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LEXICON AS THEORY:
SOME DEFINITIONS AT THE EDGE OF SAN FRANCISCO BAY

Jane Wolff

Most people love San Francisco Bay better than they understand it. The landscape's power as scenery has obscured its ecological complexity, its natural and cultural dynamics, and its ongoing evolution as a metropolitan centerpiece. Not everyone knows that the bay and its edges have been shaped by a long list of unromantic agendas—military strategy, resource extraction, commerce, real estate speculation, industry, and politics—in constant dialogue with living systems and environmental forces at scales from the microscopic to the regional, and beyond. Its landscapes are intensively used, and pressure for change from urbanization, economic hardship, environmental politics, public regulation, and sea level rise is only growing.

San Francisco Bay demonstrates a problem ubiquitous in contemporary landscapes: it defies the vocabulary we've inherited for describing the world around us. In the age of the Anthropocene,¹ human intentions and environmental processes are present simultaneously almost everywhere, from the densest cities to the most remote parts of the globe. These forces are always acting on each other, and the reciprocal, reiterative, cumulative exchanges between and among them produce circumstances where it becomes impossible to draw a line between nature and culture, between economy and ecology, and sometimes even between categories that seem as clear as land and water. To call such divides a product of our collective imagination is not to deny that there are forces properly categorized as human and forces over which people have no control. It's to say that the places we know today are ecological hybrids. They're hard to describe, and because language is intimately tied to perception,² their nuances are hidden in plain sight.

1 To make the point that human activities have profoundly transformed all of Earth's ecological systems, atmospheric chemist Paul J. Crutzen defined the Anthropocene as a new geological epoch "supplementing the Holocene—the warm period of the past 10–12 millennia. The Anthropocene could be said to have started in the latter part of the eighteenth century when analyses of air trapped in polar ice showed the beginning of growing global concentrations of carbon dioxide and methane. This date also happens to coincide with James Watt's design of the steam engine in 1784."

He introduced the term in his paper "Geology of Mankind," in *Nature*, no. 415, iss. 23 (2002).

2 Linguists Edward Sapir and Benjamin Whorf argued that language simultaneously shapes and mirrors people's perceptions of the world. Whorf wrote, "The categories and types that we isolate from the world of phenomena we do not find there because they stare every observer in the face. On the contrary the world is presented in a kaleidoscopic flux of impressions which have to be organized in our minds. This means, largely, by the linguistic system in our minds."

Learning to read hybrid landscapes is an essential part of thinking ahead, not only for designers who propose the physical transformation of particular pieces of ground but also for citizens whose aggregated political and economic choices affect the future of the environment. Television's great murder investigator Columbo offers useful lessons in the kind of detective work necessary to decode a complicated place.³ Episode after episode, he begins with a body. To unravel the story behind the scene, he looks for clues that might point to actors, motives, and chains of events; he situates physical evidence in the context of relationships, desires, and logistical possibilities; and finally he constructs an account of what has happened, and how, and why. Unraveling the mysteries of the Anthropocene isn't so different. Like Columbo, a landscape detective has to start with what's in front of her; to locate what she sees in the web of forces at play beneath the surface; and to thread her observations and inferences into a story about the origins of what she sees. Then, and only then, can she ask herself what the landscape means.

Our landscape detective's perceptions, observations, descriptions, and explanations will all be colored and shaped by her vocabulary, and so her investigative work will require her to examine and question the language she uses to read and represent the landscape. Her second role model might be Raymond Williams, the cultural critic whose *Keywords* asks readers to consider the ways in which specific situations shape and reshape the meanings of everyday words.⁴ If she happens to be a designer as well as a detective, this enquiry into the verbal and visual terms she uses to document what she sees will be much more than an academic exercise. Definitions are the first step toward new plans. Landscapes exist not only as physical realities but also as ideas, and the words and images we use to describe the places we know now have everything to do with the way we imagine their futures. In an era of high environmental stakes, substantial uncertainty, and increasing pressure for change, neither landscapes nor language can be taken for granted.

Paul Kay and Willet Kempton, "What is the Sapir-Whorf Hypothesis?" in *American Anthropologist*, vol. 86, iss. 01 (1984), 66, accessed on Feb. 10, 2017, doi: 10.1525/aa.1984.86.1.02a00050.

3 Richard Levinson and William Link, *Columbo*,

created by National Broadcasting Company (1968–1978), American Broadcasting Company (1989–2003).

4 Raymond Williams, *Keywords* (London: Fontana, 1976).

Why a Lexicon?

Language and perception color each other: it's hard to recognize what we can't name, and conversely, we tend to find names for the things we need to know. If vocabulary shapes the way we know the world, then the compilation of a landscape lexicon might be a first step toward coming to terms with hybrid ecologies. A means to apprehend and reconsider places that are too often taken for granted, a landscape lexicon could offer verbal and visual language in the service of related causes: perception, the awareness of what's around us; observation, the act of careful watching; understanding, the recognition of significance; and speculation, the contemplation of possibility. It could serve simultaneously as a technical document that examines how things work, a historical document that looks at how the landscape evolved (and is still evolving), a cultural document that brings values to light, and a political document that can be used to frame discussion about how and why the landscape might respond to the pressures that are acting on it today. If it were able to address sophisticated content in conversational terms, it could speak to a range of audiences, from experts to people new to its subject matter. That range of readers would make the lexicon into a political tool; the shared language it puts forward could set the terms for thoughtful public conversation about change.⁵

A Test Case: Land and Water

Theory requires testing, and San Francisco Bay makes a useful case study for a landscape lexicon. Seven generations of urbanization have produced what looks like stasis, but a careful look at the shoreline reveals the dynamic environmental processes at work below the surface of the city's consciousness. Deceptively simple words like land and water describe a considerable range of circumstances that are neither separate nor static. Exploring their precise and varied meanings is a way to study the landscape's history and to reimagine its possibilities.

⁵ This set of propositions and the examples that follow it belong to an ongoing research project that includes the exhibit "Bay Lexicon," completed in 2013 for the Bay Observatory gallery at the Ex-

ploratorium in San Francisco, and a book manuscript of the same name, currently in process.

⁶ This definition is distilled from several sources,

For instance, reference dictionaries agree that land means solid ground,⁶ something fixed, stable, consistent, inhabitable, and, at least in the United States, ownable. A close look at San Francisco's edge undermines that certainty. The land along the shore varies in origin, in character, in use, in meaning, and in possibility. Some of it would have shown as *terra firma* on eighteenth- and early nineteenth-century sailors' charts. Much of it is a later construction, part and parcel of the building of the city in the decades after 1848. Collective memories are strangely short: It's easy to forget that the conditions we find underfoot haven't always existed, and it's hard to imagine that they won't persist. Even so, the land along the shore is dynamic. Its status remains open to change—and to changes in interpretation.

The *terra firma* on those sailors' charts comprised the low mountains of the Coast Ranges. A mix of molten lava and sedimentary rock, the hills of the San Francisco Peninsula formed when the movement of tectonic plates pushed the sea floor up into crumpled folds. Three or four million years later, the hills served as strategic points for the Spanish colonizers and American fortune-seekers who aimed to control the territory inside the Golden Gate. Fort Point, the headland at the gate's south side, offered three armies (the Spanish, the Mexican, and the American), the ability to watch over the strait (and to fire on it) and the means to keep enemies and rivals out of the bay. Control of the headland meant control of the harbor, the city that grew up beside it, the rivers that led inland, and the resources that lay beyond.

To the east of Fort Point, at the corner of the San Francisco Peninsula, Telegraph Hill's fixity, height, and unmistakable form made it a **landmark**. Named—that is, defined as—Loma Alta by the Spanish and Signal Hill on the US Navy's early charts of regional waters, it offered naval vessels and merchant ships a possibility as important to colonization as defense. It helped voyagers to find their way through unknown territory. Prominent enough to be seen from the bay, the harbor, and the city, its summit became the site of a series of beacons:

including the *Oxford English Dictionary*, the *American Heritage Dictionary of the English Language* and Google definitions, which are based on the *Oxford Pocket*

English Dictionary.

7 This definition is distilled from several sources,

a semaphore telegraph station, a time ball, a welcome sign for Theodore Roosevelt's Great White Fleet, and Coit Tower.

As San Francisco grew, *terra firma* became raw material for **new land**. Most of the city's current edge with the bay is an invention created between the middle of the nineteenth century and the first decades of the twentieth. Before the Gold Rush, some of it was marshland and the rest was shallow water. Then, driven by the demand for developable land, San Franciscans mined their hills for rubble to fill in the shore. Telegraph Hill, the harbor's first landmark, became a quarry, and its east side was broken up and reassembled as North Beach, the Produce District, the Embarcadero, and the Financial District. Constructed between San Francisco's inconveniently steep hills and water deep enough for ships to berth, the new land offered a level surface on which to build the city. But the processes of cut and fill had unexpected consequences. Blasting on Telegraph Hill caused landslides; the rock cracked; houses collapsed into fissures; and the eastern slope became an unstable cliff. And though the new land looks trustworthy enough, it lacks the structural integrity to withstand earthquakes. In the great shocks of 1906 and 1989, it shook like Jello. The warehouses and factories it had supported cracked and fell. Even so, a century after the filling of the shoreline began, the unabated demand for real estate led to the creation of another kind of new land: high-rise buildings that multiply the surface of the ground with every story. Height at the water's edge requires deep footings. At the Embarcadero Center, the foundations for towers of twenty, thirty and forty-five stories reach down sixteen stories through fill and mud to bedrock, and their bases have to act as shock absorbers if—when—the ground shakes.

The new land inherits its instability from the **tidelands** on which it was built. Large parts of what we know now as the shore of San Francisco Bay were marshes that flooded twice a day when the tides came in. Sometimes wet and sometimes dry, the tidelands were too ambiguous to be owned until an idea fundamental to American culture—the definition of land as property—changed their character and meaning. In 1850, federal legislation allowed the sale of swamp and overflowed lands on the condition that they were made dry. The tidelands became a commodity, and speculators made the marshes and shallows into ground high enough to be developed and sold.

Turning tidelands into new land required the construction of a **seawall**. Resting on rock that lay below the bay's mudflats, the stone and concrete wall followed the line of mean low tide. It was raised to a level above mean high tide, the water behind it was pumped away, and the space behind the wall was filled with rubble and debris. Building and backfilling the seawall was a monumental endeavor: it took fifty years before that regular, vertical line redefined the edge of the city. The scalloped, sloping coast disappeared but water from the bay still moves through the seawall and saturates the porous ground that San Franciscans built between open water and *terra firma*.

The seawall has uphill cousins, retaining walls that transformed San Francisco's steep slopes into **terraces**. Defining land as property instigated an enormous earthwork project: turning the Coast Range into real estate meant redistributing the ground into level building lots. Sometimes roads are terraced, too, split in half by walls along their center lines. In the most precipitous spots, streets turn into stairs, strings of terraces scaled to walking. But these claims to property are constantly contested by forces beyond people's control. Roots and water (and sometimes earthquakes) work against every retaining wall and terrace—and against the idea that land is ever truly fixed. Even the sturdiest structures crack, and these cracks spread over the whole of hilly San Francisco serve as wholesale reminders that permanence is a fiction.

Standard definitions of water are as uninflected as those of land: colorless, odorless, transparent, two parts hydrogen to one part oxygen, it's usually encountered as a liquid, falls as rain, and makes up rivers, lakes, and seas.⁷ San Francisco Bay asks for more nuanced descriptions. The water in the bay is not homogeneous physically or chemically; its boundaries are almost impossible to draw; it moves constantly. Despite its depiction as a flat, blue field on the map, water means much more than the absence of land. It connects faraway places to each other. It links the tiniest elements of the landscape to vast regions and powerful processes. It carries elements of the past forward into the present and the future. Its specific material properties change with location and context, just like those of land, and its varied characteristics and tendencies have shaped the city in different ways.

The chemistry of the water in San Francisco Bay varies over time and in space, and **salinity** is the measure of its saltiness. The bay is the last chamber of a great estuary⁸ where fresh water from rivers upstream meets salt water from the Pacific Ocean. But salt and fresh water don't quite mix: the fresh water is less dense, so it floats above a wedge of the sea. The salt wedge advances and retreats with the tide; it heads inland in the dry season and seaward with the rain. High tides spread it north and south from its route along the deep channel between the Golden Gate and the Carquinez Strait. In the southern part of the bay, where tides have less influence, the relationship between salt and fresh water varies locally depending on the rivers, creeks, and outlets that flow from the surrounding hills and nearby towns.

Carried by tides, currents and waves, by gravity and wind, water has the **energy** to take sand and sediment with it. That energy produces alongshore drift. Sediment is carried forward by a wave, for instance, and then drops because of gravity. As the process repeats, the sediment is carried along the coast. When it meets an obstacle—say, at Heron's Head, a jetty built to anchor an unrealized southern crossing of the bay—the water loses energy, and the sediment drops. In this case, the abandoned embankment held what fell; soil began to accumulate; plants and animals suited to the salinity of the water emerged; and a marsh formed. Water built a new coastline.

Water permeates land. It runs underground through **pores** in the soil and **pipes** below roads. When rain drips from the leaves of the trees into gaps in the soil, it moves slowly down and sideways into rivers and springs, or, taken up by the roots of a plant, it makes its way back into the air. But beneath buildings and streets it travels as fast as possible through the sequestered space of the sewer system. And though the streams that used to flow from the hills to the shore have been buried, they've left persistent traces in the patterns of the city. Sometimes easy paths for water turned into easy paths for traffic. The valley that carried Islais Creek from the top of Glen Canyon

including the *Oxford English Dictionary*, the *American Heritage Dictionary of the English Language* and Google definitions, which are based on the *Oxford Pocket English Dictionary*.

8 San Francisco Bay belongs to the San Francisco

Bay-Delta Estuary, the largest tidal estuary on the west coast of the Americas.

9 This beautiful but apocryphal story about the

to the coast became the route of Alemany Boulevard. The creek still flows through vaults and tunnels, out of sight and, except where roads turn into bridges, mostly out of mind.

The hills that surround San Francisco Bay define its first **watershed**. The harbor they made, just inland from the Pacific, was the first engine for growth in San Francisco. Now it is the center of a metropolis that jumps across the Coast Range into the Bay's second watershed, the Great Central Valley of California. San Francisco Bay is the only outlet to the sea for the twenty-six rivers that run into the valley from the Sierra Nevada Mountains. Those rivers are carrying the mountains to the bay, bit by bit. Fast-moving streams running down steep slopes have the energy to pick up bits of weathering rock. As the streams merge, they carry this load through the Great Valley, the California Delta, and the Carquinez Strait. Then they enter the Bay, they slow down, and their sediment falls to the bay floor. During the Gold Rush, miners blasted away the sides of mountains to get at ore buried in the Sierras. Tons of rock and gravel washed downstream; some of it even traveled past the Golden Gate. The rivers were choked, and the bottom of the bay changed forever.

The Bay's second watershed was redefined in the 1920s by engineers. Since then, an **aqueduct** has carried the Tuolumne River from behind a dam in the high Sierras through pipes that run straight to San Francisco. Every spigot in the city is connected to the mountains. The aqueduct is good and bad. It protects the city from local scarcity and provides fresh water uncontaminated by the farms of the Great Valley and the factories of the metropolis. But what comes out of the tap is used at the expense of the bay and the estuary. And before the aqueduct, that water belonged to the fish.

The fish living in San Francisco Bay—and the people **fishing** for them—inhabit both its watersheds: they're soaked in the detritus of mining. To separate gold and silver from ore and sediment, miners used mercury as a catalyst. Millions of pounds of mercury traveled with the outwash from the mountains of the Sierra Nevada. It settled on the bay floor, and now it travels through the food chain as a neurotoxin. There is enough mercury trapped in the bay's sediment to persist for ten thousand years. Metabolized by bacteria in the water, it becomes methyl mercury; excreted by the bacteria and eaten in

turn by plankton, small fish, big fish, and people who eat big fish, it becomes more concentrated at every step. Fishing does more than connect people to their suppers; it ties the traces of the past to the present and the future.

Vocabulary: A Manifesto

Long ago, the floor of San Francisco Bay was dry, and the rocky islands we know now belonged to the low mountains of the Coast Range. Then, ten thousand years ago, the last ice age ended. The glaciers melted. Sea level rose. The bay filled up like a bathtub, and rising water made land into islands.

The water is rising again, and once again it will redefine what we understand as land. High high tide already covers the lower steps of the seawall at Crissy Field, just a mile inland from the Golden Gate. It's a small matter now, but as sea level climbs, what will happen to the constructed land between the hills and the open water? As a society, we're in the early stages of a conversation about what that will mean and what it will require, and defining the language with which we have those conversations is a political problem. The Bay is the product of collective, incremental, often invisible decisions made by individuals, markets, and governments. It has plural constituencies whose interest in and understandings of the same environment vary widely. The future depends on the aggregation of many people's choices and on wide support for difficult policy changes. A clear, nuanced, shared vocabulary for public discussion is an urgent necessity.

Neither San Francisco's shoreline nor its dilemmas are unique: the bay belongs to a landscape type that occurs again and again in ports and coastal cities. Versions of its characteristics and dilemmas can be found from London and Rotterdam to New York, Boston, Toronto, Vancouver, and Houston. Different as they are, these waterfronts followed similar trajectories. They were constructed with earthworks that transformed the fluctuating edges of oceans, lakes, estuaries, or rivers into working harbors. Their harbors, built for sailboats, grew and changed with advances in navigation technology between the middle of the nineteenth century and the second part of the twentieth. The cities that grew up beside them became centers for financial, commercial, and

industrial enterprise that both supported and profited from port activity. In the last fifty years, industry has left for cheaper labor markets; shipping has moved from old ports to new facilities that can accommodate giant container vessels and the staging areas they require; and obsolete port lands have fallen out of use and into dereliction. Ironically, a renaissance has emerged from the realization that the shoreline is an amenity just as the threat of sea level rise is making itself felt. Since the turn of the twenty-first century, urban waterfronts across North America and Europe have been recast as pleasure grounds in economies that have shifted from labor to leisure. Built up and out from marshy ground along historical shorelines, these urban edges are all at the front line of flooding. Soon they will all need to be reimagined.

Vocabulary is a tool for perception; like the Inuit's mythical twenty-seven words for snow,⁹ it tells us what's happening now. It's a tool for physical transformation; it reveals the material properties of sites and shows where and how they might be altered. Most of all, it's a tool for conversation about a set of complicated dilemmas in which we're implicated both as designers and as citizens. If landscape architects go to work as public lexicographers—if we can develop the means to represent and share what we know about the tangled, hybrid conditions of the contemporary environment—we stand to gain the possibility of agency at scales beyond individual sites and immediate problems. Expanding our specific tasks from designing sites to designing conversations gives our discipline the chance to influence policies and practices that have traditionally been beyond its reach, and, even more important, the chance to help build a culture that speaks the language of its landscape.

Inuit emerged from Franz Boas's early twentieth-century study of the relationships between culture and language.

