PERSPECTIVES FROM THE FIELD

Dredging: An Expanded View

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As we enter uncharted territory of climate change, humanity will likely rely on macroscale design to consciously self-guide the evolution of the biosphere. While risk-mitigating strategies such as conservation, restoration, and energy efficiency have their own merits, there is a growing sense that, in certain circumstances, transformational adaptations are necessary to survive the impacts of climate change (Intergovernmental Panel on Climate Change, 2012; Kates, Travis, and Wilbanks, 2012). Such adaptations introduce change on a much larger scale and with much greater intensity. In this context, ecologic urbanists will have three important roles: (a) to problematize emergent issues on regional and global scales, (b) to use inclusive and transdisciplinary thinking, and (c) to participate actively in technology forecasting.

While there are limitations to environmental prognosis, society's health depends on anticipatory design thinking in the broadest sense. Knowing when and where collaborations are desirable and speculating on the types of technologies that may be needed for making prognoses is becoming ever more critical for imagining our ecologic and economic future. In Boston, for instance, while even the low-emission scenario is expected to spike the frequency of climate-related disasters, the city's economic stability involves expanding and deepening the shipping channels, thus reinforcing existing patterns of environmental damage (Massachusetts Executive Office of Energy and Environmental Affairs, 2011). Considering that 95% of United States (US) foreign trade relies on the maritime transportation system, there is no shortage of examples of the environment/economy paradox faced in coastal cities such as Boston (US Department of Transportation Maritime Administration, 2007). Clearly, resolving this—and the other vast arrays of human altered ecologies—requires us to think broadly, innovatively, and in terms of diversely different timescales.

Working under the premise set forth by Simon Levin (2000) that "the biosphere is a self-organizing system in which global patterns emerge from evolutionary innovations that arise and spread locally" (p. 17), there is an urgency to develop technologies that enable environmental practitioners to understand and anticipate relationships between ecologic and economic patterns. Practically, this inquiry should engage technology in many ways, and on many scales, transforming tech into a sticky coagulant that binds words and, subsequently, ideas. In this way, a transdisciplinary lens becomes a precursor for innovative technologies that enable us to read and write patterns aptly across local and global scales.

Viewing the conflict of interest between dredging and environmental damage through a transdisciplinary lens is particularly interesting because dredging produces millions of cubic yards of sediment by-product that could be used to fortify the urban environment against sea-level rise. To begin, we know that the mechanical transposition of dredged sediment alters hydrodynamics. An improved understanding of this relationship might enable us to design a digital model for measuring and visualizing the spatiotemporal effects of sediment being moved. It is easy to imagine that this digital model could also provide insight into the residence time of the harbor's water, which might enable us to hypothesize many other things, including long-term effects on biological systems. Going even further, it may even enable us to design an ecosystem that supports biological diversity. In order to use sediment to create a buffer from storms, a digital model for better understanding characteristic vulnerabilities could be developed to inform the ideal placement of sediment. Finally, combined with advanced satellite systems, we could monitor the hydrodynamics of the harbor, bay, gulf, and ocean in real time, and project changes and understand the large-scale impact of the overall design. Visualizing such macroscale patterns might enable us to design with slowing oceanic currents or increasing precipitation patterns in mind.

In response to the need for collective action, intellectual cross-pollination and collaboration have questioned the rigidity of disciplinary boundaries. A hybrid knowledge base is emerging—one that establishes a platform for rethinking relationships among the anthropologic, biologic, and geologic; expands and contracts ways of seeing emergent industries; extends our capacity to anticipate change; creates a soft landing; and fundamentally increases our chances for imagining a coevolutionary process that balances the human condition with the evolutionary timescale of the biosphere.

References

Intergovernmental Panel on Climate Change (IPCC). 2012: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change*, C.B. Field, V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley, eds. Cambridge University Press, Cambridge, 582 pp. Available at http://ipcc-wg2.gov/SREX/

Kates, R., W. Travis, and T. Wilbanks. 2012. Transformational Adaptation When

doi:10.1017/S146604661300063X

Incremental Adaptations to Climate Change Are Insufficient. *Proceedings of the National Academy of Sciences, USA*, 109(19):7156–7161. Available at http://www.pnas.org/content/109/19/7156.full

Levin, S. 2000. *Fragile Dominion: Complexity and the Commons*. Basic Books, Cambridge, MA, 264 pp.

Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA). 2011, September. *Massachusetts Climate Change Adaptation Report*. EOEEA, Boston, 121 pp. Available at http://www.mass.gov/eea/docs/eea/energy/cca/eea-climate-adaptation-report.pdf

US Department of Transportation (US DOT) and Maritime Administration (MARAD). 2007, November. *The Maritime Administration and the U.S. Marine Transportation System: A Vision for the 21st Century*. US DOT and MARAD, Washington, DC, 48 pp. Available at http://www.marad.dot.gov/documents/Vision_of_the_21st_Century_10-29.pdf

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