

Writing Samples – Alyx Dellamonica

Includes:

- Aqanomics Web Site articles
- Inclusion & Diversity Statement, UCLA Extension
- Amazon write up of Rollercoaster Tycoon video game
- **SEO article** on JD Edwards Orchestrator
- Marketing SaaS blog entry
- Script for keynote speech/video: How we became LV426
- Writing Lecture: Diminishing Returns in Research

Aqanomics Thought Leadership articles & Pride Flipbook

Context As part of the GHD MarComms team, I wrote and edited thought leadership pieces for a major marketing campaign, Aqanomics. All four of the articles showcased on this site were drafted, edited, and project managed by me: <https://aqanomics.ghd.com/en/insights.html>. (one is included below.)

I also generated social media material, such as this flipbook for [World Pride Day](#).

New research reveals USD5.6 trillion water risk by 2050

Research exploring the economic consequences of water risk fueled by climate change through to 2050 predicts that droughts, floods and storms could wipe USD5.6 trillion USD from the GDP of key economies, with some more affected than others. Which places and industrial sectors face the most pain, and which are poised to adapt? More importantly, how can we build greater resilience to reduce the impacts of water risk to protect economies and the communities they support?

Projecting water risk

In 2021 droughts, floods and storms affected more than 100 million people globally, causing injury, loss of life and threatened livelihoods. As climate change intensifies, worsening storms are expected to cause increasing losses, estimated at USD1988bn by 2050, with floods and droughts adding USD1472bn and USD607bn additional risk respectively. Aqanomics uses a bespoke model to estimate future water impacts, applying it to eight countries and five critical sectors of the economy. This is the first time that water risk was calculated at a GDP and sector level. Aqanomics found that water risk is spread unevenly, depending on the state of an area's existing infrastructure, local geographic features, dominant industries, local prevention systems, and existing government policies towards mitigation.

The majority of countries examined in the study have large, technologically advanced economies, with resources that, if deployed swiftly, may reduce these projected costs. Knowing that risk is spread

unevenly within these regions may also imply that nations with smaller economies and fewer technology options will face a similar scale of risk, with greater challenges in achieving resilience.

The findings raise an urgent call for investment, innovation and cooperation across regional and national boundaries, presenting opportunities to transform both local and global water systems. This would reduce the economic consequences predicted by Aquanomics, protecting communities and people from ecological impacts and loss of livelihood.

Which places and sectors face the most risk?

In terms of water-related GDP losses between 2022 and 2050, it is estimated that the US will be hit hardest, with estimated losses of USD3719bn. As a percentage of GDP, Australia and the Philippines are also at high risk, with average annual economic declines of between 0.6% and 0.7%.

The UAE is expected to be less affected, with projected losses of USD27bn and a 0.1% average annual GDP loss to 2050 while the UK also faces a similarly small loss of 0.1%.

As for sectors, the Aquanomics research predicts the manufacturing and distribution sector will be most heavily affected by increasing water risk, facing total output losses of USD4211bn by 2050 due to restricted production processes, damaged assets and disrupted distribution. Energy and utilities are expected to be least affected, with total projected output losses of USD237bn.

Aquanomics' geographic risk profiles illustrate strengths and vulnerabilities in each country, helping identify where investment in targeted interventions can most effectively mitigate projected impacts.

China, for example, has made huge investments in water infrastructure. These may lessen the human costs of flood events, but the country's manufacturing and distribution sector could still lose nearly USD1.7tn to shortages and water-related disasters over the next 30 years. Losses could be further reduced by diverting recycled water into these sectors, or by relocating some industries away from flood risk.

Though the UK's projected financial losses due to water risk are lower, its long coastline and ageing infrastructure are vulnerable to floods that will cost USD153bn between 2022 and 2030 alone. Rehabilitating or replacing water infrastructure may require instituting water harvesting in communities to reduce pumping, or changing utilities' billing systems to accurately price non-essential uses of water. Increasingly, solutions will require cooperating with nature--in the Medmerry Managed Realignment scheme, for example, the government purchased land from people in endangered communities, relocating residents inland, creating nature reserves and allowing salt marshes to re-establish on the shorelines.

Even the UAE, which has highly advanced water infrastructure, must address a vulnerability to rising sea levels, which could affect critical desalination facilities.

Building water resilience

The diversity of water risk means there is no one-size-fits-all solution for improving resilience to water risk. Adaptation and mitigation efforts in regions facing severe water scarcity will differ from those applied in areas where the greatest risk is posed by over-abundance through flooding and storm events.

In the past, the common response to water challenges was to "build big" — creating centralised systems scaled-up to as much as five times the size of current needs, and intended to perform the same way for over a century.

But building for resilience means we can no longer rely on implementing costly, large-scale and single purpose infrastructure interventions. Governments, businesses, communities and the water sector must take a more strategic view of resource management, focusing on three synergistic principles:

1. Adaptation – build resilience into new projects

The industry needs to rapidly adapt to evolving risk. Adopting an adaptive management model using smaller and even temporary investments--with 5, 10- and 20-year horizons--will allow more flexibility in responding to change. By acknowledging the uncertainty of future challenges, a more integrated and systems-based approach is needed to constantly assess the changing environment, responding in a way that optimises both investment and outcomes for communities and economies.

2. Optimisation – improve and re-purpose the resilience and performance of existing infrastructure with advanced technologies and data driven insights

Improving the responsiveness of water systems can potentially be a game changer. Smart devices and sensors allow utilities to monitor assets in real-time, enabling as-required and predictive operational interventions and maintenance such as managing in real time as floods occur. This saves money by deferring new investment, and informs decisions about directing and adapting future investment. For sectors such as agriculture, irrigation practices based on intelligent asset management can reduce the water needed for production as well as reduce waste in storage and transport of water resources. This is crucial in the world's thirstiest industry, as food production accounts for almost 70% of global water withdrawals.

3. Prioritisation of regeneration and use of nature-based solutions through adoption of a circular economy

A circular economy approach to water management is crucial. Focusing on water recycling and working with natural processes will improve the long-term sustainability of water infrastructure and reduce costs. Benefits for communities and customers may include more reliable service, higher confidence in local supply chains, swifter recovery from water-related disasters and continued ability to affordably insure homes and businesses.

New projects are beginning to mimic the natural water cycle. Australia will soon build a billion-dollar wastewater treatment plant in Upper South Creek, Sydney, implementing circular economy initiatives to recycle water for urban and industrial uses. Across the world in California, Google has committed to reaching a target of net positive water for its next Silicon Valley campuses.

Circularity may be especially effective in cities, where reused water can be repurposed after recycling to nearby urban greening projects, urban agriculture or into supporting decarbonisation and the energy transition by use in cooling systems or even in green hydrogen production. Or increasingly, returned to the drinking water system itself.

Completing circular reuse of water in this way can eliminate the need to pump water long distances, an expensive process that comes with a high energy — and therefore a high carbon cost. Strategic planning can determine the most opportune and economically beneficial uses for recycled water, which will face high demand as scarcity forces us to diversify water sources.

How we respond to increasing water risk is going to be critical to our future health, prosperity and quality of life. Acting to transform our water systems is not something we can delay or take on in isolation; collaborative action must be taken today. Embracing this reality will help avert the forecast hard economic losses – setting us up for a healthier, more prosperous, and more resilient water future.

Inclusion & Diversity statement, UCLA EXTENSION

Context: In 2021 the Extension Program began to require instructors to include a personal inclusion and diversity statement for all syllabi. Specific goals for this piece were to set student expectations—to tell them, essentially, how and in what ways the instructor would strive to respect and value them as individuals. As a queer and genderqueer person I was a mentor to other instructors in this process, and this is the piece I used as a teaching tool and in my own syllabi.

Sample: It is my intent to help students from diverse backgrounds and perspectives succeed in this writing class, by nurturing a culture where every participant respects their classmates as human beings and as writers. Everyone comes into these courses from a different path, bringing unique histories, skills, artistic dreams and genre sensibilities. Our work is infused with our lived experiences, our place in society, and the things that make up our identities. I aim to foster a class environment where each student feels respected and valued, so their best energy can be devoted, simply, to writing.

Naturally I will at times stumble on this path, because nobody is perfect and privilege is invisible to those of us who have it. I hope as those moments arise you--as you're able and if you're willing--help me to recognize them, so I can do better going forward.

Please do tell me or UCLA Extension if any of the materials, resources or statements presented in my classroom are troubling or cause you discomfort. You can speak up in class, or contact me via Canvas email for a private conversation. You can also talk anonymously about any issues with your Student Affairs Officer [contact info redacted.]

Amazon Games Write-Up, ROLLERCOASTER TYCOON

Context: In-house write-up describing player experience for a new game.

ROLLERCOASTER TYCOON--Want to build an empire without all the usual bloodshed? Try Roller Coaster Tycoon, which puts you in total control of a theme park, managing every detail from ride development to rescuing lost guests.

A simulator in the style of SimCity, this game has a simple enough concept: build a park attractive enough to draw in hoards of tourists and then separate them from their hard-earned money. This is accomplished by researching and building rides, along with amenities, gardens and decorations. Once you have your infrastructure and the staff to maintain it, it's time to sit back and watch the funds roll in, all in hopes of building an even bigger rollercoaster somewhere else!

The big draws in a theme park, the coasters are expensive and flashy. They lure in thrill-seeking guests prepared to pay top dollar for a wild ride. RollerCoaster Tycoon even allows you to design the coasters yourself, a finicky but ultimately rewarding operation.

Despite a clunky interface and the usual simulator drawbacks--such as long waits while you acquire funds for the next ride--Roller Coaster Tycoon is an utter gem of a game. Its soundtrack, a mix of calliope music and ride machinery, is mixed with the sound of guests squealing with delight and terror as the

coasters hurl them around. The sound mix is joyfully evocative, and you can almost smell the cotton candy and the popcorn.

Best of all, you can play in this theme park for hours without once losing your children or friends, getting sore feet or experiencing motion sickness.

Tech/SEO article:How to Use Orchestrator to Integrate Third-Party Applications with JD Edwards

(SEO terms in italics)

How to Use Orchestrator to Integrate Third-Party Applications with JD Edwards

Gathering the data that impacts your business and analyzing it in real time is critical for staying ahead of competitors, reacting with flexibility and foresight to the unexpected. *JDE Orchestrator* is the lens that sharpens this foresight, allowing users to connect with third party apps to automate time-consuming business processes while highlighting strategic insights.

Anchored by a powerfully intuitive graphical interface, Orchestrator provides tools for employees to fine-tune strategies for meeting an array of organizational needs. Technical developers and business analysts can automate any repeated procedure, building comprehensible and transparent routines that access, verify and then act upon incoming information. With *JD Edwards Integration*, data generated internally or by outside apps—whether e-commerce websites, CRM systems, inventory control software, work order databases, or even devices that monitor weather and travel conditions along shipping routes—can be leveraged in the moment, when it matters.

Eliminate data errors

This transfer of information from source instruments and apps also reduces the risk of errors in the data-gathering process. *JDE orchestrator integration* ensures that automations can reject bad data, preventing errors as they evaluate and trigger automated responses in routine situations. When a more nuanced approach is called for, automations notify relevant stakeholders in time for decisive action.

Easy updates from anywhere

JD Edwards integration with third party apps increases efficiency by allowing users without complex coding skills to streamline business processes. It is as easy to add a one-click link to integrate JDE analysis with a spreadsheet generated in MS Excel as it is to build an alert for a sales team whenever a large and complex client order is initiated. Employees using mobile apps in the field can update call reports, creating an up-to-the-minute picture of the customer landscape as they identify opportunities. Orchestrations connected to outside apps and the Internet of Things can monitor soil levels and operate automated irrigation systems for agricultural users, process repair requests for equipment breakdowns in an array of industries, mitigate inventory shortages at warehouses, and capture data on health and safety compliance on worksites. What's more, *JD Edwards Integration options* mean these orchestrations can be tested for efficient and effective operation, within Orchestrator, before deployment.

An integrated approach to business systems

JD Edwards EnterpriseOne integration has over 80 modules that empower employees working in analyst and management roles. Its ability to streamline repeated tasks and optimize the efficiency of human capital means users can integrate with other enterprise information management solutions to import and export documents, build schedules, and collaborate on projects. HR apps give employees the autonomy to set times for professional development courses, book leaves, and access company support systems around the clock.

With *JDE Edwards integration* with third party apps handling all of your routine business functions, your human talent can focus on high value tasks to drive your business growth.

MarketingBlog: How Content Marketing can Scale up your SaaS on a Budget

How Content Marketing Can Scale Up Your SaaS On a Budget

Creating a brand identity that builds trust and generates sales is the primary goal of SaaS content marketing, but what does that mean? By following a content strategy aimed at addressing your customers' specific needs, you can make your business more visible on SEO, build traction on social media, and ensure that prospects stick around to hear your message.

Benefits of Content Marketing

The best content marketing introduces qualified prospects to your company in a way that makes you approachable both as a service provider as an authority. It talks about them, not you, spotlighting their business challenges... and then demonstrating that your team is the one with the expertise to discover viable, long-term solutions. This customer-focused content demonstrates how you can be important in their journey. It is an approach that elevates reader confidence and, ultimately, improves conversions.

Building content on a consistent basis as part of a long term plan is also the answer to bringing repeat traffic to your site. The goal is to attract, convert, and retain a target audience by offering meaningful content showing your focus on customer success. These are the kinds of offerings that can enhance customer retention.

Reaching and connecting with your target audience using these techniques builds credibility, elevating brand awareness to drive better organic search rankings, qualified traffic, and lead generation. While engaging your target audience at every stage of the funnel, this content will primarily serve those most prepared to buy. After product adoption, content marketing builds up the customer relationship to ensure that it continues.

Increase marketing ROI

It can be difficult to measure ROI on any marketing investment, and SaaS content marketing requires a unique approach. SaaS is no single thing and readers may see it as a one-size-fits-all solution, a cluster of poorly understood apps stretching across a wide range of industries. The intangible nature of your product makes it more important that blog topics and other content avoid any touch of the generic. By educating customers about the unique problems your product solves, content marketing enhances their problem awareness, while simultaneously offering your brand as the most easily adopted solution. The synergy increases when the approach is

creative. In addition to offering blog articles, images and video, look for chances to go further—innovative deployment of interactive tools and attention-grabbing product tours can sharpen customer interest in your solutions.

Content creation is sustainable at lower cost than, for example, product-led marketing. It delivers results both in the short and long run. Content offers the most impactful returns when delivered strategically and across multiple channels. Another advantage is its potential to be evergreen, offering a long tail on ROI.

Put another way: forming a content strategy that incorporates text, audio, visuals, demonstrations and social media elements, all engineered with clear business goals in mind, can deepen the sense of connection felt by your target audience and increase conversions.

Scaling up SaaS

It is key for SaaS content marketing to focus on the customer experience. Offering insight into what clients can expect at every stage after product adoption—guaranteeing a seamless experience through the onboarding phase, deployment and subsequent updates—builds your authority and increases trust in your brand. Content-based promotion of new features of your product demonstrates how you are always looking ahead to their next challenge. Concrete examples of past successes highlight the value proposition while inviting prospects to imagine similar payoffs for themselves.

Grow Your Business

SaaS companies looking to achieve growth using content marketing succeed when they devote sustained attention to creating a brand that feels genuine and invites customer confidence. This kind of relationship-building cannot happen overnight, or with one scan of a single article. By regularly posting specific content targeted at prospects with high buying intent, creating a knowledge center that allows them to see and evaluate their unique challenges. By offering solutions to those challenges, you can increase your marketing ROI and expand your reach within the marketplace.

Live/Video Keynote Script: How we Became LV-426

Context: I give this talk periodically to university writing classes, writing symposiums, and futurist events. The last in-person appearance was the 2019 Worldcon in Dublin, so I haven't updated my science or terraforming references since then.

How We Became LV426

INTRO SLIDE

I'm going to talk about a number of things today, including everyone's best-known and absolute favorite topic—Canadian history. No, really, what I'm going to do is tell a bunch of stories that together make sort of an environmental collage, because a big part of my upcoming novel...

SLIDE TWO

... *Gamechanger*, is about taking multi-track approaches to creating a world where humans come together to survive the current climate-change crisis.

Like most writers, I began as a passionate reader.

SLIDE TWO - IMAGINATION - MAP OF OZ

--For nine year old me, escaping into another world was one of the chief pleasures of reading, and I know I'm not alone. Imaginary places can take on a reality for us that rivals what we sometimes call consensus reality. Many of us spent our childhood visiting Oz, Narnia, and Wonderland.

SLIDE THREE - BOOK COVERS

In our teens, we ventured out to Arrakis and Discworld. And then there were the media landscapes: the future in which the Federation and the Klingon Empire sometimes come to blows or Gallifrey... these places all exist very strongly within our imaginations. Everyone has had the experience, I hope, of looking up from a book and having to recalibrate, to basically remember where and when they actually were.

--A lot of these worlds beguile us because they are charming colorful paradises. Others are LV426, the world where the crews of the *Nostromo* and later the *Sulako* meet their tragic end in the *Aliens* movies.

SLIDE FOUR - SCENIC LV426

--LV426 isn't a nice place to visit. You wouldn't think anyone would want to live there. It's one of those places that looms large in SF fans' cinematic memories because of what happened there, and a lot of fans could probably describe the landscape, ecology, and terrain. So let's do that. It's dark. You never see the sun, assuming there is one. The air is full of flying grit and howling wind. The one wildlife species we know of is an invasive life form from somewhere else in the universe.

SLIDE FIVE - HADLEY'S HOPE

--But interestingly, people do live there, for awhile. In the fictional world of *Aliens*, when an expansionist profit-driven human society decides it wants to settle there, they send terraformers. These are settlers, living in bleak habitats, making a living doing something that's referred to vaguely as atmosphere processing. We don't learn much about that process, of course. The shake and bake colony is beside the point. The point is monsters vs. Sigourney Weaver, and I think we can all agree that works out reasonably well for us, if not for her.

--But one of today's stories is about a world very much like LV426. A world with a sun that went unseen for depressingly long stretches of time. A world with a sky full of grit, blowing in a way that created static electricity so intense it could short out the electricals on an unshielded vehicle. If you went outside, you might see lightning sparking from the barbed wire around your habitat. If you shook someone's hand, the jolt could throw you to the ground.

--This is a real world that we already made.

SLIDE SIX - HOMESTEAD POSTERS

--Between 1880 and 1920 homesteaders encouraged by the U.S. and Canadian governments settled over 200 million acres of North American territory known colloquially as The Great Plains. They displaced first nations societies, and they displaced wildlife. A high percentage of these settlers went into farming.

--People being people, we cherry picked the most promising land first, but by the latter phases of this process, farmers were settling in areas where historically rainfall was very low. Southern Alberta. The Texas Panhandle. But they lucked out. Rainfall was unusually high for a few years, and this bubble of bounty coincided with a vast upswing in the price of wheat that was driven by World War One. Homesteaders were making money.

SLIDE SEVEN - DUGOUT

--LV426, you might remember, was a pretty miserable place to live. So were those early homesteads. Mostly people lived in dugouts... holes in the ground, walled in tarpaper. There are stories of people heating up the iron in the mornings to iron the walls to kill the centipedes.

--So it's not surprising that once the cash started rolling in from these wheat harvests, we did a thing that humans all do... we went into debt. They wanted vehicles. They wanted farm equipment. They wanted pianos. Most of all, they wanted to not live in paper-lined bug infested holes in the ground. And who can blame them. The banks had been a little leery of opening the pursestrings, but governments again encouraged the trend, with legislation like 1916 U.S. Federal Farm Loan Act.

--When rainfall dropped off and the price of wheat decreased, and all these homesteaders needed to continue making enough income to service their debt, the obvious answer was lean in and plant more wheat. In 1917, 45 million acres of wheat had been harvested across the U.S. By 1919, 70% increase to 75 million acres. And then, in 1930, the price had dropped to a tenth of its high, and in places there was another threefold increase in the acreage plowed.

The worse it got, the harder they did the bad thing. Sound familiar?

SLIDE EIGHT - KILLER DUSTSTORM

--The process I'm describing is nothing less than a permanent ecological transformation of North America whose goal was to make it suitable for agriculture and occupation on a European model-- because I'd like to remind you, this region had already been occupied. By 1930, the goalpost had moved, and people were literally fighting to survive in an environment that seemed determined to kill them.

SLIDE NINE - TERRAFORMING AND ITS CONSEQUENCES

--When we say terraforming, we usually think of things like those atmosphere bakers from Aliens. It's a science fiction word and we associate it with expanding our footprint out into the galaxy, to taking over new terrain. But terraforming is one behavior on a spectrum of human activities, and some of the other

points on this spectrum have labels like land use, development, drainage, landfill, damming, dredging, diking, and agriculture.

SLIDE TEN - TERRACED FIELDS

--These are activities that have existed for almost as long as humans have. The first time we put a seed in the ground, we're trying to impose our will on the chaos of the natural world. When our ancestors in the Early Bronze Age started propagating almond trees whose seeds weren't laced with cyanide, we were taking the first baby steps on a road to the technology that led, inevitably, to genetically modified tomatoes. When the indigenous people of my home province of Alberta initiated controlled burns in their territory to create good meadow for browsing species like caribou, they're shaping the land.

Now, obviously, all species shape their habitat to some extent, but the thing about humans is we have a finer grained and more conscious control over the process.

SLIDE ELEVEN - GEOGLYPH

Terraforming in this wider sense isn't just something that happens in regions dominated by grasslands. This is a geoglyph. It's a geometric design carved into the earth hundreds of years ago. The more we deforest the Amazon, the more of them we find--there are hundreds in Brazil alone. They show building activity and evidence of intense forest management in an area western anthropologists once used to consider "Edenic" or pristine in pre-Columbian times. In fact, the lion's share of the Amazon Basin may have been a mixed-use cultural parkland supporting millions of people.

SLIDE TWELVE - TEXT CARD - HOW DEEP IS THE HOLE

--There's no doubt that in our desire to extract nutrition and wealth from the landscape, we alter and frequently damage it.

--What was the result of all that plowing in the twenties? The first dust storm, in September of 1930, was such a weird anomaly that people called their government weather office to say, basically, WTF.

--And we have had our share of WTF moments.

Here's a little one: in July 2011 a massive dust storm hit Phoenix Arizona. It is thought that if Arizona becomes warmer and has decreased rainfall--both of which are predicted for the coming century, that ground cover will die off and dust storms will be more common.

SLIDE THIRTEEN - NORTH POLE

But, okay. Arizona. If you're not a snowbird and you're not an American, do you care? What about something a little closer to home? In 2016 the temperature at the North Pole on January 1st was above freezing.

SLIDE FOURTEEN - ARAL SEA

--National Geographic reported in 2014 that the Aral Sea Basin, once the 4th largest freshwater lake in the world, was dry for the first time in 600 years. How did this happen? One of our favorite world-altering activities was the culprit: it was irrigation for agriculture... and not even agriculture solely for food--the rivers that feed the Aral are irrigating cotton, too. Anyway, as humans took water out, the salinity of the Aral Sea rose. Fish species died, industries dependent on those fish also died, and 40000 people were out of work. The number of farm workers who happened to have the accidental privilege of being upstream from the Aral was a significantly smaller number.

SLIDE FIFTEEN - PLASTIC AND FISH

--And speaking of fish, a new study says the oceans might contain more plastic than fish by 2050. As if that wasn't freakish enough, we have already poured enough concrete to cover the entire globe in six inches of the stuff.

--Okay, maybe you're saying fine, or you're thinking this isn't the same thing. So what if way back in 1930 there were some dust storms. Crops didn't grow, people didn't thrive, our grandparents if they were the right age complained about it endlessly. That's not the same as what's happening now.

--Here's how bad it got in the nineteen thirties: as the storms began to do their damage, farmers tried taking one of the few things that grew in relative abundance--tumbleweeds, and feeding them to their cattle.

SLIDE SIXTEEN - DEAD RABBITS

--As the situation continued to degrade and the cattle all died, they started pickling the tumbleweed and eating it themselves. Incidentally, tumbleweed has no nutritional value. For meat, they would gather on clear days, drive rabbits into an enclosure, and club them to death.

--Doesn't that sound like the lifestyle those settlers were all looking for?

SLIDE SEVENTEEN - CCC WORKER

--But it stopped, right? How'd that happen? Essentially, we did that too. It was a process that required science, political will, and a lot of planting.

--The science part involved, first, figuring out that the plowing and the storms were related... and second, proving it to politicians. You all know how hard it can be to convince people, especially electable people, that their voters might be causing a problem. But once the political will was in play, turning the great plains into the slightly Less Great Plains became a matter of money, time, and hard work. Thousands of people across the continent were hired to plant grass and trees in the very fields where, a few decades before, the ecosystem had been abundantly equipped with more varieties of both.

--Needless to say, what we had after the dustbowl wasn't what we had before. We replanted the bare minimum of acreage, with the intention of continuing to farm the rest. The newly planted grasses were

different species. The trees that had stood in the prairies for countless decades were gone. The indigenous culture of the great plains was transformed in ways it's still recovering from.

--But planting the grasslands allowed a compromise. I mentioned debt earlier. What humanity did in the late Thirties wasn't so much paying back the biomass it took out of the ecosystem. It might be likened more properly to having paid the interest on a loan without taking much of a chunk out of the principal.

--People didn't move out of the the Great Plains en masse. Agriculture continues there, to this day, on land that's relatively unsuited to farming. In the High Texas Plains, it's irrigated from the Ogallala Aquifer. Mostly cotton is grown there, and currently the aquifer is declining at a rate of 1.1 million acre-feet a year. This means there may be a century or less of water remaining in this underground lake.

--I came into this talk imagining that as far as climate change goes, I'd probably be preaching to a pretty friendly choir. I'd like to believe that most everyone here, though, is past the point of needing science to convince them that that something's up with Earth's climate these days, and that human impacts are what's caused it.

--Through a billion choices, both individual and collective, we have transformed the world. Now we're on the tick tick tick tick climbing stage of a rollercoaster ride. We don't know when we're going to tip, pause, and begin the freefall.

SLIDE EIGHTEEN-TURBINES

--So this is all very doom and gloom, and that's not really my thing. It's very easy and sometimes necessary to focus on the damage we've done and our dread of the consequences. But dread can be suffocating. We're sort of afraid that by the time we get everyone on board, by the time there's consensus that man, there's problem brewing, we'll not only be on the downslide of that rollercoaster ride but screaming into a turn too sharp to allow us to stay on the rails.

--So heading back to our very own LV426, here's where we get optimistic: when people began replanting the great plains, not everyone was on board with that either. People said it didn't matter, people said it was too late, people said it wouldn't work and--perhaps most importantly--they said it was a waste of the almighty taxpayer's dollar. People said: we're in the middle of an economic crisis and this isn't a good use of our resources. It's a pretty familiar song.

--Replanting the Plains moved forward without some kind of imaginary consensus of the population and could not have waited for it. And in the end, for good or ill, those landscapes once again became fit for human habitation.

--Some wild and delightful things that inventors, scientists, governments and sometimes corporations are trying now without waiting for consensus:

SLIDE NINETEEN - DE-EXTINCTION

--De-extinction - De-extinction is to Jurassic Park what the Moon Shot was to Star Wars. I can't give you pterydactyls, but students at Canadian Mennonite University have grown a squash that was extinct for 800 years. Meanwhile, Harvard University is working with Siberian ecologists on a plan to bioengineer current species of Asian elephants into Woolly Mammoths as part of a scheme to keep the northern permafrost from warming up and filling the atmosphere with methane.

GEOENGINEERING

Ethiopia planted 350 million trees in twelve hours a couple weeks ago. It's estimated by some that if we could plant a trillion trees, worldwide, they would absorb a quarter of our surplus atmospheric carbon. The challenge is partly political will, partly money, a lot of planting—and figuring out how to repurpose land so we don't stop producing food at the same time. Speaking of food...

SLIDE TWENTY - PALUDICULTURE

--Paludiculture - Peatland makes up 3% of Europe's agricultural land but according to the Guardian it's currently responsible for 90% of its CO2 emissions from farming. Europe is beginning to investigate reed plantations in peat swamp areas. Essentially you grow the plants that the swamps are optimized to produce, you find a profitable use for them, and the peatland becomes a carbon sink instead of a carbon source.

--There's a dam being built in Kazakhstan that's supposed to help with the Aral Sea problem and conservation efforts are underway in the Ogallala Aquifer.

SLIDE TWENTY-ONE - QUOLLS

Behavioral terraforming --Quolls - Quolls are one of the marsupial species who somehow survived the introduction of cats to Australia. They're adorable, they're numerous, and they're omnivorous... they go out at night and hunt bugs, seeds, whatever they can find. They do like their meat, though, and this is problematic because one of the things they find in relative plenty in their habitat is another invader, the cane toad.

Cane toads would make pretty decent eating, except that they secrete poison. When quolls catch and eat cane toads, they die. So here's what the quollologists (no, just kidding) did. They caught a bunch of quolls and kept 'em in big cages with a variety of food sources. One of the things on offer is a cane toad sausage. I know--this talk comes with a recipe! They caught the toads, washed off the poison, stripped the meat. They added an emetic and put it back in an unpoisoned toad skin casing.

When the quolls eat the cane toad sausage, they get miserably sick, for about a day. Most of them never look back. A few of the optimists try the sausage twice. Nobody goes for thirds.

What blows my mind about this, though, is when they released those quolls back into the wild, they teach their young to avoid live cane toads. Now catching every uneducated quoll in Australia isn't really an option, but after a few good trial runs the program was expanded. Cane toad sausage now gets dropped on quoll habitat from helicopters, and quolls are leaving the invaders alone. This is a behavior

that might have evolved over time if the quolls had managed to avoid extinction. Instead this new behavior has taken hold in less than a decade.

This is good news for species with evolutionary advantages like cuteness. If you present the right package, we might bestir ourselves to save you.

SLIDE TWENTY-TWO - ASPIRATION AND DESPERATION

--Terraforming's a popular topic in science fiction. We have *Aliens*, where it's something of a side issue, but we have Heinlein's *Farmer in the Sky*, *Venus of Dreams* and *Venus of Shadows* by Pamela Sargent, and *Red, Blue, and Green Mars* by Kim Stanley Robinson. We dream of expanding our society first across the solar system, and then possibly to other worlds. This is a cool dream and I'd like to think that it's still a far-off possibility. But in the meantime, we've terraformed ourselves into toxic corner on the only viable habitat humanity's got going. And to the best of my knowledge, the starships aren't built yet. If we're aboard the Titanic, folks, we are hooped for lifeboats.

--So what can we learn from our foray into turning North America into LV426 in the 1930s? First, obviously, we've screwed up before and we've patched together at least a partial solution.

Admittedly, the compelling argument in the present day is that we've screwed things up again, worse, over a vastly larger area.

I'm fully aware that the problem with things like alternative power generation and rewilding and paludiculture and saving quolls and carbon fixing is that it seems like too little too late. Whenever a post about a promising new technique or technology crops up, we're apt to mostly connect with our despair over the damage, our grief over the things we've lost, our belief that there's no consensus and it's too late, and generally a sense of helplessness. It's that dread I talked about.

SLIDE TWENTY-THREE - NAYSAYING COMMENTS

I read the comment threads on those tech posts. There's a lot of naysaying. There are so many problems. And it's true. It may not be enough. We may have already dug a hole too deep to science our way out of.

But, ultimately, what else have we got? There is no plan B I've ever heard of that wasn't find all the oil, use all the oil, and hope for the best.

Remember, when governments initiated the program to start planting the grasslands, to enact that imperfect solution, there were plenty of people who said it wouldn't work. They didn't carry the day.

This brings us, finally to us, and the idea of creating the future by imagining it.

Fantasy fiction, going all the way back to classics of the genre like the *Illiad* and *Macbeth*, is fond of oracles. In science fiction, predictive modelling has been used as a sort of techno-oracular story engine going back at least as far back as Asimov's *FOUNDATION SERIES*.

But we science fiction writers are also a form of oracle.

When I was learning to write, I went to Clarion West. One of the most inspiring things I learned was in a talk by Greg Bear about how he had spoken to NASA scientists whose work was inspired--not done, but inspired in part--by Isaac Asimov, by Star Trek, by all the great stories that launched humans into the stars. We told them humanity could go into space and their response was "Hey, yeah, let's do that."

They could conceive this grand project, so very easily, because they had already made the voyage in their imaginations, in the books Our People had written to entertain them. It'd be grandiose to claim that we as a tribe put humans into space. But we shaped that outcome in ways we'll never fully understand.

This is something we can apply to the current crisis, and to any future crisis. If we do what we already do, by looking at these emergent green technologies critically, extrapolating what they might do, and imagining outcomes that aren't always failure, that are not always the apocalypse, who knows what we might achieve?

Who knows who we might encourage or inspire?

SLIDE TWENTY FOUR - BEAR QUOTE

Science fiction writers have been thinking about terraforming because we've decided part of our job is imagining humankind's survival in other environments and our proliferation to other worlds. There are two things we do that are entirely our bailiwick: one is to create worlds so compelling that people forget, momentarily, that they aren't real. Another is to perform thought experiments on the way to making those worlds. We are the ones who can, for the low low cost of a book advance (low, very low) imagine a near-future society where we've gone all in on paludiculture, and look forward to both the benefits and the downsides before some government spends millions on actually implementing it.

We've had a great run on apocalyptic novels and zombie hoards in the genre lately, and I would never want to see those books vanish. But I would argue that people are ill-equipped to build a future if they can't imagine it in specific, vivid, glorious detail. If we as a tribe of imaginers, visionaries focus solely on the tipping point, the roller coaster ride and the possible failure of our society, then we are doing our part to seal our doom.

Any of us could inspire the engineers who save our collective ass. My challenge to everyone in the room is this. It's time to start carrying our readers past the LV426es, and into futures vivid, appealing and plausible enough to make them worth fighting for.

Making the earth fit for human existence will be our first great terraforming challenge as a species. It will be the defining historical event of this century, the one that shapes the next two to three generations.

Thank you.

Writing Lecture, UCLA EXTENSION

Context: I teach a course called The Art of Creative Research. This piece, Diminishing Returns in Research, is intended to remind students to think about the learning process, the way we use numbers to encapsulate unquantifiable things, and to indicate that it's possible to go too far down the rabbit hole when they ought to really turn their thoughts to writing.

Sample: Diminishing Returns (How much is too much?)

Let's play with some very imaginary numbers:

Imagine you took three undergraduate level university courses on a given topic. This would come to about 120 hours of in-class instruction and, in theory, another 120 hours of study. That's a lot of time spent thinking about the subject matter in question, so we might expect that after those few courses, you're going to be able to write about it from a place of some comfort.

This obviously varies with subject and aptitude: some people are going to be more inclined and able to learn, say, Dutch history going back 500 years than many of us are to learn the deep structures of the brain, or the math governing quantum physics. There are finite topics too, like memorizing the periodic table, that may take far less time.

But the basic idea is that if you're getting around 240 hours of combined instruction and self-directed study—or, in some cases, just spending that time on self-directed study—you're going to come out of it with a good grasp of the fundamentals, and probably a lot of the proprietary language tied to a given topic.

Think about how much you would know about beekeeping if you spent 240 hours on it. That's six full forty-hour work weeks!

The same goes for sports. After six work weeks of trying to learn to surf, you might not be a very good surfer, depending on your aptitude and base athleticism. But you would probably know all the lingo, right? You'd have picked up techniques for maintaining boards and equipment, you might be able to distinguish between types of waves, or know the names and locations of lots of beaches and some of the annual sporting events. Maybe the stories of a few of the big historical figures within the sport would be in your back pocket... and all of that would be more than enough to let you to write a convincing story or a good creative nonfiction article or any of the other kinds of works you have been exploring in this class.

I have seen this concept reduced to a blanket statement that 100 hours gives you an 80% understanding of a given topic. This is also a made-up number, but it's a useful thing to book-end with another very famous blanket statement quoted in terms of learning skills, which is the Malcolm Gladwell-inspired aphorism that it takes 10,000 hours to achieve mastery in a given thing.

(Okay, here's one more. In fiction writing, you sometimes also see the maxim that you should throw away your first million words, on the theory that on word 1,000,001 you're only just starting to get good.)

I am probably over emphasizing the point that these numbers are fictional. They express an important idea, but I'm keen to qualify it by reminding you, at every junction, that everyone is different and every topic is unique. Still, there's a truth buried amid these made up numbers, and I want you to get to it. So pretend both of these things are true:

- 100 hours spent studying leads to an 80% understanding of your topic.
- 10,000 hours spent in practice will lead to mastery.

With that in mind, consider your second hundred hours.

If you slip into additive thinking, you might not even need 100 more hours to get to 100% from 80%. Shouldn't another 100 hours take you to full understanding of everything, right? If mastery comes at 10K, what will you be doing with the remaining 9800?

It's important to remember that the essence of most skills involves building mastery on an exponentially harder curve.

Say 100 hours literally taught you exactly 80% of everything about surfing. Maybe the second hundred hours might only get you another 10%. The third hundred hours might get you another 3-5%, if you're lucky... but don't count on it. I'm being generous. Hours 301-400 won't even get you to 96.

Numbers aside, if it is your life's goal to be a beekeeper or a corporate accountant or the world's absolute best skyscraper window washer, you're going to put in all the time required. But if it's your goal to write a good article about the window washer who finds love at the apiary—if the thing you actually want to master is writing—you should pause when you have a solid hundred hour grip on the topic. Ask yourself if more research is just a way of procrastinating, avoiding the thing you initially set out to do.

Writers can be very avoidy, can't we?

This is one of the basic ideas of the law of educational diminishing returns. And what your takeaway on this should be is: don't go too far down the rabbit hole.

This class is meant to be, as I have probably said before, a bit of a bop. You're all writing whatever delights you and the idea is essentially that we have two passions working in collision and collaboration. One is your creative impulse, your desire to write amazing works of literary art. The other is your passion for your research topics, which are an inextricable part of the thing you were working on.

You're supposed to be taking your desire to make words and your excitement about a given topic and turning them into the most delicious written confection you can possibly generate. And as a group here in class, we are basically tasting the banquet and figuring out what works in terms of using those factual ingredients and writing techniques.

So in part this is an essay about balance.

Research is fun. It also has the potential to feel like accomplishment even when you've learned as much as you need to for your project. Just reading two more books on your chosen topic for diving into the essay/epic poem/novel opening... well, getting those books read are quantifiable tasks finished. And you can never be too prepared, right?

Sometimes it's hard to feel confident that you know enough. Imposter syndrome creeps in. And at other times it's just hard to sit down and write, because writing's a different kind of work, one that sometimes demands vulnerability. If you've given yourself permission to take some time just to take in information, it can be a real shift of gears to go back to putting out content.

So one thing you can do about getting out of research mode and back into writing is to plan a transition. Look at the actual material, figure out if there is anything you need to still learn, and fix a deadline for learning that specific thing. Allocate a couple days, if you need them, for organizing the info. Then set a day for when you're going to begin writing.

This is all very well and good, but temperamentally there are also some of us who jump into a writing project as soon as we possibly can. Maybe we spent three hours learning the basics of beekeeping and then we start writing the story, and then we get to the point where we don't know something... and we have to stop and look it up.

Is that OK?

It absolutely is. There are probably topics where it's more effective and topics where you really do have to get the grounding first, but the fact is there are lots of writers who do this: push in, get started, make some guesses, fact check later and accept that this might mean changing things radically once they have the facts.

Being a writer and having a love of learning often go together, and it can be hard to give up a research trail, whether you're deep into it before you've begun a given literary project or picking up the necessary facts as you go.

The thing to remember is that once you get to the point of knowing everything you need for the piece you're writing, you're done researching. Continued research is fun and you should keep doing it if it gives you joy, but start priming yourself to notice that transition. Not only is this an efficient use of your time, but it's important to know when you're doing something for fun. You wouldn't want to miss it, after all!

Let me know, as always, if you have any questions.