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Getting Humans Back Into Nature: A Scale-Hierarchic Ecosystem Approach to Adaptive Ecological Planning

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Evoking An Ecosystem Approach to Disaster Planning: Nested Systems, Multiple Functional Boundaries and the Ecological Recontextualization of New Orleans

A key principle from within an ecosystem approach to planning has to do with the imperative to use multiple temporal and spatial scales in conceptualizing context and telling consequence. In planning, this principle is stymied by the practice of fiscal discounting, which is deeply ingrained into decision making protocols. This practice ensures that the future is always worth less—often much less—than the present. Partly as a consequence of this practice of fiscally discounting the future, and partly because many elected officials are strongly influenced by the time scales of election cycles, legislation-based and regulatory decision systems are afflicted by a form of attention deficit hyperactivity disorder that hugely handicaps functionally robust decision making and implementation—especially when such decision making needs to consider processes that play out at time scales dramatically different from those in the political process, or is driven by the equally short attention-span of popular news media's propensity to highlight crises in some fleeting way. The case of disaster planning, as underscored by the recent Hurricanes Katrina and Rita which struck the Lower Mississippi River Delta, is an instance where an ecosystem approach would prove particularly beneficial.

The Imperative for an Ecosystem Approach to Disaster Planning

An ecosystem approach to integrative regional planning demands that good decisions in complex spaces cut across existing political and administrative jurisdictional boundaries, abiding instead by geographical, functional and ecological boundaries, and then playing out along more than two or three functionally relevant time lines.

Take, for instance, the case for protecting New Orleans from future storm-based flood events. The US Army Corps of Engineers (USACE) has noted that it is quite possible, technically, to protect the city from such storm surge events, using some combination of ecological restoration techniques that rehabilitate the wetlands and barrier islands that once naturally buffered the Lower Mississippi delta, and a strategically constructed system of levees. For such protection to be put in place, however, the resources and the political will must be made available over a time-scale of decades, rather than weeks or months (Anon, 2005).

Due to this attention-deficit hyperactivity disorder that afflicts planning and policy, we can be virtually certain that the complex set of actions necessary to protect New Orleans from future storm events will probably not happen without conscious and sustained effort on our part to counteract this systemic affliction that virtually constrains us to act at a single, short and rapid time scale. What is needed is some reliable way to change the practices of decision-making to ensure that appropriately multiple spatial, temporal and organizational scales are used in generating operational descriptions of ecological context and of consequence. A systems approach, based on scale hierarchic ecosystem ecology, offers a useful set of tools to help shape an alternative approach to planning, one that is able to take account of the multiple boundaries that shape complex realities, and the occurrant time-frames that underwrite ecological processes and functions.

In disaster planning, a central distinction is made between actions required in the relatively immediate aftermath of any particular disaster, such as providing rescue and recovery efforts, restoring transportation routes and communication channels, reintegrating and reprovisioning supply chains, providing survival relief, and providing trauma support, and the longer term restorative and preventative actions that need to be made to complete the regional recovery and reconstruction process and to integrate valuable lessons learned into institutional, technical and cultural practices. All this is vital to effectively mitigate against future similar events, and we detract from any one of these at significant costs to sustainability planning.

President George W. Bush's recent initiative to "rebuild New Orleans," will likely suffer from such ADHD-induced temporal and spatial anomalies, with no institutional mechanisms being put in place to counter "the market's" formulaic practice of discounting the future and the consequent planning limitation of needing to cram as much activity as possible into the shortest period of time, so as to capitalize on the relatively short period for which attention is likely to remain focused on "the problem."

Context and Consequence, On the Lower Mississippi River Delta

Rivers are key organizing elements in watershed ecologies, dominating processes and functions and their arrangement across space and time, in a sense comprising the spinal column about which the body of its lands take form, grow and change. The Mississippi River is no exception. New Orleans, and the areas that most immediately support its existence, are dominated by the reaches of the Lower Mississippi delta. Wetlands and barrier islands are two key ecological elements that shape and structure that land, and the continued health and wellbeing of both are imperative to the future of the place we have come to value, both for its ecologies and for our human (economic and cultural) purposes.

Throughout history, but with increasing intensity during the more recent period of the land's settlement by white European immigrants and its subsequent appropriation into the United States of America, the river has been useful to the diverse ecological and human communities that have sprung up around its ebbs and flows. With increasing intensities of population, industrialization, and globalization pressures, the stresses and constraints imposed upon the riverine system have also increased.

The US draws enormous economic benefits from this riverine delta system. Examples of revenue sources include, farming of rice and other crops, fisheries resources extracted from the Delta ecosystem, nature tourism and hunting activities, direct natural resource extraction such as oil wells[1] and mining,

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[1] Coastal Louisiana is the single largest domestic source of oil and condensate within the US. In addition, approximately 30% of the nation's entire imported oil

the tourism-related benefits accruing from the cultural practices that have evolved within the bayou ecosystem, as well as in the river's use as a channel for the transportation of freight, linking global marine shipping with domestic US goods movement into the American heartland. Any useful description of rich context of this system would take account of each of the diverse sets of boundaries that each of these purposes would project upon the ecological complex that is the Lower Mississippi River delta.

The gradual but increasing channelization of the Lower Mississippi River has sought to constrain the natural tendencies of rivers to shift course in evolutionary response to landscape and process-function changes over time. The tendency of the river to overflow its banks seasonally, flooding the surrounding lands, resulted in the increased embankment of the Mississippi River. In addition, projects have sought to modify the course of the river in ways that minimize the costs of navigating the river from its Gulf of Mexico port facilities to the inland reaches of the US hinterland. Together, these actions have dramatically disrupted processes and functions ecologically vital to the reformation and maintenance of the wetlands that form the overarching context for New Orleans. These projects have also caused significant deteriorations of the barrier islands so integral to the ecosystem at large, and that have long buffered the city from Gulf storms. The US Geological Survey [USGS, 1995] warns that:

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and natural gas supply is transshipped through the Louisiana Delta [USACE, 2004: ii] *(a)s the barrier islands disintegrate, the vast system of sheltered wetlands along Louisiana's delta plains are exposed to the full force and effects of open marine processes such as wave action, salinity intrusion, storm surge, tidal currents, and sediment transport that combine to accelerate wetlands deterioration.*

The river carries down silt from its inland reaches, to be deposited throughout the wetland marshes as well as out into the delta region, allowing the buildup of soils in a manner that counteracts the unceasing erosion of coastal lands by ocean currents, and the subsidence tendency of soils in marshy coastal regions. This process of siltification is an imperative that we have disrupted at our own peril, as the recent Hurricane Katrina so vividly demonstrated for us.

Since the 1930s, coastal Louisiana has lost some 900,000 acres of coastal wetlands. "The current rate of loss is about 16,000 acres per year." [Galloway, 2003: 2] About 70% of this loss in coastal wetlands has been estimated to derive directly or indirectly from human activity, and from our continued appropriation and alteration of the natural estuarine landscape [Izzo, 2004]. Ecological processes being driven by this human appropriation, and in addition to the loss of buffering coastal lands, barrier islands and wetlands, include subsidence and saltwater intrusions into aquifers due to draw-downs of groundwater, and the loss of other ecological and biological functional value deriving from habitat loss. to take just one example, migratory birds, the USACE [2004: ii] estimates that:

(a)pproximately 70 percent of all waterfowl that migrate through the U.S. use the Mississippi and Central flyways. With over 5 million birds wintering in Louisiana, the Louisiana coastal wetlands are a crucial habitat to these birds, as well as to neotropical migratory songbirds and other avian species who use them as crucial

stopover habitat. Additionally, coastal Louisiana provides crucial nesting habitat for many species of water birds, such as the endangered brown pelican. These economic and habitat values, which are protected and supported by the coastal wetlands of Louisiana, are significant on a National level.

Consider that at the time when New Orleans was established as a settlement by the French, in 1718, some 100 miles of barrier islands lay between it and the Gulf of Mexico. Since then, the Mississippi Delta has been losing land at the rate of between 25 and 50 square miles per year (which translates into approximately 2 acres per hour) [Barras et al., 2003], in large measure because our efforts to maximize the economic benefits of the Mississippi River to humans in their present time. The delta region now lays exposed to the elements that will jeopardize human well-being long into the future. In very real ways, past human generations had captured economic wealth for themselves, while deferring the costs onto then-future and now-present generations. Perhaps because we continue to discount the future by skewing the time scales of our descriptions for economic analysis, and because we continue to exclude purpose and perspective in assessing the context and the consequences of proposed action, we are not doing much better, as planners.

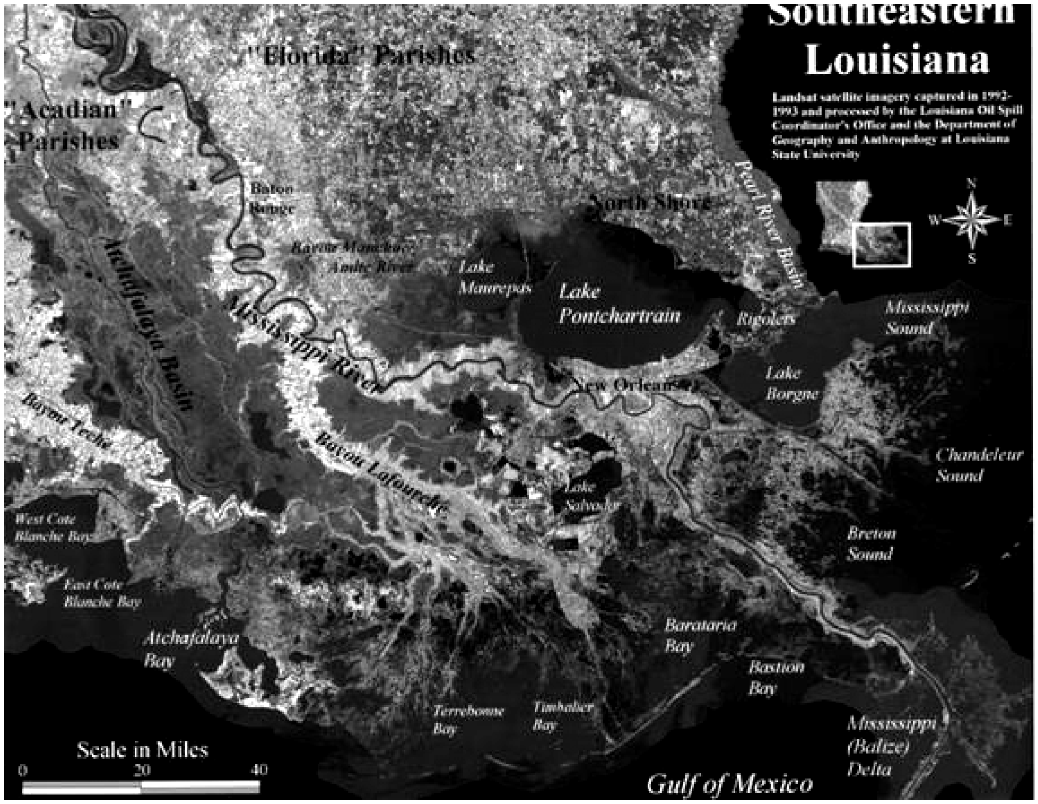

Figure 1: The southeastern Louisiana Barrier Islands as the ecological context for a New Orleans impacted by Hurricane Katrina.
[America's Wetland Resource Center, undated]

Other natural and human forces are at work here as well, which must additionally be given standing in an ecosystem approach to disaster planning that seeks to better integrate context and consequence. In the case of global climate change, direct observations indicate that ocean temperatures are rising. This assures us that the intensities of future hurricane events are bound to increase. Similarly, sea levels have been observed to rise, in part due to the melting of glaciers, in part due to increased coastal runoff, and in part perhaps due to local land subsidence, In any case, the ways in which we choose to buffer ourselves from future storm events must take all these aspects into account in our depictions of context and our analysis of consequence.

Elements of An Ecosystem Approach to Disaster Planning

One essential and central element in such a restructuring must be some form of an ecosystem-approach to integrative regional planning, in a way that pragmatically changes how we make descriptions of problems, and how we think to set about addressing them. In a sense, the move is from a “problem-solving” mode that seeks to eliminate the problem, or “make it go away,” to an on-going and adaptive “problem-management” mode that seeks to engage context and consequence. A second and necessary element in such a move to ecosystem management has to do with the way we think of descriptions, and the ways information is embedded within them.

Conceptualizing the world as being structured in the form of nested systems leads us to understand that those aspects of the world that demand description as complex systems must be conceptualized as having more than one or two functional boundaries which can only be captured using multiple spatial, temporal and organizational scales. Evolutionary ecosystem ecology provides a sound basis for effecting such changes in our decision-support mechanisms, and in the development of long-lasting adaptive disaster management strategies.

Once again, Rittel and Webber’s characterization of “tame” problems and “wicked” problems (1973), as a way of capturing key operational distinctions between simple, closed, mechanical systems, and complex, open, organic systems, is a useful place to begin our search for an adaptive ecological approach to disaster planning. When we are dealing with "wicked" problems, that is to say, problems emergent from the processes and functions that drive complex, organic and open systems, then descriptions must capture the multiple boundaries that structurally characterize complex systems if they are to be useful.

The diverse array of factors and forces that drive such an ecosystem approach to disaster planning, involving the setting the multiple boundaries of functional relevance, can only be made evident by the systematic and self-conscious use of appropriate spatial, temporal and organizational scales, coupled with an application of a levels of organization approach to system description. An ecosystem approach to disaster planning offers the necessary conceptual shift as well as the descriptive tools and techniques to counter the spatial and temporal biases inherent in conventional planning and policy—the singularization of place-based boundaries, and the fiscal discounting practices that skew temporal scales strongly toward the present. Not only do we need to be able to think about place in more sophisticated ways, but the imperative for sustainability as well as the imperative of ecology requires that we use multiple boundaries and multiple functional scales in crafting our descriptions, if we are to capture complex reality in a way that more richly sets the context for our interventions, and shows us more of the potential ecological consequences of our actions.

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