

*Climate Change Adaptation and the
Law of the Horse*

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Note to Searle Roundtable participants: What follows is our very preliminary cut at a “big picture” examination of how law might organize for climate change adaptation. We seek your input on (a) whether we have framed an important question and done so clearly, and (b) if so, whether the proposed method for working through the topic flows, makes sense, etc. All comments, positive and, even more so, critical, are welcome. Thanks, J.B. and Jim.

PRÉCIS

CLIMATE CHANGE ADAPTATION AND THE LAW OF THE HORSE

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A few years ago, at a conference on the ‘Law of Cyberspace’ held at the University of Chicago, Judge Frank Easterbrook told the assembled listeners, a room packed with ‘cyberlaw’ devotees (and worse), that there was no more a ‘law of cyberspace’ than there was a ‘Law of the Horse’; that the effort to speak as if there were such a law would just muddle rather than clarify; and that legal academics (‘dilettantes’) should just stand aside as judges and lawyers and technologists worked through the quotidian problems that this souped-up telephone would present. ‘Go home,’ in effect, was Judge Easterbrook’s welcome.¹

INTRODUCTION

The arrival of climate change adaptation (CCA)² as a substantial policy concern at local, state, national, regional, and global scales has its roots in the growing realization that, barring developments in politics and technology of miraculous dimension, climate change appears to be a part of the future for present generations and many to follow.³ It will play out over the global

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¹ Lawrence Lessig, *The Law of the Horse: What Cyberlaw Might Teach*, 113 HARV. L. REV. 501, 501 (1999); see also Frank H. Easterbrook, *Cyberspace and the Law of the Horse*, 1996 U. CHI. LEGAL F. 207 (written version of the speech quoted in the text). the [law](#) of the [horse](#) -- an unnecessary effort to bring together unrelated and duly self-contained bodies of law. See Karl N. Llewellyn, *Across Sales on Horseback*, 52 HARV. L. REV. 725, 729 (1939)

² Climate change adaptation “refers to changes made to better respond to present or future climatic and other environmental conditions, thereby reducing harm or taking advantage of opportunity. Effective mitigation measures reduce the need for adaptation.” U.S. GLOBAL CHANGE RESEARCH PROGRAM, GLOBAL CLIMATE CHANGE IMPACTS IN THE UNITED STATES 11 (2009), available at <http://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf>; see also INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY app. at 869 (M.L. Perry et al. eds., 2007) (“Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.”), available at <http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-app.pdf>.

³ See INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, SUMMARY FOR POLICYMAKERS, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY, CONTRIBUTION OF WORKING GROUP II TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 19 (2007), available at <http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-spm.pdf> (“Past emissions are estimated to involve some unavoidable warming . . . even if atmospheric greenhouse gas concentrations remain at 2000 levels”); V. Ramanathan & Y. Feng, *On Avoiding Dangerous Anthropogenic Interference with the Climate System: Formidable Challenges Ahead*, 105 PROCEEDINGS OF THE NAT’L ACADEMY OF SCIENCES 14251 (2008) (estimating committed

landscape in ways policy makers are starting to anticipate and in some ways they have yet to imagine.⁴ Humans will have to adapt to changing conditions as sea level, surface temperature, rainfall, snowmelt, ecological assemblies, and a myriad of other environmental conditions change, some of which will come on gradually and some in more abrupt fashion.⁵ Some changes will be for the better for some people in some places and for the worse for other people in other places.⁶ There being no analog from humanity's climate past from which to base what to do about humanity's climate future,⁷ managing and responding to these changes will be costly and difficult,⁸ and potentially serious mistakes will be made if robust CCA policy institutions are not in place.

warming of 2.4°C even if greenhouse gas concentrations are held to 2005 levels); Susan Solomon et al., *Irreversible Climate Change Due to Carbon Dioxide Emissions*, 106 PROC. OF THE NAT'L ACAD. OF SCI. 1704 (2009) (estimating a 1000-year committed warming effect).

⁴ For general summaries of the legal and policy issues likely to come with climate change, including reviews and syntheses of science and law literature on the topic, see Alejandro Camacho, *Adapting Governance to Climate Change: Managing Uncertainty through a Learning Infrastructure*, 59 EMORY L.J. 1 (2009), Robin Kundis Craig, "Stationarity is Dead"—*Long Live Transformation: Five Principles for Climate Change Adaptation Law*, 34 HARV. ENVTL. L. REV. 9 (2010); Holly Doremus, *Adapting to Climate Change Through Law that Bends Without Breaking*, 2 SAN DIEGO J. OF CLIMATE & ENERGY L. 45 (2010); Robert L. Glicksman, *Ecosystem Resilience to Disruptions Linked to Global Climate Change: An Adaptive Approach to Federal Land Management*, 87 KAN. L. REV. 833 (2009); J.B. Ruhl, *Climate Change Adaptation and the Structural Transformation of Environmental Law*, 40 ENVTL. L. 363, 365-71 (2010).

⁵ For overviews of the likely global and domestic impacts, see generally INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 2, *passim*; U.S. GLOBAL CHANGE RESEARCH PROGRAM, *supra* note 2, *passim*.

⁶ Climate change is not all about harms—there will be benefits in many forms for many regions of human populations and for many species. Agriculture in the United States, for example, may find benefits from warming temperatures, increased precipitation, and higher carbon dioxide levels. See Oliver Deschenes & Michael Greenstone, *The Economic Impacts of Climate Change: Evidence from Agricultural output and Random Fluctuations in Weather*, 97 AM. ECON. REV. 354 (2007). Of particular relief to many is that "the production of high-quality wine grapes is expected to benefit from a warmer climate because of a longer growing season and more favorable growing conditions in the short-term." See CAL. NAT. RESOURCES AGENCY, CALIFORNIA CLIMATE ADAPTATION STRATEGY DISCUSSION DRAFT 92 (2009), available at <http://www.climatechange.ca.gov/adaptation/index.html>.

⁷ Ecologists now warn of the no-analog future—ecological variability unprecedented in the history of ecology, riddled with nonlinear feedback and feed-forward loops, previously unknown emergent properties, and new thresholds of irreversible change. Matthew C. Fitzpatrick & William W. Hargrove, *The Projection of Species Distribution Models and the Problem of Non-Analog Climate*, 18 BIODIVERSITY & CONSERVATION 2255, 2255 (2009) ("By 2100, a quarter or more of the Earth's land surface may experience climatic conditions that have no modern analog"); Douglas Fox, *Back to the No-Analog Future?*, 316 SCIENCE 823, 823 (2007) ("[I]f the climate changes over the next 100 years as current models predict, surviving species throughout much of Earth's land area . . . are likely to be reshuffled into novel ecosystems unknown today."); Douglas Fox, *When Worlds Collide*, CONSERVATION, Jan.–Mar. 2007, at 28 (arguing that it is likely that the world will enter into a no-analog future within 100–200 years).

⁸ The International Institute for Environment and Development (IIED) in 2009 released a review and assessment of global climate change adaptation cost estimates, which not surprisingly are expected to differ from sector to sector and from region to region and to vary widely based on assumptions about timing, intensity, and technique of mitigation and adaptation strategies. See MARTIN PERRY, ET AL., ASSESSING THE COSTS OF ADAPTATION TO CLIMATE CHANGE: A REVIEW OF THE UNFCCC AND OTHER RECENT ESTIMATES (2009), available at <http://www.iied.org/climate-change/key-issues/economics-and-equity-adaptation/costs-adapting-climate-change-significantly-under-estimated>. The report concludes that prior estimates of \$49-171 billion global investment per year through 2030 for necessary adaptation initiatives underestimates likely funding needs by a factor of 2 to 3. See *id.* at 8-14. In another recent study, the World Bank estimates that developing nations face an adaptation price tag of \$75-100 billion annually through 2050. See WORLD BANK, THE COSTS TO DEVELOPING COUNTRIES OF ADAPTING TO CLIMATE CHANGE: NEW METHODS AND ESTIMATES (2009), available at

Given the daunting policy challenges of this no-analog future, policy makers are increasingly concerned about the ‘adaptation deficit’ in climate change policy that has built over time as focused attention on reducing greenhouse gas emissions has crowded out progress on policy for managing the impacts of climate change.⁹ It stands to reason that law will have much work to do in closing that policy gap as CCA presents new kinds of questions and conflicts for public and private legal institutions. But so what? In other words, will any of the demands of CCA, as substantial as they may be for society, technology, governance, and the economy, require the formulation of a ‘law of climate change adaptation,’ or will it turn out that there is no more need for a distinct law of climate change adaptation than there is for a ‘Law of the Horse’?

It may very well be, as Judge Easterbrook suggested about the ‘law of cyberspace,’ that judges and lawyers will simply employ existing doctrines, tools, and methods of law across a multitude of fields, albeit in new and different combinations and applications, to work through the quotidian problems that our souped-up climate future will present. As Easterbrook described and rationalized this approach for cyberspace law:

Error in legislation is common, and never more so than when the technology is galloping forward. Let us not struggle to match an imperfect legal system to an evolving world that we understand poorly. Let us instead do what is essential to permit the participants in this evolving world to make their own decisions. That means three things: make rules clear; create property rights where now there are none; and facilitate the formation of bargaining institutions. Then let the world of cyberspace evolve as it will, and enjoy the benefits.¹⁰

Should we chart such a course for CCA and the law? Surely the legal system is imperfect, and climate change, galloping forward as it seems inevitably destined to do, poses an evolving world that we understand poorly. But if climate change forces CCA into prominence as a foremost policy concern,¹¹ is it truly wise to let the law of CCA evolve as it will rather than design a legal field around CCA specifically? Professor Todd Aagaard has written that the proper way to frame this kind of question is to examine the commonalities that bind the relevant set of legal questions together:

A field of law must exhibit some degree of commonality, a characteristic or set of characteristics shared in common by the situations that arise within the area of law that the field encompasses. Commonalities establish patterns that cohere the field....Only when the common characteristics are legally relevant do the materials they encompass appear as an identifiable corpus. Otherwise, an area of law appears to be merely an amorphous amalgamation of portions of other, existing fields. An area of law unified only by factual commonality—that is, a common factual characteristic or characteristics that make no difference to the application of the law—is, like the Law of the Horse, a joke rather than a legitimate field of legal study

<http://beta.worldbank.org/climatechange/content/economics-adaptation-climate-change-study-homepage>. The European Environment Agency has also provided a useful report on the complexity of estimating adaptation costs. See EUROPEAN ENV'T AGENCY, CLIMATE CHANGE: THE COST OF INACTION AND THE COST OF ADAPTATION (2007) (reviewing the main methodological issues).

⁹ See Ruhl, *supra* note 4, at 365-72 (2010) (recounting the history of policy attention to mitigation at the expense of attention to adaptation).

¹⁰ Easterbrook, *supra* note 1, at 215-16.

¹¹ See Daniel Farber, *Climate Adaptation and Federalism: Mapping the Issues*, 1 SAN DIEGO J. CLIMATE & ENERGY L. 259, ___ (2009) (“If society is faced with massive climate impacts...adaptation will become one of society’s highest priorities.”).

because the various laws that govern activities related to horses have nothing legally important in common. Indeed, the common element of the horse is legally irrelevant.¹²

So which is it to be for CCA and law—coherent legally relevant commonalities that bind into a field of law, or amorphous amalgamation of portions of other fields that assemble into nothing more than a Law of the Horse? Although there has been growing attention to CCA in legal literature,¹³ scholars have skipped over this question for CCA and the law. Simply put, in 50 or 100 years, will lawyers think of CCA as sitting at the center of a distinctly and coherently defined body of law and practice devoted to its special set of common problems, or will the concerns of CCA have been disaggregated and assigned to business, tort, environmental, securities, constitutional, and other fields of law? Just as cyberspace lawyers examined their own “field” with this sort of probing in the late 1990s, this is an important question to ask now for CCA, at the dawn of its policy formulation, because how law and CCA are thought of today will influence the design and implementation of CCA policy well into the future.

Consider in this sense how environmental law developed as a discrete ‘law of the environment’ as regulatory institutions emerged from the field’s roots in common law nuisance.¹⁴ Few would suggest today that there is no more a distinct ‘law of the environment’ than there is a ‘Law of the Horse.’ Quite the contrary, environmental law is regarded as one of the most complex and specialized fields of practice, with many of its own problems, trade-offs, doctrines, tools, and methods.¹⁵ Lawyers identify themselves as ‘environmental lawyers,’ and those who do not are wary of entering the maze. But this was no accident. Policy makers, lawyers, and legal scholars of the 1970s *conceived* of the law of the environment as something more than just a bunch of unrelated legal challenges that happened to intersect at the common factual ground of human impact on nature.¹⁶ The law of the environment was to be no ‘Law of

¹² Todd S. Aagaard *Environmental Law as a Legal Field: An Inquiry In Legal Taxonomy*, 95 CORNELL L. REV. 221, 242 (2010). Aagaard argues that “a legal field is a group of situations unified by a pattern or set of patterns that is both common and distinctive to the field. We can conceptualize a legal field as the interaction of four underlying constitutive dimensions of the field: (1) a factual context that gives rise to (2) certain policy trade-offs, which are in turn resolved by (3) the application of values and interests to produce (4) legal doctrine. An organizational framework for a field identifies the field’s common and distinctive patterns, which may arise in any of these underlying constitutive dimensions.” *Id.* at 221.

¹³ For a survey of the legal literature on climate change adaptation, see Ruhl, *supra* note 4, at 391-432.

¹⁴ See RICHARD LAZARUS, *THE MAKING OF ENVIRONMENTAL LAW* ___-__ (___)

¹⁵ Aagaard, *supra* note 12, at 251-82.

¹⁶ In his sweeping assessment of the origins and coherence of environmental law as a field, Professor A. Dan Tarlock recounts the audacity of the early visionaries of environmental law:

What we now call environmental law is very much embedded in the legal landscape. The area has developed in an astonishingly short period of time as a result of the rise of environmentalism as a political force in the late 1960s. The field was created virtually out of whole cloth by a receptive Judiciary and Congress. In the 1960s, environmental protection was a marginal political idea. Lawyers followed the great common law tradition left open to socially marginal groups and pursued a “rule of law litigation” strategy. To discipline public agencies through what we now call “public interest” litigation, they had to convince courts that something called environmental law existed, when in fact it did not. Creative lawyers used a few meager precedents and vague, seldom applied statutes to convince courts that public agencies had a duty to consider “environmental” interests and to take steps to avoid or mitigate adverse “environmental” impacts. Lawyers skillfully created the fiction that the recognition of new environmental protection duties *merely* required courts to perform their traditional and constitutionally legitimate function of applying and enforcing, rather than creating, pre-existing rules.

A. Dan Tarlock, *Is there a there there in Environmental Law?*, 19 J. LAND USE & ENVTL. L. 213, 215-16 (2004).

the Horse.’ Rather, its early designers concertedly forged a distinct regime of *environmental law*, and what is recognized today as that field of law would not have materialized as such if they had instead listed all the issues of the environment and divvied them up to existing agencies and fields of practice and policy. Granted, it is not a fully formed, coherent field of law in all respects,¹⁷ but no lawyer mistakes it for just a “Law of the Horse.” By contrast, policy makers, lawyers, and legal scholars now agree that there will need to be law for CCA, but there has been little attention given to the threshold question of whether it should be formed as a coalesced ‘law of climate change adaptation’ or as an amalgamated ‘Law of the Horse.’

This Article is the first to examine that question front and center. Using a scenario based approach for testing the distinctness and coherence of CCA as a legal design issue, we ask which fork of the road policy makers should take as they begin to formulate law for CCA. Part I of the Article opens that inquiry by exploring the policy challenges of CCA in order to tease out what will be relevant legal questions and disputes. We first outline in law-relevant terms three scenarios of CCA that have been developed in climate change policy literature (1) adapting reactively to gradual incremental climate change (the Accretion scenario); (2) adapting proactively in anticipation of significant cumulative effects of climate change (the Avulsion scenario); and (3) adapting to abrupt and severe climate change impacts (the Apocalypse scenario). We then match these scenarios with a set of legal case studies built around coastal development, water scarcity, and endangered species. For each case study, we envision the legal challenges likely to arise in each of the three scenarios of CCA policy.

Part II uses the case studies and scenarios to test the capacity of existing litigation, regulation, and market institutions to handle the legal challenges of CCA. We explore the structure and history of the law of coastal development, water management, and endangered species to ask the ‘Law of the Horse’ question for each—is there anything to suggest that these respective bodies of legal practice, using and adapting their tested institutions of litigation, regulation, and markets, are simply not up to the task of managing CCA in its different policy scenarios? To put it another way, is there anything about the CCA policy scenarios that points to the law of coastal development, water management, and endangered species having to yield to the formation of a ‘law of climate change adaptation’ as a distinct legal field?

Asked either way, we find [**working hypothesis:**] little reason to expect the necessary development of a distinct ‘law of climate change adaptation’ outside of the possibility that apocalyptically abrupt and severe climate change impacts overwhelms existing social and legal capacities for emergency response. This is not to say that the law of coastal development, water management, or endangered species will remain static under the Accretion and Avulsion scenarios. Quite the contrary, they and other fields of environmental and land use practice will need to adapt to the demands of CCA over time, and they will be transformed as they adapt. In 50 years hence they may bear little resemblance to their present forms, but neither do they bear

¹⁷ Indeed, Tarlock has suggested that what makes environmental law so fresh and distinct may also threaten its long-term viability:

We often lose sight of three related but disturbing features of environmental law that make its future survival problematic. First, it is, in the span of legal time, an infant area of the law that may not necessarily live to maturity. Second, its survival is more problematic than other areas of law because it is not an organic mutation of the common law, or more generally, the western legal tradition. Third, as a result of the first two, environmental law remains largely unintegrated into our legal system; thus, it is vulnerable to marginalization as support for environmentalism ebbs and flows.

Tarlock, *supra* note 16, at 217.

close resemblance to their forms of 50 years ago. Their capacity to continue adapting will be the key to their resilience as fields of practice and policy in the face of climate change.]

In Part III we step back from what is learned from this exercise to suggest general approaches for law in response to the demands of CCA. Should policy makers attempt to build a special law for CCA, or should they focus on building resilience and adaptive capacity in the institutions of existing fields of law that may have something to say about CCA? Although we cannot discount the possibility of apocalyptic climate change, neither can we, nor we daresay anyone else, sketch out what the law of the apocalypse should be. By contrast, it is far more plausible to outline ways of adapting the litigation, regulatory, and market institutions of existing fields of public and private law for managing the Accretion and Avulsion scenarios of climate change. Just as there is no ‘Law of the Horse,’ but rather a collection of practice fields that intersect at the horse—veterinary law, racing law, agricultural law, consumer law, and so on¹⁸—so too will law best manage climate change adaptation through a spectrum of independent but intersecting fields.

The problem, however, is that work on this ‘Law of the Horse’ approach for CCA should have begun ten or twenty years ago. The recent trend toward use of regulatory markets in environmental law and elsewhere provides a promising foundation for preparing for CCA, but very little headway has been made on incorporating more general adaptive management techniques into regulatory law. Closing the adaptation deficit will not require that we begin designing a new ‘law of climate change adaptation’ from the ground up, but it will require that we begin work on readying the ‘Law of the Horse’ across the spectrum of legal practice and policy to enhance resilient and adaptive legal capacities.

OUTLINE

I. Moving from Adaptation Policy Scenarios to Legal Design Challenges

A. Policy Scenarios from Accretion to Apocalypse

This section sets out CCA policy scenarios (below are place-holders; we will use IPCC models and perhaps work by Ted Parson and others to show how poli sci literature is treating these)

There is strong scientific consensus that climate change means change, so we know that one, or some variant of these, will happen

- The Accretion Scenario – Reactive policies in response to long slow gradual change
 - More of the same but worse
 - All we do is slowly adapt over the long term
- The Avulsion Scenario – Proactive policies for a brave new world of technological triumph

¹⁸ See Easterbrook, *supra* note 1, at 207 (“Lots of cases deal with sales of horses; others deal with people kicked by horses; still more deal with the licensing and racing of horses, or with the care veterinarians give to horses, or with prizes at horse shows.”).

- Significant and relatively rapid change
 - Mass species migrations
 - Mass ecological transition
 - Sea level rise on a significant scale more big storms
 - Water scarcity acts not just as a finite limit on growth, but as a cause for severe transformation of land use in some parts of the country
 -
- But technology and other human and natural capital resources allow resilient adaptation, albeit at great social and economic cost
- The Armageddon Scenario -- Catastrophic change
 - New York really is underwater
 - Adaption capacity is swamped in many respects

B. Legal Design Case Studies

So, what kinds of legal issues are likely to emerge in each of these scenarios? We use three case study topics to explore this:

- Coastal development
- Water scarcity
- Endangered species

II. Evaluating Institutional Capacities for CCA

A. Creation versus Adaptation

Sometimes new fields of law emerge; sometimes existing fields adapt

Environmental law is a useful case study for us b/c it has done both in recent history

- Statutory epic of 1970s moved envtl law from a subset of common law nuisance to a distinct and robust body of law
- It has evolved since, in some ways well beyond its original form
 - Consider Envtl Law started out in the 70s mostly as command & control regulation
 - Market-based instruments crept in gradually
 - Now markets are almost the default for
 - designing new regulatory programs (cap-and trade; PES)
 - and for repairing and updating old ones (SO₂; WMB; ESA, Clean Skies)

So, what should be the default for the law of climate change adaptation (CCA)?

- Create something new from scratch?
- Or adapt from existing fields of practice and policy?

We have the luxury and burden of asking that question, as CCA presents a fresh opportunity to design a substantial new body of environmental law to take on a fundamentally different set of challenges

- Draw on the “stationarity is dead” theme
 - The range of variability will broaden
 - The frequency of variations will change
 - Plus some new phenomena never before experienced will occur
- Don’t know what the glidepath of CC is
 - Whatever it is, its effects will be uneven across the landscape and thus CCA is not a uniform policy
 - Not entirely clear what all the policy goals and trade-offs will be
- This makes it difficult to discuss law for adaptation
 - How do you design law for the unknown?
- But we can envision a range of scenarios, some more probable than others
 - And then apply what we know about instrument choice and legal regimes to assess whether legal change will be appropriate and, if so, what kind of change

Our central question is whether, given the experience of the last 40 years of environmental law, CCA law is something new or just more of the same.

- Will CCA require a new body of law at its inception with past 40 years of experience under our belts to address challenges we have not faced before?
 - If so, how might we envision CCA law will evolve?
- Or will CCA and its changes be entirely within the grasp of our current legal regimes, requiring little more than incremental changes to respond to CC as it unfolds?
 - If so, what assembly of known legal instruments will be most effective?

B. Case Study Evaluations

We next track the three case studies (each of which incorporates the three scenarios) through the institutional mix environmental law went through: litigation (common law phase), regulation, and markets

Questions to ask:

- What would we expect the best legal regime for addressing these problems in these scenarios?
- Will the policy instrument design change depending on the scenario?
 - e.g., Does a Katrina every ten years require changing the underlying law?
- May depend on what we are trying to achieve
 - e.g., Reduce vulnerability, enhancing resilience, etc.

Broader issues to address:

- Maybe we should be skeptical about whether there really is a sea change for law resulting from adaptation worlds
 - Go slow and steady may be most appropriate
- Default rule thus might be to wait and respond to changing facts, introducing markets or regulation as appropriate

- But there is reason to think that for some of the issues in some of these scenarios, the best approach is to be proactive and start using these particular instruments right now
 - In which circumstances could you be proactive?
 - What would be the best way to start a pro-active adaptation regime?

IV. Envisioning the ‘Law of the Horse’ for Climate Change Adaptation

Some preliminary thoughts:

- Markets may work very well in several situations, all of which share a theme of having to deal with long time frames and where proactive regulation would be extremely unpopular.
 - Where we want to secure future habitat, such as where we think species will relocate or wetlands will emerge, to make sure the area is available. Very hard to regulate for that, so incentives will help
 - Where we want to prevent further development in areas where carrying capacity is likely to diminish (heat, water, inundation). Zoning could get us partially there, but likely will lean heavily on TDRs etc.
 - To guide human migration
 - To favor particular adaptation responses (such as to defend) where others would be very costly, uncertain, etc
- Lack of progress on adaptive management is not promising