has been reduced to an object. Today we struggle with concepts to reassign animate qualities or agency to the river.



One starting point is to address nature not as a passive product (natura naturata) but as a producing entity (natura naturans). The appreciation of nature's self-organizing capacities allows understanding our role in facilitating a co-evolutionary path. The close reading of the animate and productive capacities also carry the potential of co-productivity. In contrast to the tradition of bio-mimicry (learning from natural form), we need to learn how to better understand natural systems' performance and organization and, most significantly, their metabolism. Bio-mimicry should therefore move from the objective of drawing from formal repertoire to a model for constructing and maintaining metabolic structures.

Instead of increasing measures of control by installing more grey infrastructure, how can we begin to appreciate how the deltaic metabolism provides structure for itself? Can we find ways to tap into these metabolic services without compromising their integrity with counterproductive infrastructure? The more recent interest in ecosystem services and green infrastructure can be understood as first attempts to identify the enduring or redundant productive capacities of "natural" systems.

These insights require a holistic perspective that apprehends the layered ecological amalgam's implications and appreciates the culture/nature hybrids that reside in the swampy ground of deltas. (Jonas 2012)

In order to fully reconcile these alienated and unresolved nature/culture hybrids, we need to learn about contemporary critical ecosystem theory just as much as emerging discourse in the humanities that readjust our relationship to objects known as "object orientated philosophy."

We may begin to consider the river as a legal subject (Serres, 1995), as human/nonhuman hybrids (Latour, 1993) we created for ourselves and ultimately as something too large to fully comprehend and manage in its entity: a HyperObject (Morton 2013)

We need to focus on matters of concern of non-human entities. It's a call to disclose all the non-represented objects we have created ourselves and invite them to the Parliament of things. (Latour 1993)

In ecological terms co-evolution offers a path that accounts for both the human-centric perspective of landscapes' utility and the eco-centric perspective of landscapes' agency to identify synergies between the two.