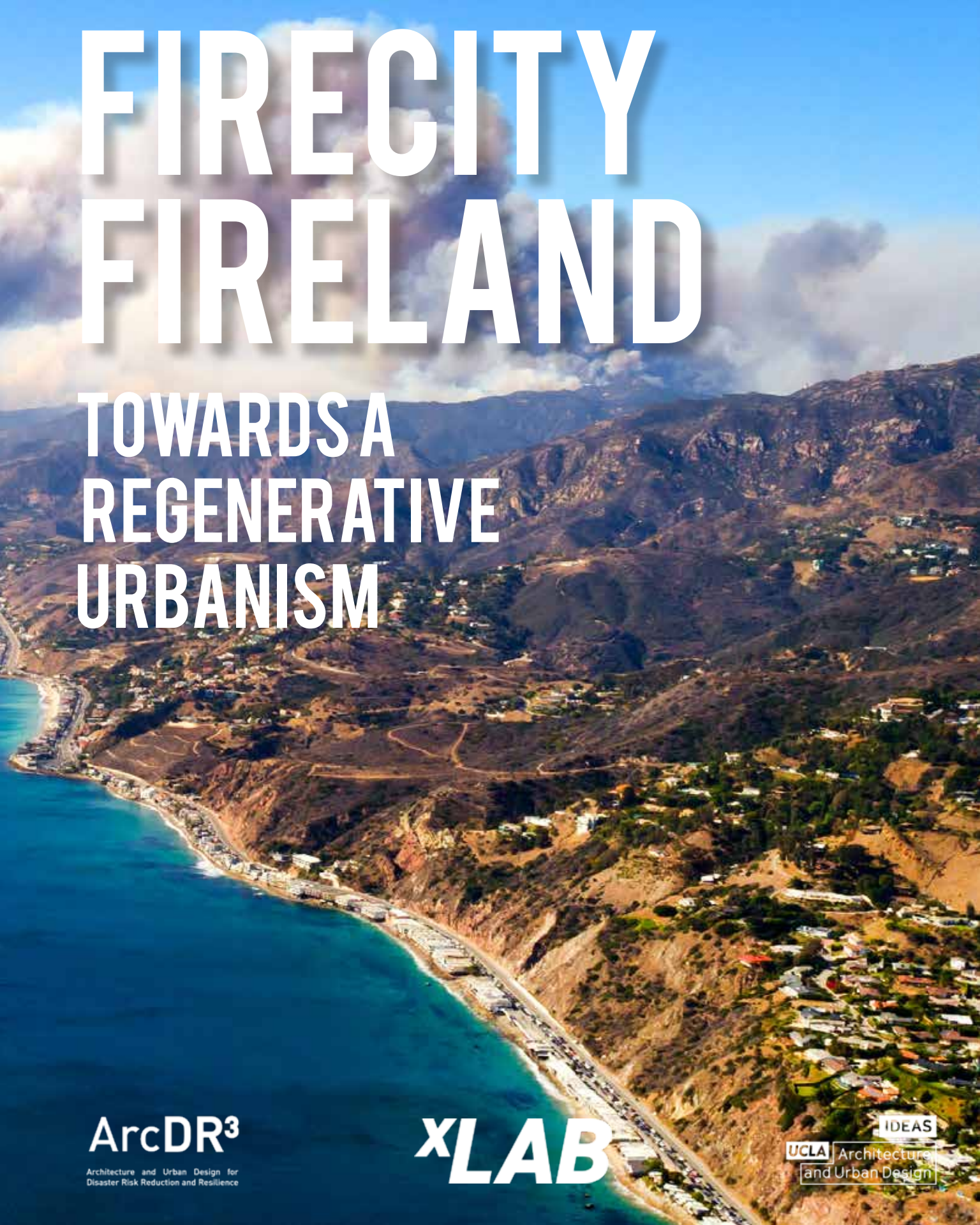
FIRECITY FIRELAND

TOWARDS A REGENERATIVE URBANISM



ArcDR³
Architecture and Urban Design for Disaster Risk Reduction and Resilience

XLAB

IDEAS
UCLA Architecture and Urban Design

FIRECITY FIRELAND

TOWARDS A REGENERATIVE URBANISM

Credits

About xLAB:
xLAB is an international think tank that examines architecture's elastic boundaries and considers new possibilities through interdisciplinary collaboration in the study of the future built environment.

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Introduction

Hitoshi Abe, Mohamed Sharif

Ricardo Facio. *Layalton Fire California 2020*. Photo. Flickr. August 15, 2020. Public Domain.

0. What is Regenerative Urbanism?

Herbert Girardet, *Creating, Regenerative Cities* (New York: Routledge, 2014).

> "The planning of new cities, as well as the retrofit of existing cities, needs to undergo a profound paradigm shift. Mere 'sustainable development' is not enough. To be compatible with natural systems, cities need to move away from linear systems of resource use and learn to operate as closed-loop, circular systems. To ensure their long-term future, they need to develop an environmentally enhancing, restorative relationship between themselves and the natural systems on which they still depend."

Regenerative Urbanism* is an aspirational term that encourages the reframing of conventional urban design and planning techniques through contemporary models more dynamic, more elastic, and more faceted than conventional static plan-based ones. A catalyst for a holistic, evolutionary approach to metropolitan development – in this instance one focused on risk management and resilience in the face of natural disasters like fire – it underlines an approach that synchronizes and synthesizes information flows through simulation and forecasting of multiplex forces within an ever-developing intelligence network.

Always learning, the targets and outcomes of Regenerative Urbanism resonate with the research concerns of developmental neuroscience. Analogous to the nervous systems of complex organisms and their pathologies, regenerative urban morphologies and behaviors are conceived with anticipatory views toward adaptability, flexibility, and mutation. Physiologically, the organizational components and systemic, structural interrelationships of Regenerative Urbanism aspire to operate with a similar attitude to martial arts, particularly those that mobilize soft and malleable techniques of absorption and redistribution as a response, or even as a preemptive avoidance, of the hard impact of external forces.

Soon to be tested at the fiery interfaces between nature and artifice, between ungovernable wilderness and governable constructs, the combinatory design and planning techniques of a Regenerative Urbanism will flicker between software and hardware. As information in formations, our applied research on Regenerative Urbanism will reinvigorate visionary ideas of and influences on urban design from cybernetics to Metabolism.

1. Establishment of International Studio Platform to pursue Regenerative Urbanism: ArcDR3 Initiative (Architecture and Urban Design for Disaster Risk Reduction and Resilience)

ArcDR3 (Architecture and Urban Design for Disaster Risk Reduction and Resilience) Initiative is a 3-year global interdisciplinary architecture education project organized by xLAB at UCLA, IRIDes at Tohoku University in Sendai and Miraikan National Museum for Emerging Science and Innovation in Tokyo.

ArcDR3 proposes the study and design for resilience and risk reduction in our contemporary environment. ArcDR3 Initiative is launched as a part of the Association of Pacific Rim Universities (APRU) Multi-hazard program and involves participation from 11 APRU Universities: UC Berkeley (USA), University of Hong Kong (Hong Kong), University of Melbourne (Australia), National Cheng Kung University (Taiwan), National University of Singapore (Singapore), Pontifical Catholic University of Chile (Chile), University of Tokyo (Japan), Tohoku University (Japan), Tsinghua University (China), University of Washington (USA) and University of California Los Angeles (USA).

The purpose of the Initiative is to create a more effective integration of theory (research) and practice (design) by creating an international platform for producing and exchanging the knowledge that reduces the risk of recurring disasters and enhances resilience. With the key objective of addressing the theme of “Regenerative Urbanism” and its implications for architecture and urban design, 11 participating Universities have developed their context-specific design studios for the 2020-2021 academic year. With the urgency of establishing new strategies for designing buildings, cities and environments, ArcDR3 Initiative proposes an International Studio Platform, where research findings will be shared among all the participants. The 3-year long initiative includes a series of symposiums and exhibitions where the results of the research will be shared, as well as a concluding publication, scheduled to be released at the end of the program.

02. “Fire” as Local Context

> “Our study will be situated in Los Angeles County, an area prone to wildfires naturally, but also experiencing dramatic increases in catastrophic wildfires likely due to a combination of climate change, increasing development at the urban-wildland interface, and a lack of preventive measures and public education.”

Ali Mosleh, *“Research Proposal on Risk-Informed Integrated Approach to Assessment and Community Engagement”* (unpublished manuscript, 2019), typescript.

The Los Angeles Metropolitan Region is naturally predisposed for wildfire activity with its abundance of dry fuels in chaparral and woodland ecosystems, hot and dry Mediterranean climate, and rugged topography in and around the region’s multiple mountain ranges. The Santa Ana winds also contribute to the particularly explosive nature of fires in Los Angeles. These basic components of wildfire ecology are exacerbated by climate change, which has contributed to drought conditions and above-average temperatures in the entire state. The history of wildfires in Los Angeles has been dangerous since the beginning, starting with the Griffith Park Brush Fire in 1933 that was the deadliest in the state until the 2018 Camp Fire in Paradise. Since then there have been an estimated 60 large wildfire events in the Los Angeles Metropolitan Region. Their frequency has increased since the turn of this century, where three or more major wildfires occur every year. Wildfires cause damage to residences (typically single-family homes), commercial buildings, and infrastructure such as highways and power systems. Human activity causes the majority of wildfires. Recent significant wildfires in the Los Angeles Metropolitan Region, including the Woolsey, Saddle Ridge, and Getty Fires, were started by power lines or other electrical infrastructure. Wildfires have societal consequences, including loss of life and the disruption of social processes. They also expose and exacerbate existing social and economic inequities, such as the vulnerabilities of poorer and rural neighborhoods lacking infrastructure, and the threats to domestic and essential labor working in evacuation zones.

In pursuit of Regenerative Urbanism as part of the ArcDR3 initiative, UCLA A.UD will lead simultaneous synergistic design research studios, focused on the twin topic of fire-risk-reduction and fire-resilience, at Perloff Hall and the IDEAS campus. These synergies will also form and

be informed by interdisciplinary collaborations on campus with other UCLA departments including Engineering and Planning as well as with 11 universities participating in the ArcDR3 initiative. With a focus on the fire-risk-reduction and fire-resilience, both at Wildlife Urban Interfaces (WUIs) and within interstitial multi-hazard zones within the Metropolitan Los Angeles region, design research studios will contribute a vital array of design visions and knowledge to the ArcDR3 initiative and help to establish the conceptual framework of Regenerative Urbanism.

In adopting and modifying the global ArcDR3 Grand Syllabus to the Los Angeles regional context, and engaging with relevant authorities and experts both within the UCLA community and beyond, the studios will operate as a combined think tank whose culminating projects will be shared and discussed at international conferences, displayed in international exhibitions, and disseminated through globally accessible publications.

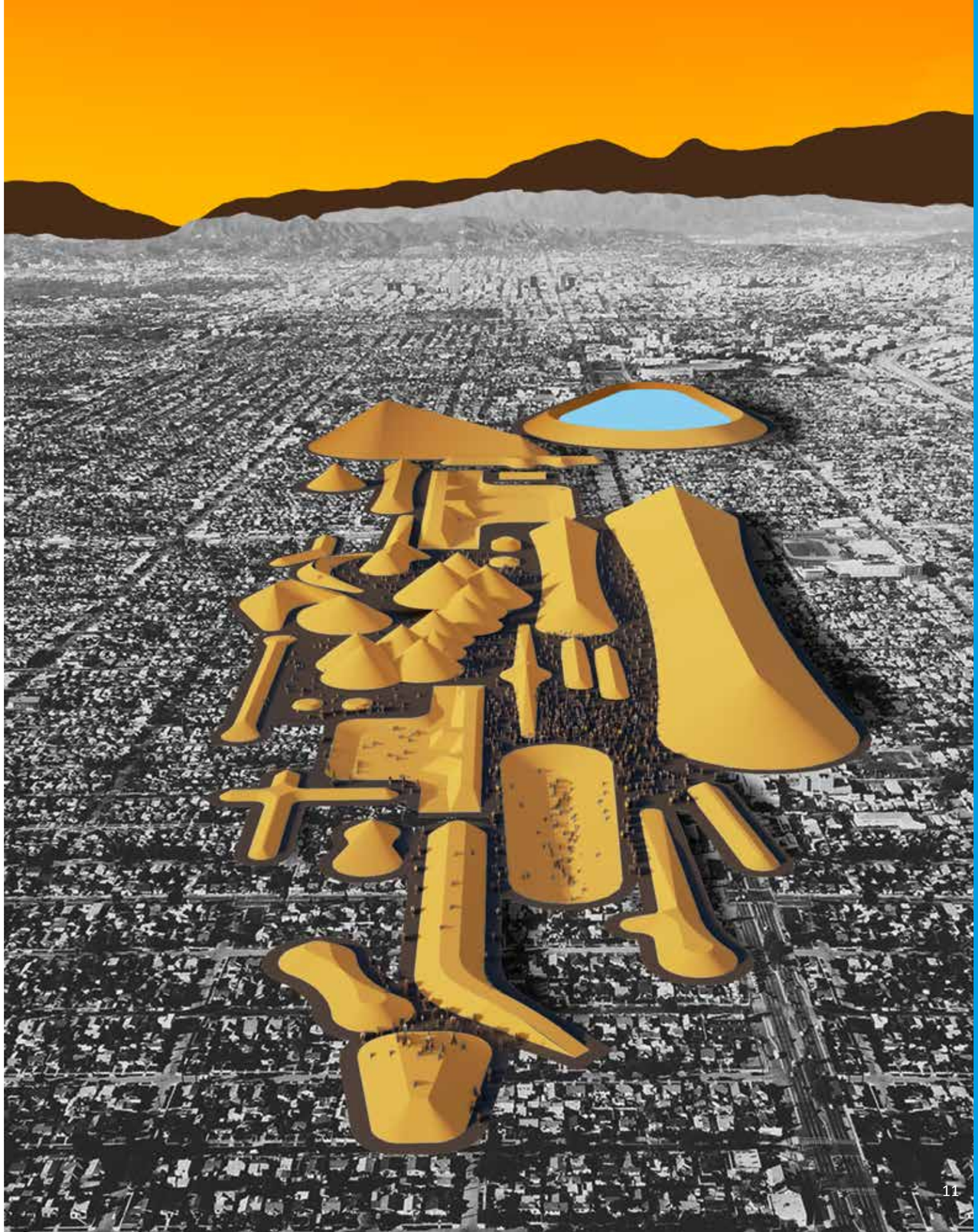
Although the recent destructive fires burning millions of acres of California forest have captured the headlines, the greater more sober reality is that fires will have a lasting effect on California urban life. This growing fire problem in what is called the urban-wildland interface will plague state and municipal leaders for the foreseeable future (Agee, 2006, 12).

James K. Agee, "Foreword." In *Fire in California's Ecosystems*, edited by Neil G. Sugihara. (Los Angeles: University of California Press, 2006), xi-xiii.

Fire is a complex physical phenomenon that affects a larger ecosystem. The nature of a fire is a function of the local topographical conditions, the air temperature and humidity, wind speed and direction, level of precipitation, soil and vegetation types. All of these play a role in its spread rate and area, compromising the greater ecosystem, including the area's water quality and quantity, soil stability and erosion, and plant and animal mortality (Sugihara and Barbour, 2006).

Neil G. Sugihara and Michael G. Barbour, "Fire and California Vegetation." In *Fire in California's Ecosystems*, edited by Neil G. Sugihara. (Los Angeles: University of California Press, 2006), 1-9.

Firefighting is a technical issue, but also a social, economic and political one. The institutional realities of reducing the occurrence and spread of fire include the fact that: much of the affected land is owned by a combination of federal, state, and county governments who must coordinate their fire fighting and management resources. There are jurisdictional differences in zoning policies that determine what and where buildings are constructed. The insurability of property will have a great impact in the years to come as fires are more frequent and intense along WUIs. The number of agents involved in the controversy is so great that the big picture of the "ecosystem" needs to be updated. Just as architecture is a technical pursuit that shapes social, economic, and political life, we will look at fire in both its technical dimension and its impact on civic life. Witnessing before us the consequences of the climate crisis on the lands we inhabit, we will explore the effects of fire on the multi-agent ecosystem of Greater Los Angeles, including natural resources, geography, human social networks, laws and codes, and non-human inhabitants.



ESTUDIO BRAVA, *LAnd Poster*. Courtesy of the author.

03. Parallel Design Research Studios

The parallel design research studios will coordinate efforts to develop diverse proposals based on shared findings. Because architecture yields insights through both research and design, the studios are organized to take the best advantage of both modalities of exploration. The parallel structure is intended to share AUD's cross campus intelligence through a feedback loop of collaboration and dialogue. It will provide students with access to presentations by fire, city planning, and urban design experts in local regeneration efforts, architects and researchers working on regeneration across the 11 universities, as well as to the ongoing development, peer comments, and faculty directions of the studio projects.

The Perloff Hall based graduate-level studio, led by Hitoshi Abe, will focus on long-term research before formulating design proposals, allocating two academic terms to assess the cultural challenges, layers of governance, economic impacts and opportunities, required expertise and specialization, and spatial relationships of exposure, infrastructure, and settlement. After summing up the work from the first two quarters, the studio will dedicate the final term to design responses. The IDEAS campus-based postgraduate studio, led by Jeffrey Inaba, will dedicate three terms to design-based investigations, starting in the fall with an ecological diagram that is the basis of a "vision" plan for Greater LA, then in the winter a master plan of a selected area, and finally in the spring zooming in to develop a building design. The collective work of the design research studios will be coordinated and developed through a series of regularly scheduled joint meetings. Studio outputs will be shared to enable cooperative learning and accelerate discoveries and insights.

Bob Dass. *Wildfire in Redwood Valley, California*. Photo. Flickr. July 16, 2017. Creative Commons License (CC BY 2.0).

04. Interdisciplinary Research and Collaboration

In order to address the question of fire-risk-reduction and fire-resilience in Los Angeles across a range of perspectives, the joint initiative draws from a diverse network of educational partners and researchers. Furthermore, to strengthen the research and to cover various angles of inquiry, the team of experts from UCLA's faculty will be joined by colleagues outside of the campus. With its twin focus on fire-risk-reduction and fire-resilience, the ArcDR3 Research Group at UCLA has invited Distinguished Professor and Evelyn Knight Chair in Engineering, Director of the B. John Garrick Institute for the Risk Sciences at UCLA, Dr. Ali Mosleh to be the advisor to the design research studios. Joining Dr. Mosleh is Dr. Saeed Nozhati, a postdoctoral scholar at the Institute. Expert advice from members of the B. John Garrick Institute for Risk Sciences will play a critical role in fire hazard assessment and development of designed network strategies to prevent, mitigate, prepare for and recover from fire-based disasters. Also joining the team in an expert advisory capacity is a faculty from the UCLA Department of Urban Planning, Kian Goh, Assistant Professor of Urban Planning, who will provide insights through which to address fire threats at a strategic metropolitan level. Additionally, the participation of Adjunct Assistant Professor Chandler McWilliams of UCLA Design Media Arts will provide expert direction in the visualization of research through the lens of advanced technology and cutting edge story framing and storytelling.

Peter Buschmann. *The Woolsey Fire seen from Topanga, California*. Photo. Flickr. November 9, 2018. Public Domain.

The worst fire season ever. Again.

Joshua Stevens. *August Complex*. Photo. NASA Earth Observatory. September 1, 2020. Public Domain.

CALIFORNIA WILDFIRE HISTORY

1862
Homestead Act

The Homestead Act of 1862 gave citizens up to 160 acres of public land if they built a home and improved the land. The act rewarded pioneers, or "homesteaders" who populated the wildlands but was also inextricably linked to Federal policies forcibly removing Native Americans from their land.

1922
Better Homes in America

In response to declining home conditions after World War I, the "Better Homes in America" national reform campaign established the "modern ideology of American home ownership, housework, and consumption built on specific gender, class, and racial differences."

1940-50s
Postwar American suburbanization

Master planned, gridded communities of single-family dwellings often built on greenfield open space or agricultural land. Selling a way of life based on the nuclear family, automobile culture, and homeownership.

1956
Interstate Highway System

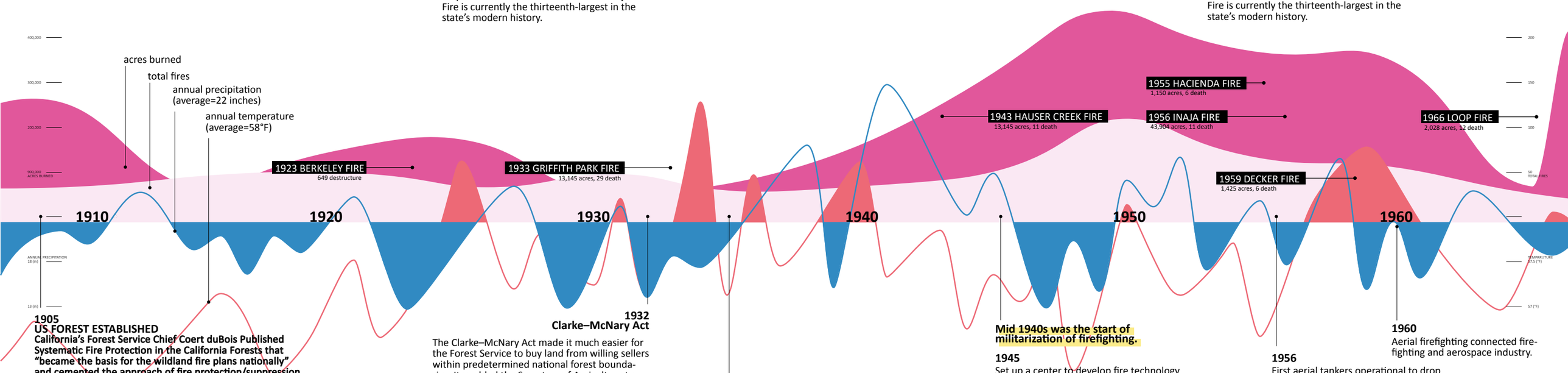
The Federal-Aid Highway Act of 1956 signed by President Dwight D. Eisenhower led to the building of the Interstate Highway System that **further enabled the creation of suburbs.**

1932
MATILIJA FIRE 219,000 acres, $120,000 (1932 USD)

With the possible exception of the Santiago Canyon Fire of 1889 (which occurred before the start of official record-keeping), it was the largest known wildfire in California history until the 2003 Cedar Fire. The Matilija Fire is currently the thirteenth-largest in the state's modern history.

1953
RATTLESNAKE FIRE 1,300 acres, 15 death

With the possible exception of the Santiago Canyon Fire of 1889 (which occurred before the start of official record-keeping), it was the largest known wildfire in California history until the 2003 Cedar Fire. The Matilija Fire is currently the thirteenth-largest in the state's modern history.



1905
US FOREST ESTABLISHED
California's Forest Service Chief Coert duBois Published Systematic Fire Protection in the California Forests that "became the basis for the wildland fire plans nationally" and cemented the approach of fire protection/suppression over light-burning. - To the Last Smoke, Stephen J. Pyne.

1911
WEEKS ACT

The Weeks Act **permitted the federal government to purchase private land** in order to protect the headwaters of rivers and watersheds in the eastern United States and called for fire protection efforts through federal, state, and private cooperation.

1932
Clarke–McNary Act

The Clarke–McNary Act made it much easier for the Forest Service to buy land from willing sellers within predetermined national forest boundaries. It enabled the Secretary of Agriculture to work cooperatively with State officials for better forest protection, chiefly in fire control and water resources.

1935
10 AM Policy

The USDA Forest Service instituted the "10 AM Policy," wherein the objective was to prevent all human-caused fires and **contain any fire that started by 10 a.m. the following day**.

Mid 1940s was the start of militarization of firefighting.

1945
Set up a center to develop fire technology inspired by that used for war.

1956
First aerial tankers operational to drop fire retardant.

1960
Aerial firefighting connected firefighting and aerospace industry.

1970
Concept of the WUI

The concept of the Wildland Urban Interface was first coined by C.P. Butler of Stanford Research Institute, who noticed **"the growing trends of more people moving into wildfire-prone areas and more wildfires burning into communities."** But it was initially viewed as a regional rather than national problem.

1990
WUI Development

Over **3.3 million housing units** were in the WUI, housing **27.6%** of the state's population.

2000
WUI Growth

Over **3.7 million housing units** were in the WUI, housing **26.8%** of the state's population.

2015
WUI Growth

Over **4.4 million housing units** were in the WUI, housing **30%** of the state's population. This is **an approximately 34% change in the number of units in the WUI since 1990.**

1970 LAGUNA FIRE — 270,686 acres; 2,820 destructure, 15 death; $1,331,000,000

In the wake of the fire, some wildfire suppression policies were changed. Congress directed the establishment of the Modular Airborne FireFighting System (MAFFS) which would allow military transport aircraft to be able to respond to wildfires if the commercial air tankers are unavailable or committed elsewhere.

1991 TUNNEL FIRE — 1,520 acres; 2,820 destructure, 15 death; $1,500,000,000 (1991 USD)

The fire's rapid rate of spread and massively-destructive nature sparked renewed recognition of the dangers posed by wildland-urban interface fires in major cities, and spurred research and investigation into improved prevention and suppression of such fires.

2017 TUBBS FIRE — 36,702 acres; 5,643 destructure, 22 death; $1,300,000,000

The Tubbs fire is the most destructive wildfire in state history, as well as one of the deadliest. It not only started relatively close to Santa Rosa, but it traveled at an incredibly fast speed which left authorities no time to make an attempt at stopping the fire.

2017 THOMAS FIRE — 229,651 acres, 1 death

2003 CEDAR FIRE — 270,686 acres; 2,820 destructure, 15 death; $1,331,000,000

The Cedar Fire quickly escalated to a wildland-urban interface fire; the WUI is the area where human development meets or intermingles with undeveloped wildland. The WUI is also where the largest insured losses from wildfire in the United States have occurred, as it is the area most at risk.

2018 CAMP FIRE — 153,336 acres; 18,804 destructure, 85 death; $16,650,000,000

Ignited by a faulty electric transmission line, the fire originated above several communities and an east wind drove the fire downhill through developed areas. The towns of Paradise and Concow were almost completely destroyed, each losing about 95% of their structures. The towns of Magalia and Butte Creek Canyon were also largely destroyed.

2018 WOOLSEY FIRE — 96,949 acres; 1,643 destructure, 3 death; $6,000,000,000

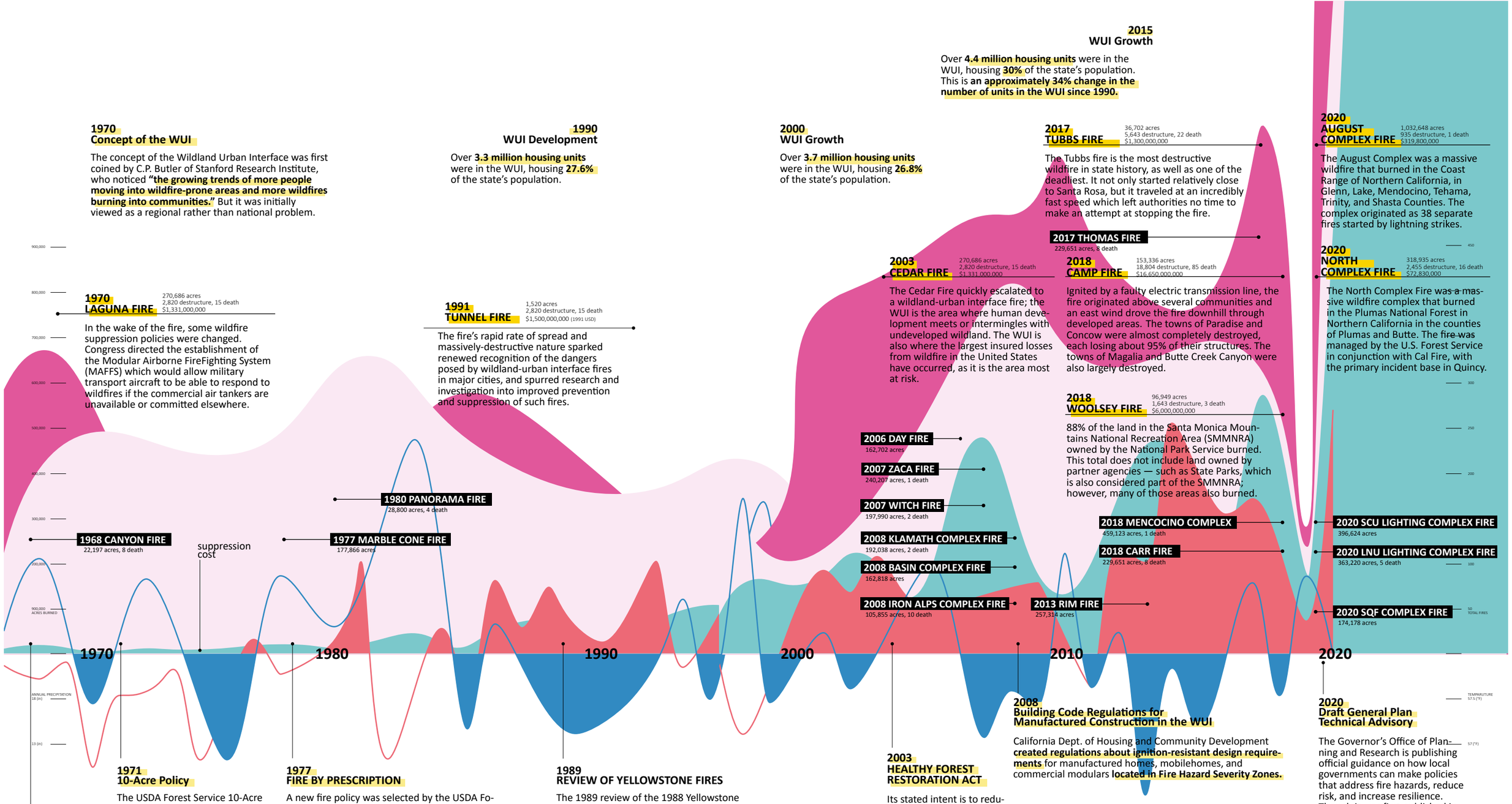
88% of the land in the Santa Monica Mountains National Recreation Area (SMMNRA) owned by the National Park Service burned. This total does not include land owned by partner agencies — such as State Parks, which is also considered part of the SMMNRA; however, many of those areas also burned.

2020 AUGUST COMPLEX FIRE — 1,032,648 acres; 935 destructure, 1 death; $319,800,000

The August Complex was a massive wildfire that burned in the Coast Range of Northern California, in Glenn, Lake, Mendocino, Tehama, Trinity, and Shasta Counties. The complex originated as 38 separate fires started by lightning strikes.

2020 NORTH COMPLEX FIRE — 318,935 acres; 2,455 destructure, 16 death; $72,830,000

The North Complex Fire was a massive wildfire complex that burned in the Plumas National Forest in Northern California in the counties of Plumas and Butte. The fire was managed by the U.S. Forest Service in conjunction with Cal Fire, with the primary incident base in Quincy.



1968
ALLOW PRESCRIBED CONDITIONS

The National Park Service changed its policy to recognize the natural role of fire, allow natural ignitions to run their course under prescribed conditions, and use prescribed fires to meet management objectives.

1971
10-Acre Policy

The USDA Forest Service 10-Acre Policy was added, which set a **pre-suppression objective of containing all fires within 10 acres.**

1977
FIRE BY PRESCRIPTION

A new fire policy was selected by the USDA Forest Service that **replaced both the 10 AM and 10-Acre policies**. The new policy encouraged a pluralistic approach — fire by prescription. Even for suppression, **once the initial attack failed, alternatives to full suppression were to be considered. Fire suppression became fire management.**

1989
REVIEW OF YELLOWSTONE FIRES

The 1989 review of the 1988 Yellowstone fires continued fire policy evolution. The review report affirmed the positive benefits of fire, but also identified the inherent risks and liabilities of using fire and recommended greater planning, preparation, cooperation, and management oversight.

2003
HEALTHY FOREST RESTORATION ACT

Its stated intent is to reduce the threat of destructive wildfires. The law seeks to accomplish this by allowing timber harvests on protected National Forest's land. Directed federal agencies to treat hazardous forest fuel; streamlined environmental assessment process for fuels projects.

2008
Building Code Regulations for Manufactured Construction in the WUI

California Dept. of Housing and Community Development **created regulations about ignition-resistant design requirements** for manufactured homes, mobilehomes, and commercial modulars **located in Fire Hazard Severity Zones.**

2009
OMNIBUS PUBLIC LANDS ACT

The bill designates millions of acres in the US as protected and establishes a National Landscape Conservation System. Collaborative Forest Landscape Restoration Program: directive to restore fire-prone forests at broad spatial scale and across ownerships.

2020
Draft General Plan Technical Advisory

The Governor's Office of Planning and Research is publishing official guidance on how local governments can make policies that address fire hazards, reduce risk, and increase resilience. Though it was first published in 2015, this update **has a strong focus on limiting growth in the WUI and increasing the resilience of existing development in high-risk areas.**

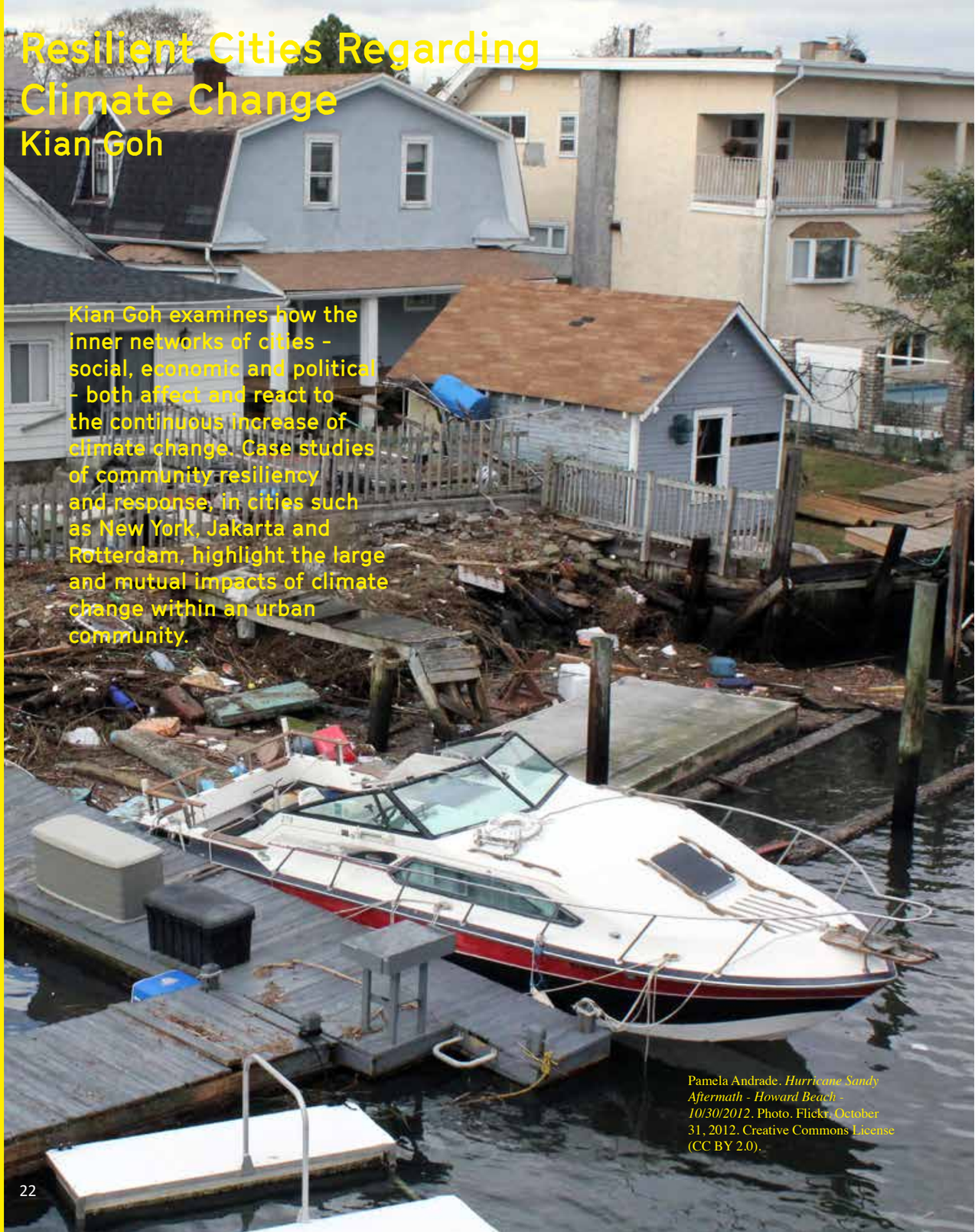
The Urgency of Resilient Urbanism

1

Kian Goh
Jeff Schlegelmilch
Ali Mosleh
Saeed Nozhati
Fumihiko Imamura
Osamu Murao
Renato D'Alençon and Roberto Moris
Amy Robles + Anabella Rosa
Yuqi Zhang + Andrew Gonzales

Resilient Cities Regarding Climate Change

Kian Goh



Kian Goh examines how the inner networks of cities – social, economic and political – both affect and react to the continuous increase of climate change. Case studies of community resiliency and response, in cities such as New York, Jakarta and Rotterdam, highlight the large and mutual impacts of climate change within an urban community.

Pamela Andrade. *Hurricane Sandy Aftermath - Howard Beach - 10/30/2012*. Photo. Flickr, October 31, 2012. Creative Commons License (CC BY 2.0).

[09:53] **Kian Goh:** I'd like to synthesize the debate around cities and climate change. One of the things that's become clear for me going from architecture to urban planning is the need to situate my work within a broader social science conversation. If I were to zoom out I would say there are six different ways in which cities and climate change have been understood. These are a little bit in chronological order (although not strictly) and they're also not not exclusive, so a lot of research actually spans some of these different distinctions. One of the categories is the specific climate change impacts on, and of, cities as centers of population and as centers of infrastructure, culture and commerce. The conversations and the research around this particular topic tend to focus on why cities should be seen as a particular kind of object in climate change research.

[12:19] Another set of research would be around how cities plan to mitigate or adapt to climate change. I would say this has been the set of core research and literature that people point to when they talk about the social scientific research on cities and climate change. Research investigates the ways in which city policies can help reduce the overall greenhouse gas emissions, therefore mitigating the causes of climate change, or the way cities can be modified, redesigned or changed one way or other in response to climate impacts, therefore adapting to climate change.

[13:09] If you talk to many folks in the climate change research world they will be quite rigid and rigorous about making this distinction between mitigation and adaptation, and for a long time researchers in and around climate change were somewhat skeptical about the ideas to adapt to it, because they felt that if we keep talking about adapting to climate change we're essentially ceding the responsibility, or giving up on ways to mitigate the causes of climate change. I agree with this, we need to actually be quite precise about what we think we should be doing; mitigating, adapting, or as I think most of us now agree a combination of the two. A third might be about how cities become resilient. The idea of resiliency has become really popular in the last 10 to 15 years, and generally speaking is understood to be how cities bounce back from shocks and stresses. So you know why that would be good generally, and I would agree that we want places, institutions, and groups of people to be able to recover from any kinds of adverse impacts that they face. But there's been an emerging set of conversations that are quite critical about the notion of resilience, mainly questioning why it's desirable to "bounce back" to conditions that basically led to the kinds of problems that we see in cities right now. A lot of us, and I would be part of this group.

This text is derived from a lecture recording, not intended to be published as an article.

We think that the resilience debate sometimes enables us to ignore some of the inequities in why climate change impacts are quite disparate, concentrated on the poor and marginalized. These people tend to be impacted most by climate, and this idea of bouncing back sometimes just accepts that that is the case. The next set of researchers are those who are really thinking about how the historical and ongoing processes of marginalization and inequality in cities are exacerbated by climate change, and also responses to climate change.

[16:31] Researchers in this realm would look at how systemic inequities in cities, basically poor, working-class communities of color have already suffered because of urban policies and continue to suffer.

[17:19] A fifth set of research in the literature looks at how processes of urban change are intertwined with processes of environmental change, particularly in the context of climate change. Change comes up many times here but it's really how the particular agents and institutions of urban governance are shifting in response to climate change, to either protect, maintain, or consolidate economic power or territorial control. So, how can we understand the different ways that cities are being governed because of imminent climate change? Which, for many political and economic elites, means the imperative to protect their source of wealth and their source of power. Then finally the sixth set, how are cities part of broader scales and levels of environmental change? When we say "city," we often mean the urban region or the ways in which different political conditions or economic ties or social relationships actually transcend any kind of distinct municipal boundary. This set of research looks at how when we talk about climate change we actually need to look beyond the city, and at the intertwined and interconnected ways in which processes in the city are linked to far larger and smaller urban processes.

[19:46] These are in my view, six different ways you can parse out various kinds of research and debates about this relationship of cities and climate change. If you ask another scholar they would probably come up with a different set, but there are a lot of clear overlaps, and broadly speaking, I think my colleagues, especially those who look at cities and climate change with a more critical lens would agree with many of the distinctions that I've made here.

[19:46] Out of these different ways to think about cities and climate change, to me two of the issues arise in a way that needs further investigation.

One key issue is scale: the scale of practice, scales of research and thinking, and scales of planning and design. As in, where do we think some of these processes start and stop, and how do we re-tune our ways of thinking or practice to impact them in the ways that we want?

The second issue would be about justice. I think increasingly as researchers around urban climate change have been expanding and their views about this, we've increasingly put our finger on the fact that issues of justice really are front and center. Not just in the ways where people often say, which is climate change will hurt people who are least responsible for it (poor people in the Global South). Yes, that is certainly the case. But, in addition to that, the fact is that so many of our climate related projects are advertently or inadvertently harming further marginalized populations.

[24:49] In my research I've looked at sites and design strategies in and around three cities: New York, Jakarta and Rotterdam.

[25:45] In New York, Hurricane Sandy in 2012 was a big wake-up call for the city. It was one of the first major disasters that made people in New York realize that climate change-fueled disasters could actually reach that far up the northeast seaboard. After Sandy, there were initiatives such as Rebuild by Design, a high-profile design competition to come up with strategies for more resilient places around the region affected by Sandy, oftentimes exemplified by this project the Big U, by the team led by BIG. We also saw a lot of interesting on the ground, grassroots initiatives, such as Occupy Sandy and other groups that responded to the impacts of Sandy in quite interesting ways. Here, one might find examples of community-based responses to both environmental and social threats.

[27:22] In Jakarta, which floods chronically every year and puts a third of the city underwater, there have been numerous attempts over the last decades to deal with this kind of flooding. When I got to Jakarta it was 2013 just after a huge flood and I got to see a lot of the emerging conversations among city managers, politicians, consultants, and some folks on the ground around what they thought should be done. One of the most eye-opening responses to flooding was this plan called the Jakarta National Capital Integrated Coastal Development (NCIDC) master plan, which is colloquially called the Giant Sea Wall. This master plan was mainly designed by Dutch hydrologists, landscape architects, and urban designers. It called for essentially a brand new city to be built on landfill in the Jakarta Bay. It both stopped the water coming in but also created these massive retention ponds that could be pumped lower and lower so that the canals and rivers from the city could drain into it. Here we also see grassroots initiatives to actually consider new ways to design in response to floods, and I trace the conflicts over these different sites and strategies back to the Netherlands.

[31:14] The Netherlands is well known for urban planning, spatial planning, and water management, and increasingly they've been positioning themselves as a kind of model for climate change adaptation and climate change responses. Tracing the actors and the strategies in places like New York and Jakarta to ideas such as floating pavilions in Rotterdam (shown below) and a growing movement among Dutch public and public private agencies to network and export in many ways the ideas that they consider to be homegrown.

[32:28] The one thing we do see quite quickly is that while these seem like disparate cities taking on particular environmental and social challenges in and around the urban regions, they're interconnected in more ways than we might imagine. It's not necessarily that the same urban designers might find themselves from one place to the other, but that the ideas broached by specific urban designers

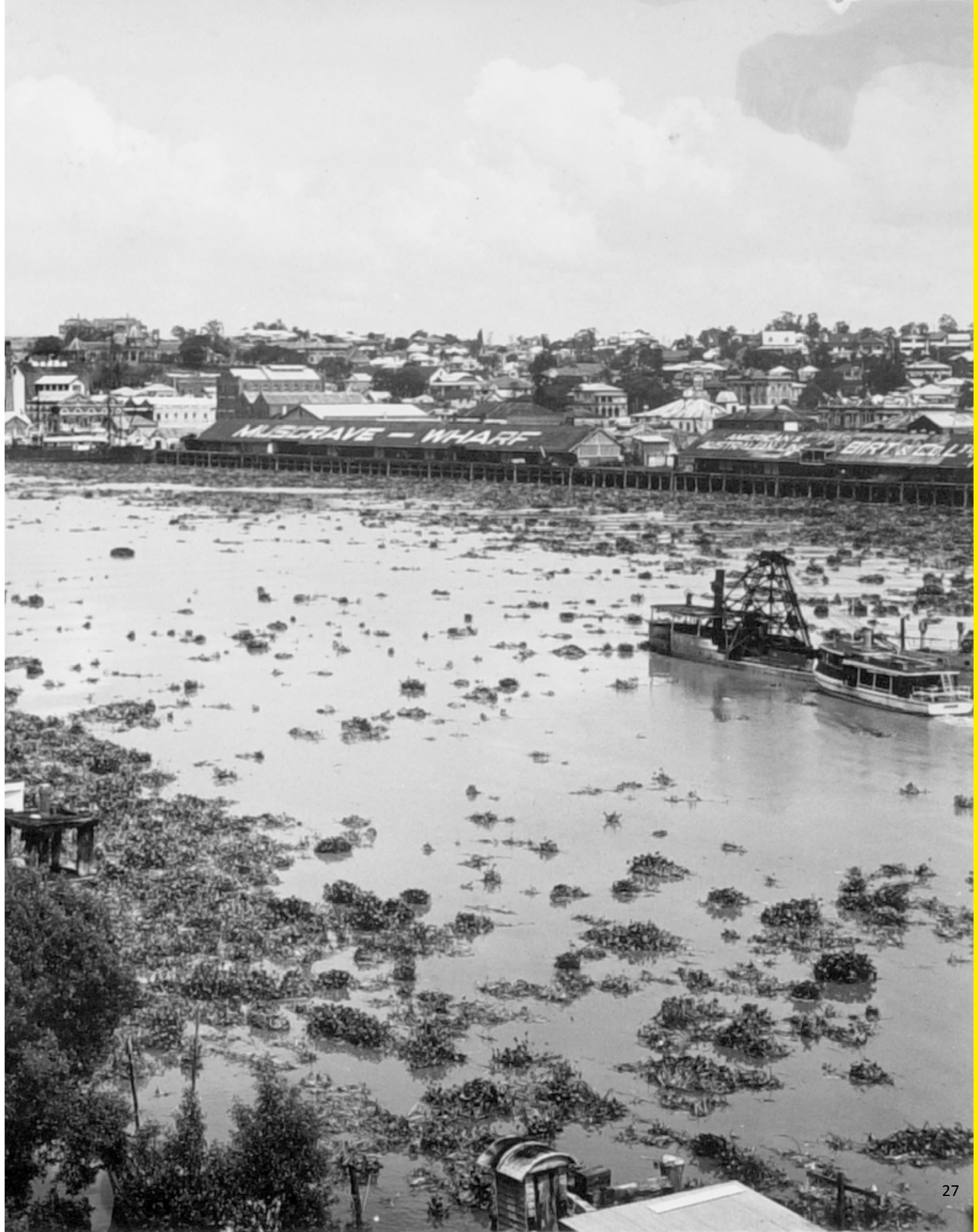
tend to have a lot of mileage in and around different sites in the world. In each of these sites you also see a ground up contestation, on-the-ground responses and protests against some of these large-scale plans proposed for the cities. So in my work looking at this shifting and interconnected space, I asked this one research question that really motivates the whole project in the face of climate change and uneven social and spatial urban development:

How are contesting visions of urban futures produced, and how do they attain power?

[34:46] I'm interested in the ways in which our ideas of the future of cities are actually produced, how they attain power, and how they are legitimized.

I think all of us understand that community engagement is a critical thing. It's hard to get projects done without it. We also want design projects to be part of communities on the ground, and to reflect their histories and their interests. At the same time, I think we need to recognize that often we run up against things that designers have tended not to try to take on — essentially politics and policy making in cities. We may learn to do community engagement in a certain way, but what we haven't done is really try to change the levels of power in cities in order to get things built in ways that are more socially attuned or just.

This is especially needed if we value the fact that some of these communities on the ground are the ones that have been most marginalized and will be impacted most by climate change.



Queensland State Archives. *Brisbane River with water hyacinth washed down in flood waters from the Bremer River.* Photo. Flickr. March 17, 1937. Public Domain.

Resilience and Social Equity

Jeff Schlegelmilch

Jeff Schlegelmilch provides an overview of how disasters of all types reveal and intensify underlying social inequalities. In this lecture, he connects resiliency to political and economic transparency and argues for typically marginalized individuals and communities to have a voice in disaster responses.

Joshua Stevens. *Woolsey Fire Burn Scar Seen from Space*. Photo. Nasa Earth Observatory. November 25, 2018. Creative Commons License (CC BY 2.0).

[02:51] You'll see, as I go through a few slides, how the built environment, the social environment and the economic environment all come together to either build or diminish resilience; and there are certain trade-offs between all of them.

[03:35] So i'm gonna talk a little bit about COVID19 as well as climate change and some wildfire and try and bring this together.

[03:53] Our center was established in 2003 and our mission has always really been at this intersection of research, policy, and practice. We're looking at how do we take the best available research (whether we're creating it and conducting it or whether it's coming from someone else) and apply that to today's issues in disaster management -- whether it's at a policy level or at a practice level. And we really look at both preparedness, the response and the longer recovery phase.

[04:45] Right now, of course, we're very involved with COVID19 policy and analysis. We're in a situation where we have a lot of uncertainty, where we have a very incomplete evidence base, and where our evidence isn't changing:

What we know about the virus today is very different than a year ago, but there is still a lot of things we don't know -- we have new tools but we have new variants, we don't know the full effectiveness... how do you translate that into action?. What does that mean for things like going back into the university? What does this mean for the future of building and healthy buildings?

[07:27] The COVID 19 experience is uneven and persistent and it's going to be that way for quite a while -- perhaps even permanently to some degree -- and this is going to be driven by the effectiveness of interventions.

Marginalized communities that are suffering from structural inequities before the disaster do worse during the disaster.

[09:49] COVID19 is no exception. The areas that have the highest rates of COVID19, the populations that it's affecting most..., who are the people dying the most from the disease? In addition to the clinical predispositions they're disproportionately latino and african-american communities. I know this is probably no surprise for anyone who's been following this up until now: the neighborhoods most affected are lower income neighborhoods -- neighborhoods where people are more likely to be essential workers, more likely to have to ride the subway, more likely to be in hourly jobs where they don't have the option to work remotely and they don't

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have the benefits of sick leave where they can stay home or take time off, and so they have a lot more pressures for going into work.

All of these things lead to disproportionate impacts, and social determinants of health also correlate with generations of structural racism and inequalities -- means that having those chronic conditions that put you at higher risk are also disproportionately borne by communities of color.

[23:00] I'm going to talk a little bit about climate change. As I mentioned, we've seen more billion dollar weather disasters than ever before, and in the last 10 years we've increasingly seen record-breaking years and record-breaking numbers of disasters.

[34:35] Wildfires are actually really very clearly linked with climate change. Hurricanes and tropical cyclones are a little trickier, they're increasingly linked and we're increasingly understanding the role of climate change to their strength and formation but there's just a lot of variables -- it's very noisy data. Whereas, with wildfires it has been a lot more clear-cut.

[35:22] So, the unfortunate fact is that it's going to get worse. We've seen the horrible fires in Paradise but also areas that have traditionally been wetter and have denser forests in the east coast and in other areas could potentially become vulnerable to the kinds of wildfires we're more used to seeing in drier climates out west.

Our past is not a good predictor of our risk going forward. We should expect to see more of this: we should expect to see more fires like this moving more aggressively, not less. It's not enough to say "well in 100 years it's has only happened once or it hasn't happened," because it could very well happen many times.

Disasters are not just about the threat, they're also about the underlying vulnerability, that's what combines with a threat.

So we're seeing increased wildfires, we're seeing more extreme, weather events, we're experiencing the pandemic but our underlying vulnerability is also contributing to this. We're building in more and more stuff in vulnerable areas. In the case of Hurricane Katrina, the storm did a lot of damage, but the levee failures did a lot more and everything that was built below sea level. During the Haiti earthquake, the building practices included a lot of concrete without rebar, not being built up to code. Hurricane Harvey, in the Houston area there's a tremendous amount of building in floodplains. Ironically there's also some pretty progressive buyback programs to get people to move out of flood plains, but there tends to be more building than buybacks.

At the end of the day, resilience is the accumulation of choices and behaviors among individuals and among communities and we can't possibly find those solutions without engaging them.

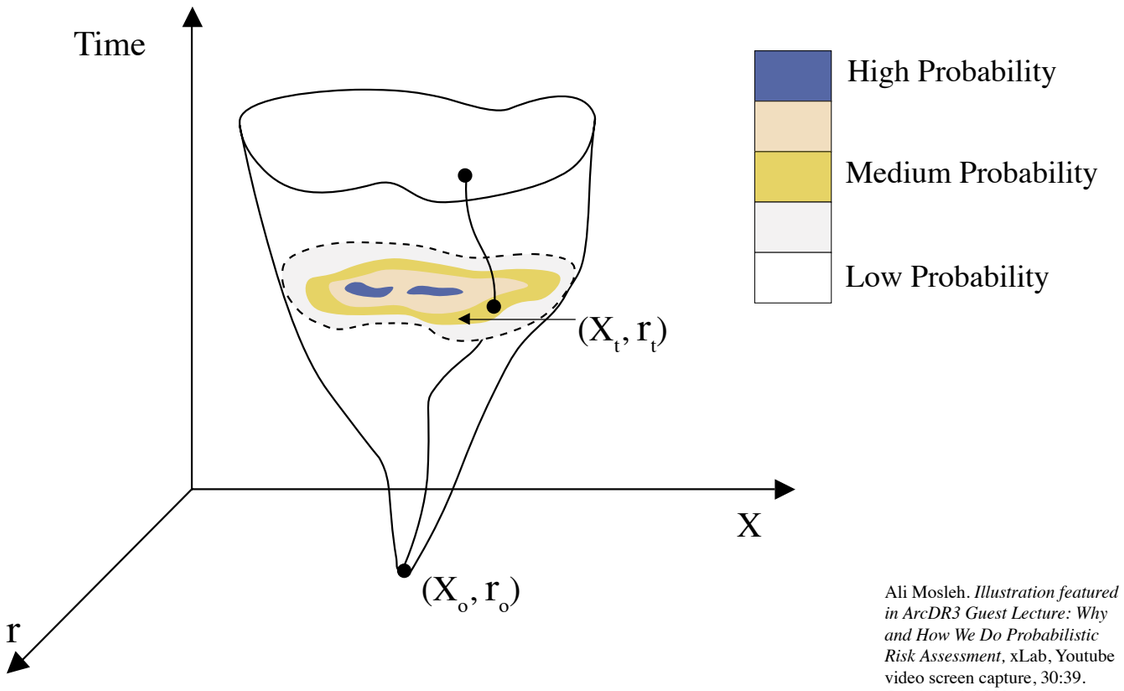
[51:34] A lot of times community engagement in the humanitarian sector and in the preparedness sector is more of pre-digesting a solution and then going to a community to get them to sign off on it; and that's not the same thing as really investing the time and energy in listening to them and letting them lead the way, and then using your platform to kind of amplify it and share those best practices with other communities as a starting point.

Jeff Schlegelmilch. *Getty Fire Burn Site*. Photo. Courtesy of the author. December 2019.

Risk Assessment: Understanding Complex Systems Subject to Uncertainty

Ali Mosleh

Professor Ali Mosleh lectures on Probabilistic Risk Assessment and its potential applications to better understand the complex systems at play in disaster scenarios. He highlights that risk assessment is a way for professionals of different disciplines to make design decisions that align with their risk tolerance and achieve their preferred outcome.



Ali Mosleh. *Illustration featured in ArcDR3 Guest Lecture: Why and How We Do Probabilistic Risk Assessment*, xLab, Youtube video screen capture, 30:39. October 16, 2020.

[04:47] Risk is a combination of uncertainty and undesirability. A situation of risk exposure is when there is an event of concern that you don't want to happen and you're not sure if it will happen or not. So, the uncertainty of that undesirable event is a key element that gives rise to the notion of risk. If you don't have the undesirability or the "negative nature" of the event, or you don't have uncertainty about it, then you don't have a risk situation.

[05:41] There are multiple ways of expressing what we mean by uncertainty and what we mean by undesirability. For example, taking the notion of uncertainty and replacing it with "likelihood" or the chance of the event of concern, and then thinking of the undesirability as the "severity" or "magnitude". Imagine: what's the chance of a flood or an earthquake? What is the size and the magnitude of its impact? Is it going to cause damage to buildings? Is it going to cause injury or death? So, severity is a measure for undesirability of the situation and likelihood is a measure of the uncertainty. More familiar terms are probability (for likelihood) and number of injuries or deaths (for severity). From these you can develop other metrics of risk using numerical values. When we ask how risky a situation is, sometimes people take these two numbers and multiply them together to create an "expected risk" value. Then you can compare risk of different situations based on the level of expected risk. So there are several ways of expressing risk, but they all fundamentally use a combination of the two key notions of uncertainty and undesirability.

[10:12] And what is risk analysis? Risk analysis is essentially the art and science of determining the potential undesirable consequences associated with use of systems and processes. This applies for example to natural disasters. Then there is the next step: you need to describe how such situations can happen. We call those scenarios -- the way that these undesirable consequences or situations could materialize. So for risk assessment, we need to know 1) what are the events/scenarios that we don't want to happen? 2) what are the consequences of the event? and 3) what is the chance/likelihood/probability of the event?

We don't do formal risk assessment just because we want to know the risk numbers. We do it because we're trying to make a decision.

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Whatever the undesirable event is, you may want to know how much money should be invested because the risk is currently too high or too low. When the risk is low and acceptable you don't want to invest effort or money to reducing it further. Thus, the decision context is important in understanding the motivation behind risk analysis and risk assessment.

[11:31] However, decisions – and the criteria for making decisions – come in different forms. It can be a preference, a statement, a rule or a law. If the decision criteria are quantitative (for example: you cannot have an accident with a frequency greater than 0.001 per year), then the risk analysis would need some quantitative component to find the value of the probabilities and the value of the consequences. Otherwise, if we do not need to make a decision in quantitative terms, the risk assessment could be qualitative in nature. That is, instead of saying the likelihood or the probability is .01, you would say the likelihood or chance is "high, medium, or low". Or, in terms of describing the consequence, instead of saying the event affects 10,000 people, you would say "a lot of people". Sometimes risk assessments are forced to be a hybrid, i.e., a mix of quantitative and qualitative.

There are many implicit risk assessments that we do on a daily basis and some of those have been imprinted in our DNA. We react to certain things in a very intuitive way because we know that there is a risk involved that we need to avoid. Of course, in societal and technological domains we use more formal risk assessment and risk management to make these decisions.

[14:35] Risk analysis is the only way that I know of to integrate our understanding of complex systems subject to uncertainty. Even if you're not really doing an assessment of the risk per se, risk assessment involves looking at the behavior of complex systems in a probabilistic way. This constitutes moving away from exact sciences to situations where we want to understand nature or systems of interest (whether engineered or natural), and we want to understand complex behavior when our knowledge is limited, in which may have to resort to ways of looking at things probabilistically and with uncertainty.

Rather than being an exact science, risk assessment incorporates knowledge and methods of many sciences (environmental, systems, social, socioeconomic systems). In the end it's an exercise in expressing the basis for preferences -- because we always have a way of engaging our risk tolerance, whether we're risk averse or a risk taker and what level of risk we're accepting vs ones we would reject.

PRA stands for probabilistic risk assessment and PSA stands for probabilistic safety assessment. QRA is quantitative risk assessment. These terms can be used as a common platform for technical exchange, particularly on safety matters between regulators and the industry.

Among peers such as engineers, scientists, designers and operators, risk assessment can be the common language to talk about the system and the process that you're analyzing. It is a rigorous and methodic way to steer design and operations of a system toward achieving a particular goal for safety and performance.

[17:11] Risk assessment can provide a way of seeing how a particular design change would result in reduction of the level of risk of a certain outcome.

[1:43:44] Looking at complex infrastructural systems, such as food supply systems, roads, electric power, water systems or telecommunication systems, we can anticipate the applications of risk assessment. However, one of the challenges that these very complex systems pose is the fact that they are interdependent: a water supply and treatment system depends on electric power, electric power depends on water systems; in emergency situations they both rely on roads; roads rely on electric powered signals and traffic lights, and so on. We can imagine these days particularly, everything depends on the internet and telecommunication. So you can't analyze these systems and assess their risk without considering their interdependency. The equation that I have here is that if you want to assess the risk of say two things failing, like electric power [A] and water system [B], you have to recognize that they are interdependent. So, the equation from probability theory is the probability of A and B failing is the probability of B times probability of A given B -- so this equation basically shows explicitly that the two events are interdependent and this is how you would capture the effect of interdependency in your probability assessment. This an important aspect to consider when analyzing systems.

One of the ways of capturing those interdependencies is to imagine concurrent scenarios. For example, in scenarios of a natural disaster -- could be an earthquake or a fire -- there is damage to buildings and infrastructure. Imagine that the water supply system and the electric power system are damaged by the same earthquake load (say damaging a transformer and a piece of pipe). One way of looking at these systems' dependency is to recognize that these two could fail as a result of the same event. Therefore when you calculate the probability of these two scenarios, you calculate them based on the same earthquake load and in that way now you're considering their interdependence.

Interdependency is an important subject in modeling and in risk assessment because if you don't consider interdependencies, you can get ridiculously low numbers for the risk.

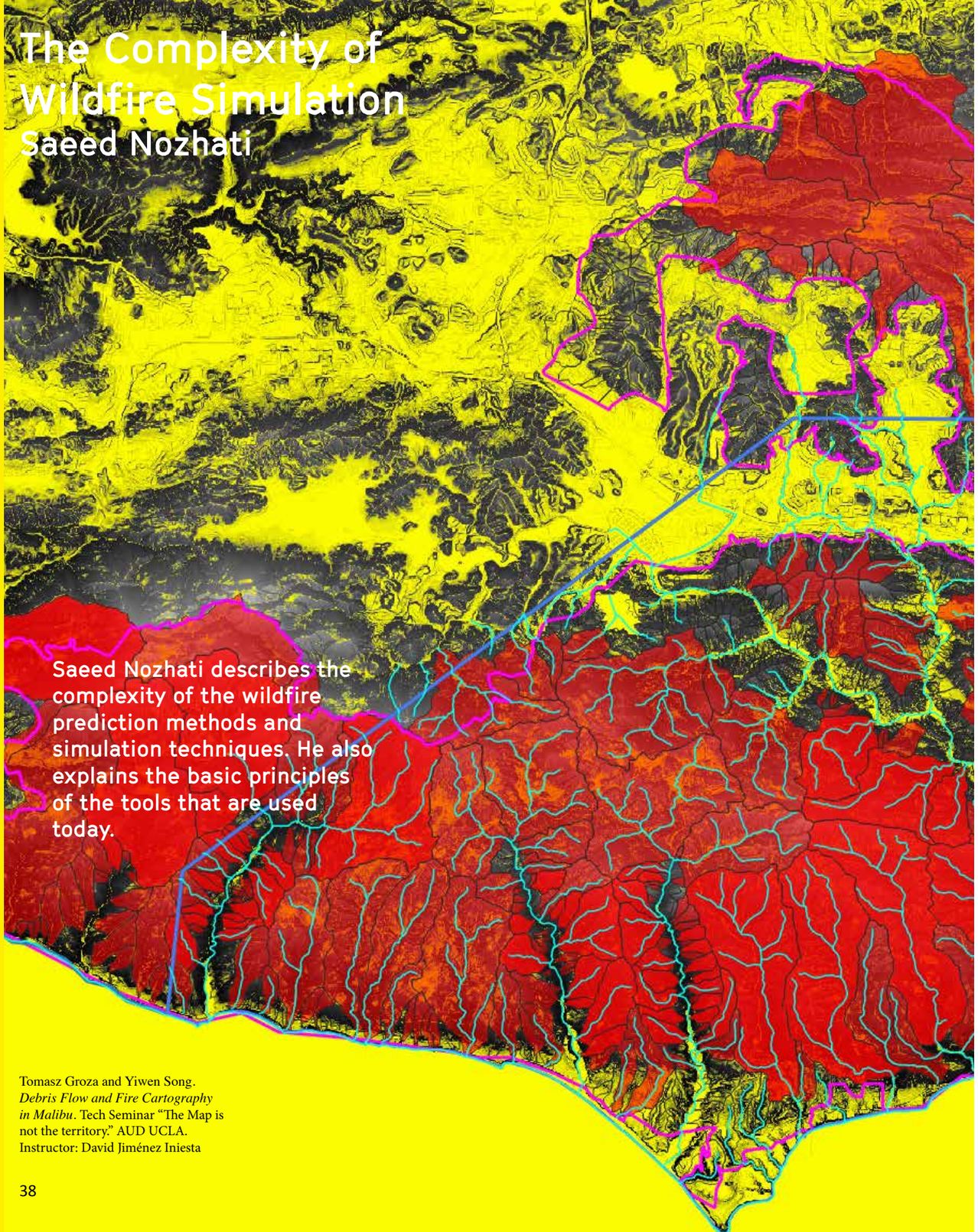
This brings me back to the point that really the challenge in doing risk assessment of modern systems and processes is that we have ultra-complex systems, they're heterogeneous, they're distributed open systems, and are increasingly smart and learning systems. The systems we deal with are interconnected socio-technical systems. They're no longer just in a piece of a machine somewhere.

[1:45:30] People, society, and interactions of the social system, with the technical system that is evolving quickly, poses a challenge in assessing vulnerabilities. There are diverse sources of supplies to building the systems: the supply chain, the quality of material and other aspects of a supplier to a building or to a system, that poses challenges in terms of assessing the quality and reliability of the safety of a system. For these systems, we often have a hybrid mix of different tools and techniques that come together. Particularly for super complex systems we use simulation to understand their probabilistic behavior. These simulations go from micro level to macro levels; from an elemental level (a fundamental physical understanding of the system -- natural or engineered) to the whole system through a model of the whole. It requires a large and continuous model, or sometimes a probabilistic simulation, to develop those trajectories in the "cone of uncertainty" that helps us understand and identify the lines of vulnerability, the path to vulnerability and damage, or undesired consequences and the corresponding probabilities.

Ashley Lee. *The Bay Bridge, taken on the day the skies were orange all day in San Francisco due to nearby fires*. Photo. Wikimedia Commons. September 9, 2020. Creative Commons License (CC BY SA-4.0).

The Complexity of Wildfire Simulation

Saeed Nozhati



Saeed Nozhati describes the complexity of the wildfire prediction methods and simulation techniques. He also explains the basic principles of the tools that are used today.

Tomasz Groza and Yiwen Song. *Debris Flow and Fire Cartography in Malibu*. Tech Seminar "The Map is not the territory." AUD UCLA. Instructor: David Jiménez Iniesta

[28:23] We know, from recent events, that wildfire intensities and occurrence rates have been observed to be increasing significantly in recent years. In 2018, the U.S. experienced the most catastrophic season in California that resulted in about 7,000 fires. The Campfire in 2018 was the most catastrophic: costing more than $16 billion and unfortunately killing about 85 people. One year before, in 2017, we had multiple wildfires north of San Francisco that cost almost $14 billion, killed 42 people and torched more than 8,000 houses collectively. Not only in the U.S. and in California, but globally, in 2018 we experienced many catastrophic wildfires such as the 2018 Australian bushfires that killed many animals. The most surprising of all wildfires were multiple wildfires in 2018 in a Swedish town which lies in the Arctic Circle, which shows that wildfires would not occur only in warm weather lands like California. Therefore, in the spring of 2018, Congress classified wildfire as a natural hazard just like hurricanes, floods and earthquakes. This may be very surprising for those who may not know that prior to 2018, wildfire was not classified as a natural hazard and therefore, they did not devote a separate budget for it in Congress. In fact, wildfire does not behave in a similar fashion to other hazards you may know. For example, with earthquakes the energy dissipates over time. But wildfire is a very complicated phenomenon and its simulation is very complex.

Wildfires are the only natural hazard in which the intensity of the hazard increases with time. The ignitable structures act as fuel to the ongoing fire and, therefore, causing it to spread over time. Therefore, simulation of a wildfire, whether it is in wildland or it is within communities, is a complex simulation.

[31:25] For example, in the first stage you should compute the initial ignition – which indicates what the chance or the likelihood is that there will be ignition in a particular area. After the fire ignition, we have a fire propagation or wildland fires – fire would propagate and it would reach the community. Then we have ember attacks or, what we call it, Wildland Urban Interface (WUI) fires. After the ember attacks, the wildfire would propagate within the communities.
The most accurate tools are computational fluid dynamics, or CFD, which can completely model and simulate a wildfire area. But they are very expensive in terms of the computational budget and are completely infeasible for very large problems, especially at the community level. If you wanted to simulate a wildfire in Northern California, in 2020, it would be completely infeasible to use CFD – that's why we use simpler models.

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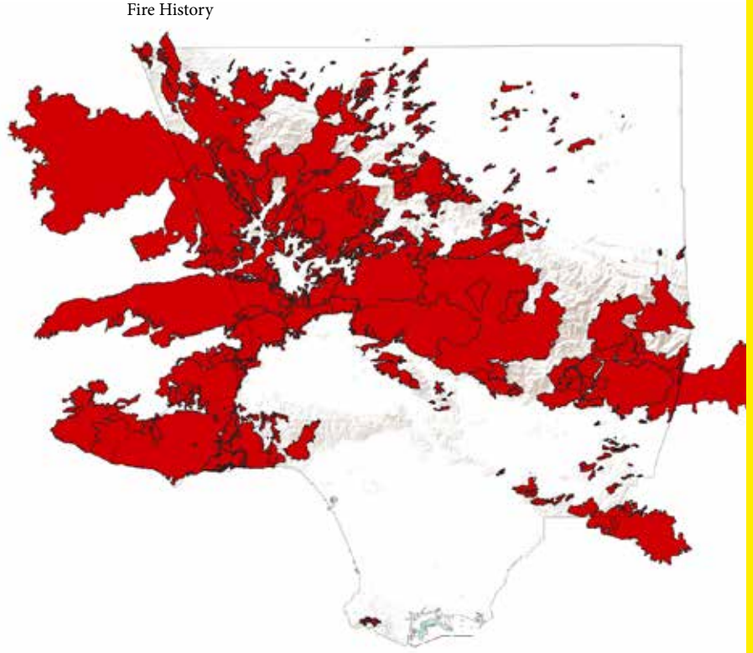
For simulating wildland wildfires, there is a typical method called cellular automata models or CAM. I will not talk about the mathematics of it, but cellular automata can tell you probabilistically how the fire will be propagated over time and within the communities based on the current weather conditions, vegetation, and fire breaks in the area.

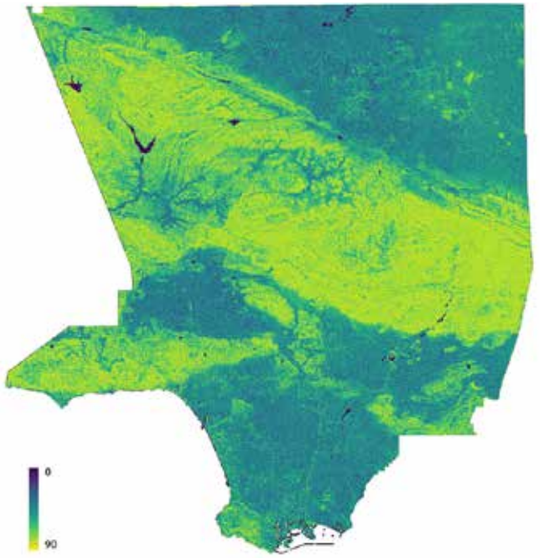
[31:25] There are several methods, but most of them are based on graph theory models that try to mimic the behavior of fire within the communities. These graph theory models are the same as the models that simulate a transmission of disease in social networks. Currently, they are using it to simulate how COVID is propagating in a community. For example, if there is a patient that carries the virus, what is the chance that the people around them would get the virus? We use it for wildfire stimulation in the same way. If there is a burning house, what is the chance that the structures around it will get ignited too? These embers, If you will, are like people who don't respect social distance and go close to other people and transfer the virus to them. Similarly, an ember attack in wildfires would propagate a fire in a community quickly.

Fire History

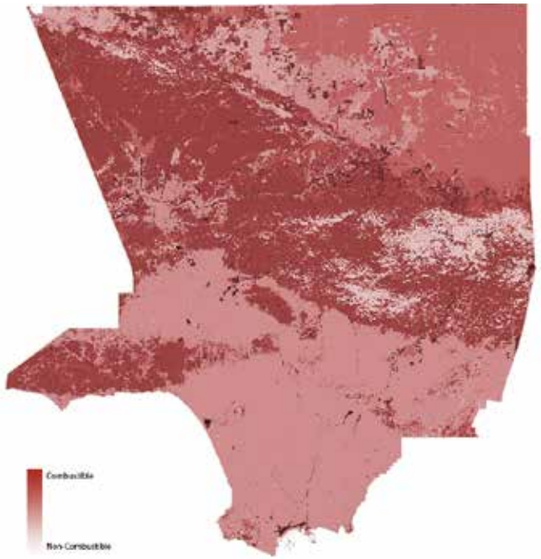


Kaiwen Yang and Guannan Wang.
Fire Cartographies. *The Map is not the territory*. Tech Seminar "The Map is not the territory." AUD UCLA.
Instructor: David Jiménez Iniesta

Slope analysis



Combustibility



Hillshade Analysis

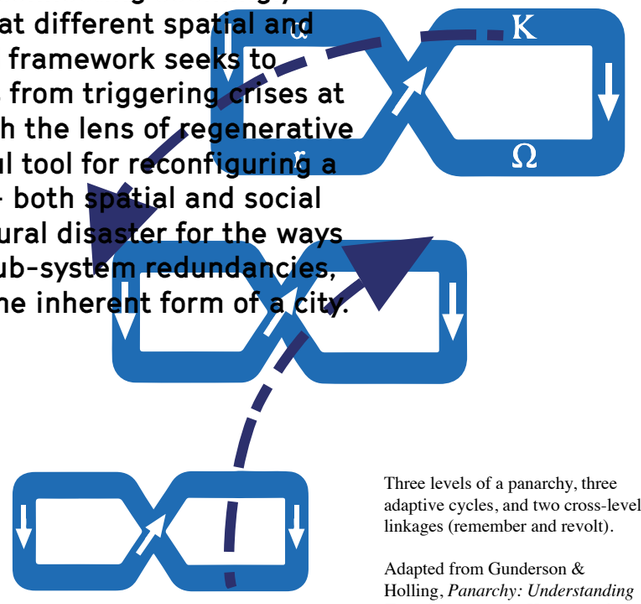
WUI

Panarchy in Regenerative Urbanism

Yuqi Zhang, Andrew Gonzales

Fire City Research Studio
Instructor: Hitoshi Abe

It is imperative that planners and designers use Panarchy, an interdisciplinary conceptual model for associating multi-scalar interactions within a system, as a framework for developing new strategies for disaster risk management in urban planning and policy implementation. While mapping the multi-pronged effects of the climate crisis on cities is compatible with the Panarchy diagram, system-wide solutions are often passed on for being too economically infeasible in the short term due to the redundancy such proposals would require. Natural disasters can happen at any point – they only become crises when mitigative systems begin to collapse in response. By interconnecting seemingly disparate systems that operate at different spatial and temporal scales, this conceptual framework seeks to prevent targeted, local solutions from triggering crises at regional or global scales. Through the lens of regenerative urbanism, Panarchy is a powerful tool for reconfiguring a city's organizational structures – both spatial and social – before, during, and after a natural disaster for the ways in which it, and its associated sub-system redundancies, allows designers to reconsider the inherent form of a city.



Three levels of a panarchy, three adaptive cycles, and two cross-level linkages (remember and revolt).

Adapted from Gunderson & Holling, *Panarchy: Understanding Transformations in Human and Natural Systems* (Washington: Island Press, 2002)

Panarchy is an interdisciplinary conceptual framework deployed primarily[1] in systems theory and ecology. It allows for different scales of interactions to be mapped into a super structure and posits that "change at one level can influence others, cascade down or up levels, reinvigorate or destroy."[2]

It is imperative that planners and designers use Panarchy as a framework for developing new models of disaster risk management in urban planning and policy implementation. Cities and their standard processes are often described through Panarchy diagrams for the ways in which analysts can visualize interdependent economic, social, environmental, cultural, and technological factors that occur within them.

Yet, while mapping the multi-pronged effects of the climate crisis on cities is compatible with the Panarchy diagram, system-wide solutions are often passed on for being too economically infeasible in the short term. Natural disasters can happen at any point – they only become crises when mitigative systems begin to collapse in response. By interconnecting seemingly disparate systems that operate at different spatial and temporal scales, this conceptual framework seeks to prevent targeted, local solutions from triggering crises at regional or global scales due to unintended consequences.[3] Through the lens of regenerative urbanism, Panarchy is a powerful tool for reconfiguring a city's organizational structures – both spatial and social – before, during, and after a natural disaster for the ways in which it allows designers to reconsider the inherent form of a city.

The key to this system, and a major idea explored in this paper, are the redundant, interlocking loops that compose the hierarchical diagram. At every level, exploitation and conservation are altered by release and reorganization; this pattern is cyclical and multi-scalar, for release has the capacity to jump scales and destabilize very slow processes at a rapid pace. At the intra-cycle scale, redundancy maintains normal functionality of a temporal system: companies grow, stagnate, collapse and reorganize often without much shock to their local economies. Redundancy, at this scale, maintains the healthy cycle of growth, collapse and regeneration. At the intercycle scale, however, redundancy works to prevent the potentially damaging effects of cascading revolt: the collapse of one company, if not for economic redundancies and protective policies, could trigger widespread economic damage. Designing resilient cities with redundancy, as a physical manifestation of Panarchy, is crucial in any regenerative urbanism scheme because it can be deployed to maintain long-term stability by compartmentalizing local phenomena and allowing for short-term instability.

1. Panarchy was popularized in systems theory by Gunderson and Holling in 2002, but the term was first coined by Paul Emile de Puydt in 1860. It was theorized as a radical *laissez-faire* solution for self-governance that allowed for every citizen to choose the form of governance that suited them best; thus, it extended market theory and competition to government itself.

2. Lance H. Gunderson and C. S. Holling, *Panarchy: Understanding Transformations in Human and Natural Systems* (Washington: Island Press, 2002), vii.

3. Gunderson and Holling, *Panarchy*, vii.

Infrastructural Redundancy

Infrastructural redundancy refers to physical forms of redundancy built into structural systems. It is critical for any regenerative urbanism conceptualized through Panarchy and actualized through redundant strategies for the continued functioning of a city during and in the aftermath of a disaster event.

The electrical grid is hierarchical, exhibiting spatial and temporal organizations that have cascading effects. Though they are at constant risk of failure from human interference and weather events, many are designed in order to prevent cascading collapse. In New Jersey where hurricanes can easily bring down power lines, The Electric Distribution Companies (EDC) "have incorporated measures that usually ensure uninterrupted connectivity to adjacent circuits if a substation fails."[4]

Redundant circuits, power generation stations and the integration of solar power for individual home use ensure that the system overall is capable of resisting failure. Failure to imbed redundancy in the power[5] grid can prove disastrous. The recent cold snap and subsequent power grid failure in Texas is a timely warning about the need for redundancy. Except for small areas of West Texas, "the power system that serves 90 percent of the state is intentionally isolated from the rest of the country…[and the] competitive wholesale power market offers scant incentives for investment in backup power." Winter storms like this most recent one have not been seen in Texas for generations, and winterizing equipment can be a costly endeavor. These, coupled with the unregulated energy sector in Texas created a deadly scenario in which power companies, more concerned with their profits, paid little attention to ensuring reliable service with built-in redundancies mandated by governments in other states.

Additionally, consider the failure of the levees in Louisiana in the aftermath of Hurricane Katrina: "the cumulative effect of using a target factor of safety of 1.3 and overestimating the soil strength"[6] on top of an engineering error that created a water gap between the wall and the soil barrier greatly reduced the effective critical capacity of the levees. These compounding errors created a scenario in which many of the levees failed due to the weight of water behind them, rather than being overtopped; in other words, they failed to perform the very task they were engineered to do. In an engineering context, redundancy does not need refer to the overall number of levees but rather the internal design features within each. In a Panarchy, redundancies at the local scale can prevent an omega factor -- revolt or crisis -- from cascading upward to the regional or global scale and overwhelm the entire system.

This has widespread implications for regenerative urbanism, in which disaster risk mitigation and recovery are inextricably linked to a city or region's ability to address cascading crisis factors. Redundancy embedded within urban infrastructure, zoning, resource management, community organizations, etc., will not prevent climatic and geologic events, but they can prevent these events from turning into disasters. How might a city look and function if Panarchy and redundancy are embedded from the beginning? The next few examples, which look at multi-scalar community planning projects, may provide a starting point, though under the current economic regime, redundant planning at most scales may not be entirely feasible, and steps into the theoretical may be required to develop these models into a fully functional regenerative urbanist praxis.

4."New Jersey: Grid Redundancy Prevents Large-Scale Power Outages," State of New Jersey Office of Homeland Security and Preparedness (NJOHSP), last modified March 1, 2017, https://www.njhomelandsecurity.gov/analysis/new-jersey-grid-redundancy-prevents-large-scale-power-outages.

5. Julie A. Cohn, "Texas Seceded from the Nation's Power Grid. Now It's Paying the Price.," The Washington Post, last modified February 17, 2021, https://www.washingtonpost.com/outlook/2021/02/17/texas-power-winter-storm/.

6. Cohn.

Urban Planning Redundancy

Urban Planning Redundancy has many implications for infrastructural redundancy, as the implementation of repetitive organizational strategies within a city directly impacts roads, power lines, and other systems. However, this form of redundancy is distinct because the 'crises' this form responds to are not acute incidents. Rather, urban forms emerge in response to long-term trends including economic factors, speculative population growth or decline, climate change, and more.

Gran Barranquillas 2050 is a proposed master plan for Barranquilla, Colombia developed by Bjarke Ingels Group (BIG) that attempts to direct the current and expected exponential urban growth of the city into its surrounding hinterlands and prevent sprawl. Using repetitive sets of mass transit lanes, ecological corridors, waterways, the plan attempts to manipulate growth into a series of 'islands' and 'fingers' tied back and easily accessible from the old city. Panarchy exists in the multiple layers of articulation within the plan. Because "transit-oriented development [and associated walkable distances are deployed] as… basic unit(s) for growth…the width of fingers and islands…are calibrated" for neighborhood scale development. At the same time, the transit network operates on a larger regional scale in the way it attempts to revitalize the post-industrial waterfront across the city. Structural redundancy in transit options – light rail, bus, car, and boat – link the newly developed urban pockets and have their own trajectory for growth that correspond and deviate from higher (city) level and lower (neighborhood) level cycles at different spatial and temporal scales. This project makes clear the distinction between urban planning redundancy and infrastructural redundancy: urban planning redundancies create strategies for long-term urban forms. While this may have implications for lower level infrastructural development, it operates at a different spatial and temporal scale and provides multi-scalar organizational strategies for sustainable development.

At a smaller scale than a city plan, Magarpatta City, Pune, India is a township owned and operated by land-owning farmers who live in the region. It was created under the Integrated Township Policy in India which "emphasizes on the role and rationale of the townships in sustainable urban development"[8] through public private partnerships with the goal of allowing smart growth without the need for heavy bureaucratic input. In order to be eligible for township consideration, groups must commit to specific educational, residential, recreational, and commercial allotments without putting pressure on local municipal resources. Construction began in 2001 and the master plan was devised with five core tenets: "a clean and sustainable environment; good living standards; modern educational infrastructure; state-of-the-art working conditions; and reliable security."[9] Environmental conditions were comprehensively considered for health and wellness, rainwater harvesting, soil preservation, and in many other aspects of construction and development. Though there are 120 investing families, residential space has been allocated for 35,000. Magarpatta City is largely self-sufficient when it comes to economic sustainability, waste management, landscape management and energy production. As this is a private enclave of sorts, exclusivity has its own implications and issues for large-scale implementation, including issues of equity, resource hoarding, in-crowds and the other of 'outsiders,' and compartmentalized initiatives that have little impact on the greater system. As

7. Jeremy Alain Siegel, "Challenge: Climate Change" (Presentation, ArcDR3 Lecture Series, UCLA, January 15, 2021).

8. Pallavi Tak Rai, "Townships for Sustainable Cities," Procedia - Social and Behavioral Sciences 37 (2012): 417-426, https://doi.org/10.1016/j.sbspro.2012.03.307.

9. Jaideep Mishra, "Pune Farmers Building Sustainable Cities," The Economic Times, last modified December 24, 2011, https://economictimes.indiatimes.com/jaideep-mishra/pune-farmers-building-sustainable-cities/articleshow/11227392.cms?from=mdr.

of 2010 there are currently 101 townships established around the 7 largest cities in India; 57 of these focus primarily on residential space with small retail and healthcare facilities while the remaining 44 are larger, containing multi-family residential complexes, retail space, entertainment space, education facilities and more.[10] During the pandemic, demand for integrated township residency has increased due to their internal organizational strategies and relative low impact on quality of life during the months'-long work-from-home periods. With more in the pipeline, Integrated Townships, and Magarpatta City in particular, provide a proof-of-concept model for compartmentalized, redundant, and decentralized urban planning that provides for necessary infrastructure and amenities at a self-sustainable neighborhood level.

(Social) Network Redundancy

Social redundancy is the human aspect of redundancy that is crucial for maintaining community organizations and initiatives. Community organizations interface with differing and overlapping sub-communities to maintain the social cohesion of the greater city. They can adapt, expand, join forces and reach out to new communities in response to crisis and create a safety net to protect the most vulnerable at the point of disaster and in the drawn out process of recovery. These can come in the form of disaster relief organizations and other crisis mitigation teams, but can also be realized as cooperative housing organizations and other entities that have a lasting impact on a community. As hyper local forms of non-hierarchical redundancy, they are capable of nourishing economic viability, land stewardship, and social cohesion in an organic fashion while still interacting with hierarchical, natural, and non-natural systems.

After the deadly 1995 Chicago Heat Wave, researchers discovered that Auburn Gresham, a neighborhood long regarded as one of the most impoverished neighborhoods in Chicago, "never lost its core institutions or its people. Stores, restaurants, community organizations, and churches animated its streets…[and] residents…knew who they had to keep tabs on."[11] The social fabric of a community actually has the capacity to save lives, and knowing the neighbors and those who may need assistance are incredibly important in disaster preparedness. This form of social network redundancy is highly organic, developed over generations, and is intensified through local small scale economic disaster via disinvestment. However, there are other ways to strengthen social cohesion through intentional community planning.

Cooperative City, or Co-op City to most, is a massive cooperative housing project located in the Bronx along the Hutchinson River. The 50-year-old housing project "provides homes for over 15,000 families across 35 buildings, and supports its own schools, weekly newspaper, power plant, and planetarium."[12] Though there is a great amount of diversity among the 42,000 residents[13], they have come together as a community to support a great number of causes. During a particularly dangerous snowstorm, residents opened their doors to the unhoused, and for 13-months, the residents banded together to protest rent hikes. Social infrastructure is far more complex than most physical infrastructures and can be hard to map. However, they are inherently redundant due to the nature of human relationships and overlapping in-groups ranging that span floors and buildings. Yet, like physical infrastructures, social networks can be framed within a Panarchy that as Gunderson and Holling suggest can overlap and intersect with natural and non-natural hierarchical cycles.

10. Times Property, "Work-from-home Raises Demand for Integrated Townships," last modified November 9, 2020, https://timesproperty.com/news/post/work-from-home-raises-demand-for-integrated-townships-blid456.

11. Alice Alexander, "Want to Survive Climate Change? You'll Need a Good Community," The Cohousing Association of the United States, October 31, 2016, https://www.cohousing.org/want-to-survive-climate-change-youll-need-a-good-community/.

12. Lucie Levine, "50 Years at Co-op City: The History of the World's Largest Co-operative Housing Development," 6sqft, last modified December 10, 2018, https://www.6sqft.com/50-years-at-co-op-city-the-history-of-the-worlds-largest-co-operative-housing-development/.

13. 2019 American Community Survey, "Co-op City Demographics," Point2, last accessed February 26, 2021, https://www.point2homes.com/US/Neighborhood/NY/Bronx/Co-OP-City-Demographics.html.

Conclusion

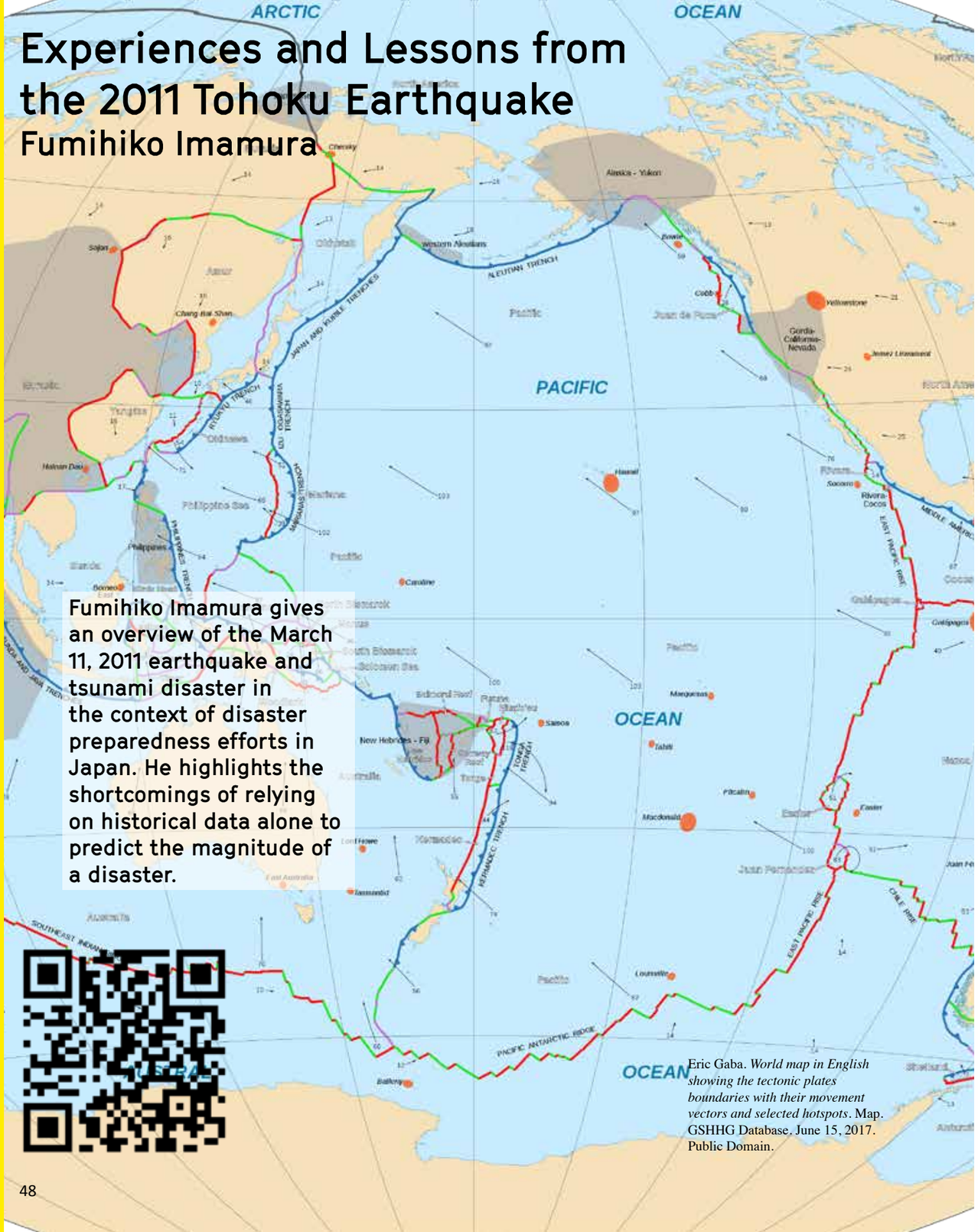
Regenerative urbanism requires the wholesale restructuring of urban planning, modes of production and consumption, and ecological stewardship. Furthermore, it must incorporate and consider redundancy, adaptability, interdependency, complex behavioral models, and the needs of communities and natural ecologies above the need for capital expansion. It is an incredibly complex issue that has no definitive solution because every urban area faces unique challenges and should develop different strategies to reflect their own history and risk of disaster response.

By introducing Panarchy as a framework for considering multi-scalar redundancies in form, function, and social organization, designers are equipped with a powerful tool for imagining possibilities as well as their hierarchical effects. Infrastructural redundancy illustrates the need to move away from fracture critical infrastructure, and that the costs associated with overdesigning a system prove well-spent in preparing for events yet to occur. Urban planning redundancy allows for overlapping and compartmentalized forms; repetitive networks in the urban fabric allow for individual pockets of urban development to fail in a crisis without unraveling city-wide processes. Moreover, repetitive clusters of development can absorb the failed clusters' production capacity and population. Social network redundancy can be seen as the glue holding these other forms of redundancy together, for collectively, communities maintain the base of knowledge for operating, expanding, and adjusting these other forms to better suit the needs of the greater city and its residents.

Understanding and implementing Panarchy in design is not an easy sell, for all of these aforementioned ideas have associated costs that can be unpalatable to developers and communities who do not fully grasp the spatial and temporal scale of both acute and chronic climatic crises. However, the Panarchy diagram provides an accessible framework for considering the effects of one development on others across space and time.

Experiences and Lessons from the 2011 Tohoku Earthquake

Fumihiko Imamura



Fumihiko Imamura gives an overview of the March 11, 2011 earthquake and tsunami disaster in the context of disaster preparedness efforts in Japan. He highlights the shortcomings of relying on historical data alone to predict the magnitude of a disaster.

Eric Gaba. *World map in English showing the tectonic plates boundaries with their movement vectors and selected hotspots*. Map. GSHHG Database, June 15, 2017. Public Domain.

[10:51] This is a very well known map (below). We are living in the ring of fire, on the boundary of the Pacific Ocean plate, so we cannot control and avoid such disasters. But we can reduce and mitigate the damages, especially if we build back better.

[11:58] You can see the activity of the large earthquakes followed by tsunamis for the first 100 years of the 20th century. So it looks like every 50 years we have the kind of the high activity of the giant earthquake and tsunami.

The 2011 Tohoku earthquake and tsunami was the largest earthquake-tsunami in Japan's past. We used the historical geophysical data for the evaluation and prediction, yet the 2011 event was not well predicted. So we have the triple disaster, one is the earthquake, second is the tsunami and third is the Fukushima nuclear accident. We need a new interdisciplinary approach to enhance the counter measures, by sharing experiences in 2011.

[15:01] So now let me start with some information on the earthquake tsunami. On March 11th, the magnitude was estimated to be around 9, 30 or 40 times and larger than our histories. Unfortunately the magnitude of the 2011 earthquake covered the whole area offshore of Sanriku and extended to Fukushima. This has not ever occurred in the past and is the largest earthquake in Japan. After the earthquake a tsunami was generated. We have a running system to inform people when a tsunami is coming, but the actual tsunami was so much larger than we predicted. Some infrastructures within the area, such as highways, play a very important role. The ordinary use is a highway, but in the case of a disaster, it functions as a safety retreat. So after the earthquake tsunami we found many other damages, for example you can see the change of topography and erosion, as well as fires. Tsunamis sometimes cause fires because of a chemical reaction caused by the attack of the water with electricity. So, clearly there are so many possibilities in terms of secondary disasters after a tsunami.

[22:40] As I mentioned earlier, we have a tsunami warning from the Japan Meteorological Agency, which is the official announcement system.

By using the database we can estimate the tsunami height and allowable time for the people to take action; but the issue is that the database is made based upon the historical data, so as of 2011 there had been no recorded tsunamis of this magnitude.

The first announcement said the tsunami was small so some of the people stopped evacuating, which is a huge problem for us. So the main reason why we have underestimated the tsunami is because of the underestimation of the earthquake.

This text is derived from a lecture recording, not intended to be published as an article.

Architecture and Urban Design for Disaster Risk Reduction

Osamu Murao

Osamu Murao gives an overview of the components of urban disaster risk, and the architectural and urban design responses to it.

Hokusai, Katsushika. *The Great Wave off Kanagawa*. *Painting*, Wikimedia Commons. Metropolitan Museum of Art, online database: entry 45434. March 17, 2015. Public Domain.

This text is derived from a lecture recording, not intended to be published as an article.

[45:13] Today my topic is architecture and urban design for disaster risk reduction. My presentation consists of three parts: first urban disaster risk, then architecture and urban design in the disaster life cycle, and finally a history of great fire and urban development in Japan. I have been involved in the research on the risk since 1995, the year of the great Kobe earthquake, when I met Professor Hitoshi Abe in Yokohama for the first time. I was thinking about this question of how we can evaluate urban disaster risk. I later found one concept from a United Nations report that included this formula: that urban disaster risk is a product of hazard, vulnerability, and exposed value.

[46:54] This is the mechanism of disaster occurrence. According to the impact level and vulnerability of the urban system, the result (the output) refers to the damage level or no damage, and the vulnerability of the urban system is based on its characteristics; social, physical, or temporal.

So, urban disaster risk is a product of hazard, vulnerability and exposed value. But we cannot control earthquake occurrences or a typhoon coming therefore we cannot stop or control hazards.

[50:51] Additionally, the exposure value is the number of people or the number of buildings, and so the prosperity of the cities is directly related to exposure value. So to reduce urban disaster risk we have to reduce vulnerability.

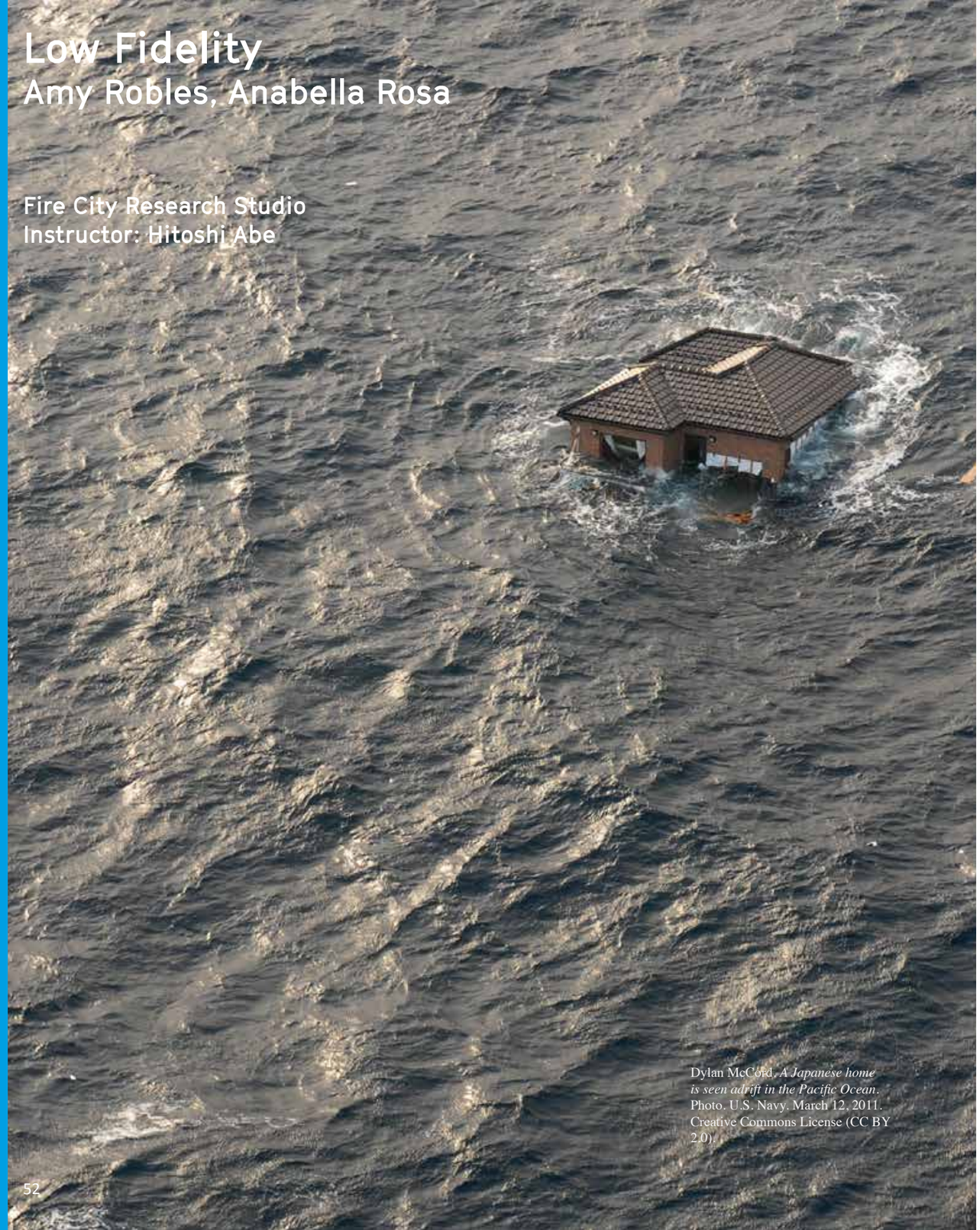
[52:07] The second part is architecture and urban design in a disaster life cycle. When we think of disaster management we often use this concept of disaster life cycle. In a disaster life cycle, in order to manage the disaster management it's easier to think of it as four phases of this cycle. After the disaster, is the first response phase, then recovery or construction phase, and then for the future disasters we have to think of mitigation and preparedness. These are four basic phases.

[1:03:27] In Japan, we had these types of houses with wood or paper, very vulnerable materials, and as a result we have had lots of great fires in our history. In 1893 the Great Fire occurred in Kawagoe City Saitama prefecture. After this fire, most of the buildings were replaced by warehouses with a roof made of unburnable material, this is an example related to the building material in order to reduce urban risk. In 1923, Great Kanto earthquake happened and was one of the most catastrophic disasters in Tokyo. We have had lots of earthquakes and great fires and if we have learned anything from these past disasters it is the trend of the number of deaths and missing persons in disasters. We see the number of deaths is reducing, with the exception of the Kobe earthquake in 1995 and 2011 Great East Japan earthquake but in general, the numbers are reducing. This is because of the development of disaster management systems, promoting national land conservation, improving weather focusing technologies and upgrading disaster information communication systems.

Low Fidelity

Amy Robles, Anabella Rosa

Fire City Research Studio
Instructor: Hitoshi Abe



Dylan McCord, *A Japanese home is seen adrift in the Pacific Ocean*. Photo. U.S. Navy. March 12, 2011. Creative Commons License (CC BY 2.0).

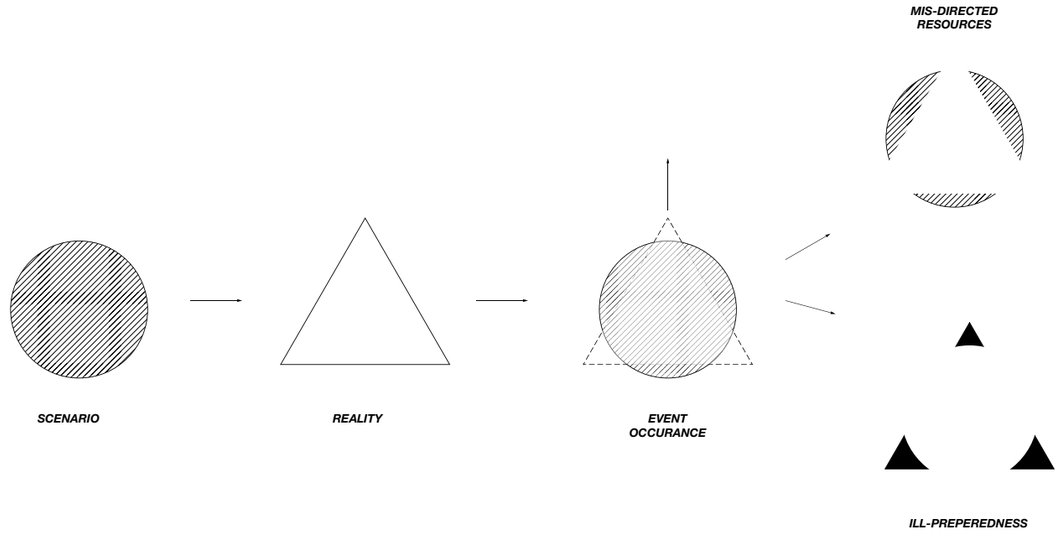
LOW FIDELITY is a term describing our approach to the inevitable gap between scenario and reality in models and predictions of disaster events. Calibrating the parameters of this gap in order to be able to design with enough flexibility to allow for deviation is an essential aspect to regenerative urbanism. Of course, there must be some accordance to estimations of what the future holds, especially given increasing technology in prediction modeling -- However, the departure point for designing with true resilience is accepting that the future is ultimately unknowable.

Generally, disaster event models are created through methods involving data collection of environmental and human factors in conjunction with risk prediction and analysis. In understanding risk as the combination of the likelihood and severity of a potential undesirable scenario, these assessments are garnered for the purpose of presenting options to policy makers hoping to increase community resilience to these events, as well as decision makers facing an imminent or current disaster event[1]. In other words, prediction models provide quantitative analysis of scenarios that are likely to take place at different internals of time (once-a-year; once-a-decade; once-a-century, etc). With this information, authorities making decisions for the well-being of larger communities seek direction and justification in the prescribed policies, use of resources, or particular course of action. Disaster events of different forms take on different modeling techniques and present specific challenges in predictability (as we will discuss later). However, the common thread throughout this mode of disaster preparation relies on creating a reasonably accurate scenario and then determining a particular stance or response ex-post-facto, in order to facilitate a community's preparedness and capacity to recover as much as possible.

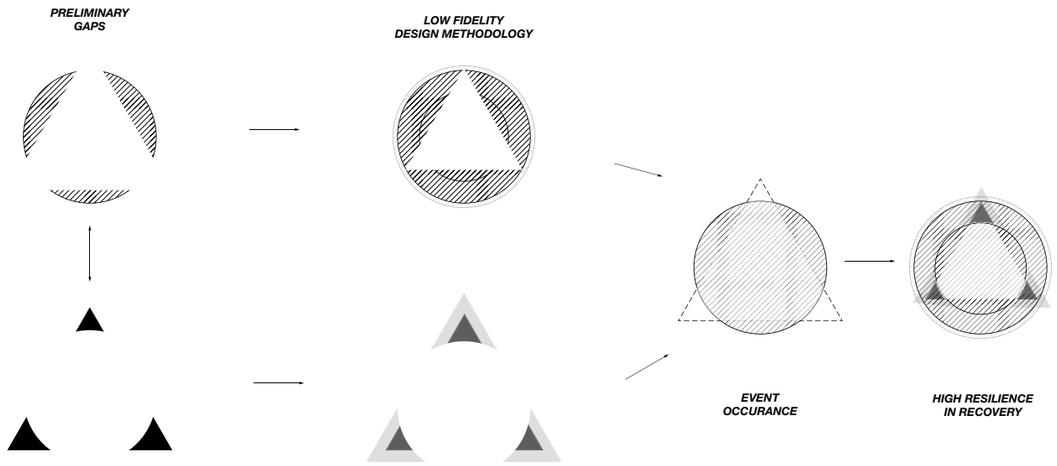
Our LOW FIDELITY approach to regenerative urbanism reverses the relationship between predicting an event and subsequently designing to some level of adherence to that model -- rather, starting with a design methodology that places importance on a flexibility to accommodate the gaps and incongruities between predicted scenarios and actual events. To illustrate how this approach can be applied to different types of disaster events, we will focus on three case studies – tsunami/flash flooding, hurricane/tropical storm, and wildfire. For each study, we will describe current practices of modeling and prediction (as well as how these predictions factor into community planning and policies) and present examples of recent design strategies that incorporate what we characterize as a LOW FIDELITY approach. Despite our separation of these disasters in order to narrow the scope of analysis for each event type, it is important to note that natural disasters can often have a ripple effect, meaning one disaster can lead into another, not just of natural disasters, but inclusive of social, political, and economic disasters as well. This is especially relevant in understanding how predictions of disasters have the potential to affect the modeling and projections of others.

1. Ali Mosleh and Saeed Nozhati, "Why and How we do Probabilistic Risk Assessment" (Presentation, ArcDR3 Lecture Series, xLAB Research Studio, UCLA, October 15, 2020).

Typical Approach



Low Fidelity Approach



Tsunami Disasters

The predicting and monitoring of coastal disasters, specifically tsunamis, is extremely challenging due to the vast size of the ocean as well as difficulties in access. Another challenge specific to tsunamis is that their predictions are frequently reliant on the predictions of earthquakes since that is how a tsunami is most commonly generated. This multi step prediction process makes the accuracy of predicting a tsunami that much more difficult and creates higher deviations of error. Despite these challenges, predictions and forecasting must be done in order to provide safe ways of living as well as evacuating for potentially impacted communities.

Although there are many unknowns in any given disaster scenario, there are some well-understood factors that are used in tsunami forecasting. For example, sea depth directly impacts the speed at which a tsunami travels. Once an earthquake is predicted, it is relatively easy for central agencies to predict when a tsunami will hit any given coastline. Long term seismic evaluations can help to forecast the timing and magnitude of future earthquakes as it did in the case of the 2011 Tohoku, Japan earthquake and tsunami. In this instance, the timing of the earthquake was as expected, yet the magnitude was far greater than anticipated. The magnitudes predicted were based on seismotectonic features according to the provinces and the maximum magnitude predicted for the Tohoku region was Mw 8.5 in comparison to the actual magnitude of Mw 9.0.[2] In 1999, the Japan Meteorological Agency (JMA) established a new tsunami warning system which was further updated in 2006 to some of the highest standards and prediction methods and even exported to other countries around the world. Furthermore, compared to the 2004 Sumatra-Andaman earthquake tsunami which was of similar magnitude and resulted in 220,000 fatalities, Japan's 2011 occurrence only resulted in 18,000 fatalities[3]. This striking difference between the two figures has much to do with the high level of preparedness that Japan has encouraged in its residents and policies- much of this attributed to experience based on past disasters. Therefore, we can see that the devastating impacts of tsunamis are not only affected by the potential inaccuracies in forecasts, but also by the preparedness and reaction of the community. It is not sustainable, nor logical to put all our trust in the accuracy of prediction modeling or in community response and reaction, but a combination and alliance of the two.

The catastrophic tsunamis that have impacted Japan have forced cities to develop plans and strategies to best prepare and handle inevitable disasters. Throughout Japan, hills and elevated open areas have been implemented as a safety location in the case of a tsunami (See Fig 1). These areas are zoned against any type of residential construction and are temporal in their program. This strategic attempt to provide areas of refuge in any number of disaster scenarios exhibits a mode of thinking in the realm of LOW FIDELITY. Here we can see an intermingling of policy, planning and design centered around both flexibility and indeterminacy -- resulting in a regenerative urbanism left open enough to account for the unknowable and unpredictable.

2. Shunichi Koshimura and Nobuo Shuto, "Response to the 2011 Great East Japan Earthquake and Tsunami disaster," Philosophical Transactions of the Royal Society A, 373 (2015): 1-15, https://doi.org/10.1098/rsta.2014.0373.

3. Koshimura and Shuto, 1-15.

Amy Robles and Anabella Rosa. *Low Fidelity Diagrams*. Fire City Research Studio. AUD UCLA. Instructor: Hitoshi Abe

Hurricane Disasters

In the case of hurricane and tropical storm disasters, prediction models vary widely both in methods of data projection and in lead time from the event. Storm guidance models are characterized as either early or late, depending on whether or not they are available to hurricane specialist agencies during the forecast cycle. “Spaghetti” models are early prediction tools which depict all possible paths of a storm at any moment. Figures 2 and 3 below show spaghetti plots for Hurricane Sandy at different stages of development of the storm. The first indicates an incredible range of possible areas that have different probabilities of being within the storm’s path. The second zeros in on the Eastern seaboard, but it still does not provide a definitive area in which to focus storm preparedness resources (or enough information to make a decision about evacuation orders).

There are dozens of types of different models used by the National Hurricane Center to predict both the track and intensity of storms[2]. Multi-layer dynamical models, which are the most complex and detailed, are examples of late guidance models. The National Hurricane report providing a technical overview of these models states: “Dynamical models are the most complex and most computationally expensive numerical models used by NHC. These models make forecasts by solving the physical equations that govern the atmosphere, using a variety of numerical methods and initial conditions based on available observations. Since observations are not taken at every location in the model domain, the model initial state can vary tremendously from the real atmosphere, and this is one of the primary sources of uncertainty and forecast errors in dynamical models.” Despite the fact that these models are relatively accurate (according to hurricane “verification” reports published by the National Hurricane Center), they are only available in the late stages of the development of a storm system. While generally officials have an idea of most extreme, potentially deadly storms in time for people to evacuate, it is more difficult to implement long-term policies and resource direction based on these types of models. Additionally, as a result of global climate change, these storms are getting increasingly larger and more extreme, as storm seasons last longer -- meaning that areas which would potentially need to be evacuated or otherwise protected with storm resistant infrastructure are on an upward trend as well.

The BIG U project proposed under the Rebuild by Design initiative demonstrates aspects of design strategy with LOW FIDELITY. Thinking beyond what potential future storms could bring to the area in terms of intensity (especially as ever-increasing extreme weather patterns make “unprecedented storms” seemingly ubiquitous) the BIG U project takes on lower Manhattan’s risks of flooding from multiple perspectives and provides a level of flexibility via context-specific program. The BIG U utilizes adaptable structures and a variety of urban interventions to increase hurricane resilience at different levels. Figure 4 maps out different facets of the project along a portion of the Lower East Side; visually describing layers of edges, drainage systems and protective barriers, integrated into the existing program of roads, bike paths and park space. In this project, we understand the importance of the role that indeterminacy can play at this level of design: leaving gaps for the unpredictability of adaptive use infrastructure. Therefore, the BIG U project provides a key example of depicting a type of regenerative urbanism reliant on flexibility and adaptability to a range of scenarios.

4. National Hurricane Center and Central Pacific Hurricane Center, “NHC Track and Intensity Models,” National Oceanic and Atmospheric Administration, last modified June 11, 2019, https://www.nhc.noaa.gov/modelsummary.shtml.

Wildfire Disasters

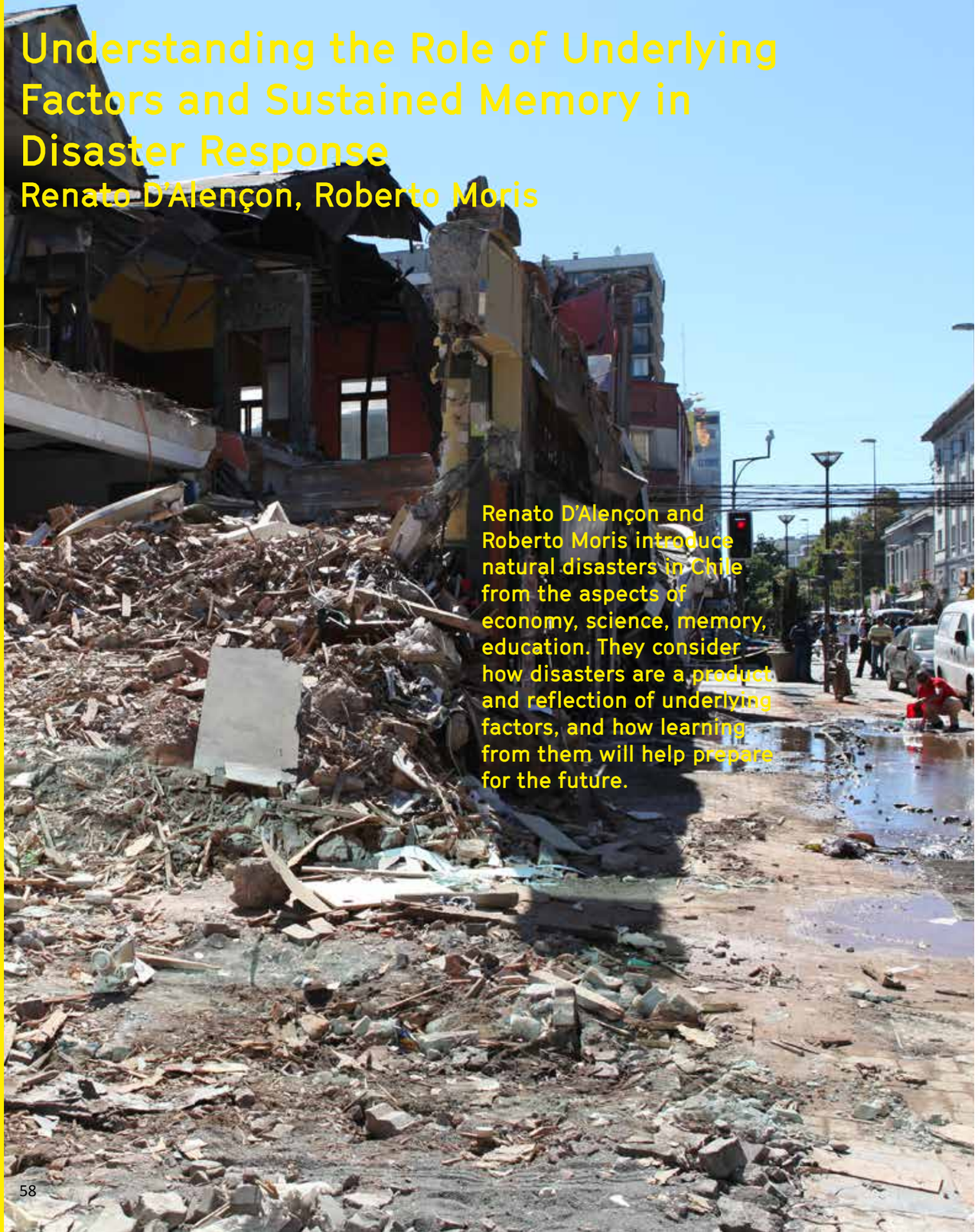
Predicting wildfires is especially difficult (even among the complex practice of predicting natural disasters in general) because the human factors involved have a relatively higher impact on the modeling of these events. For example, the actions of a single individual would not result in a tsunami or hurricane, but that is not the case with wildfire. The field of wildfire prediction uses computational fluid dynamics models which are highly complex and expensive, basing predictions from factors such as topography, climate, wind, drought level, vegetation and fuel. However there are apparent trends in global climate change (resulting in severe drought and elongated fire seasons) as well as development and growth in the Wildland Urban Interface (WUI) that contribute to increasingly destructive wildfires. In recent years, there has been a practice of shutting off power in a high-risk area when conditions are favorable to wildfires. This can be understood as a decision made according to predictive fire behavior and is an example of a clear way in which we as humans can help to lower the likelihood of ignition. It is important that these types of measures are carried out in tandem with personal preparedness in unexpected wildfire scenarios. Although many components within prediction models are accurate, with both our urban and environmental climates constantly changing it can be a challenge to predict to perfection. Therefore, it is crucial that when designing in the WUI, we do so with flexibility and the understanding of LOW FIDELITY in mind.
The concept of regenerative urbanism can be approached with LOW FIDELITY in rethinking and redesigning the WUI. As a site at very high fire risk, the WUI is an appropriate area to incorporate new strategies in development and fire resistant infrastructure. If we can design with the future, and the challenges it will present, in mind, we can create environments which will become more and more disaster resilient as we move forward.

Conclusion

Each time a disaster occurs we are able to gather more information, and with this, better predict the future. It is important that within this regenerative urbanism mindset we are able to consistently improve and design more resilient communities and environments alongside the occurrence of these disasters. This LOW FIDELITY concept can equip environments as well as their communities to adapt and adjust to a given disaster in a more flexible and disaster specific way. As architects and designers integrate this approach into design methodology, we can more adequately prepare for outcomes and scenarios, rather than intentioned form or specific structures. LOW FIDELITY as it applies to regenerative urbanism seeks to mediate between the objectives of designers and the needs of community members and stakeholders.

Understanding the Role of Underlying Factors and Sustained Memory in Disaster Response

Renato D'Alençon, Roberto Moris



Renato D'Alençon and Roberto Moris introduce natural disasters in Chile from the aspects of economy, science, memory, education. They consider how disasters are a product and reflection of underlying factors, and how learning from them will help prepare for the future.

Masonry office building in the downtown area of Concepcion, Chile collapsed as a result of the M 8.8 earthquake on Feb. 27, 2010. The construction of this building predates the establishment of strict building codes in Chile, put in place following the devastating earthquake of 1960.

Walter Mooney. *Collapsed Building*. Photo. U.S. Geological Survey. Public Domain.

This text is derived from a lecture recording, not intended to be published as an article.

[10:00] In the last two decades, in Chile we have been experiencing a lot of different kinds of events. And for us, that experience has been very important for our future. The other thing is thinking about the connections between the US and Chile. You can recognize how there are some important events in the 19th century in Chile and the US. One is 1906, the same year of the San Francisco Earthquake and the Valparaiso Earthquake. This was quite important because in that moment, both cities were very important in the Pacific Ocean. But after the construction of the Panama Canal, San Francisco was progressing better and better; the exact opposite happened in Valparaiso. At the same time, in the 20th century, Chile had a lot of very important political problems coupled with natural disasters. In 1960, we had the biggest earthquake in history (magnitude 9.5); then in 1973, we had a coup d'etat. And the question for us is what kind of things had we been learning in this process, and how prepared are we for the future?

You can imagine how huge the 9.5 magnitude earthquake was. But another important issue for us was economic access in relation to the leftist government from the end of 1970 to 1973, which was finished with the coup d'etat of Pinochet which started 70 years of dictatorship. We think about how this period was very important in the economical aspect? Because our country created the platform to be a richer country, but at the same time, was a very painful period.

[12:56] In terms of natural disasters, in 2010 we had a major event -- the first big tsunami to attack our country. It was very important for our generation. But last year, the 18th of October, we had this social outbreak, which was very, very, powerful, with a lot of destruction. We were scared in some way, but these social outbreaks represent how tired people are of the society that we have been building for the last 40 years. Is Chile the most neoliberal country in the world, even more than the United States? We have been evolving in several aspects; on one hand we are a lot richer than 30 years ago. But the cost of this development is a very unequal society.

[14:12] In this complex moment, we have also started to suffer from the Coronavirus crisis. In some ways you can think this is bad because it's one crisis over the other one. But at the same time it was good because

crises require us to take notice of the tension, of the existing problems in a broken system. We are interested in these underlying risk factors -- how different hazards attack the same problem and the same vulnerabilities. We want to understand how these underlying factors are conditioning our behavior.

In March, most of the Coronavirus cases were located in the north east part of the city, which is a richer area. This was mainly from people coming from Europe (i.e. richer people having holidays outside), but later the cases moved to the rest of the city and attacked the poorer areas in a very aggressive way. At the moment, we have a lockdown for the whole city. We recognize that some areas are more affected because the level of economic security and the access to health is quite different. As I said, in Chile we have this neoliberal model that helps the richer people. That is how in the process of the Coronavirus the government has started to repress the people because they are the ones who are really tired -- they were tired before, but now they are more tired because of the level of unemployment and other challenges.

In Chile we have been living in a kind of new social outbreak underneath the COVID crisis because this level of impact in the most vulnerable groups is a lot higher than the rest.

[17:42] Some people are worried about having clean hands, but the bigger problems are the economic recession and fighting climate change and biodiversity collapse. We want to be very aware of how these kind of crises are "training" for bigger problems -- or not. A very important point for us is that regardless of what disaster threatens us, the circumstances that underlie them are the same. And more than that, usually the same people that are affected, namely the poor, who live where there's more pollution and where there's more vulnerability.

[23:44] In addition to the hazards mentioned previously by Renato, wildfires are reaching populated areas in Chile as well. For example, the town of Valparaiso (the historical port of the country not far away from Santiago) is surrounded by a monoculture of pine trees that catch fire every summer, which every time are worse and worse.

Jesse Allen and Robert Simmon. *Wildfire Scars Valparaiso, Chile*. Photo, Nasa Earth Observatory. May 4, 2014. Public Domain.

We are not taking the transformative opportunity that such an event has. Fires have been an opportunity in the history of architecture, for instance the fire Chicago, or the fire in Hamburg that broad substantial change in urban transformation over history.[...]

We are not taking the transformative opportunity that such an event has. Fires have been an opportunity in the history of architecture, for instance the fire Chicago, or the fire in Hamburg that broad substantial change in urban transformation over history.

[37:09] Disasters are not exceptions. We need to move from just managing the emergency to focusing on resilience, where resilience is part of the model rather than something extra. For instance, in relation to the social unrest Chile will have a new constitution. A few weeks ago we voted to have a new constitution that will be the first written by 50% women and 50% men. For us that's a new opportunity to redefine the role for the country but at the same time to redefine the model of society. We believe that risk is something that we need to incorporate, not just to be reacting for every emergency. That is why we believe that the first lesson from Chile is related to memory recurrence and preparedness, and how recurrence puts pressure on the permanent institutional system.

Concerns for the sustained memory allows society to be alert. We are alert for the reaction of the system, but it's our interest to be alert about the future. And that is why challenges are improving the stability of the system.

Government of Chile. O*ne of the affected hills of Valparaíso*. Photo. Wikimedia Commons. April 13, 2014. Creative Commons License (CC BY 3.0 CL).

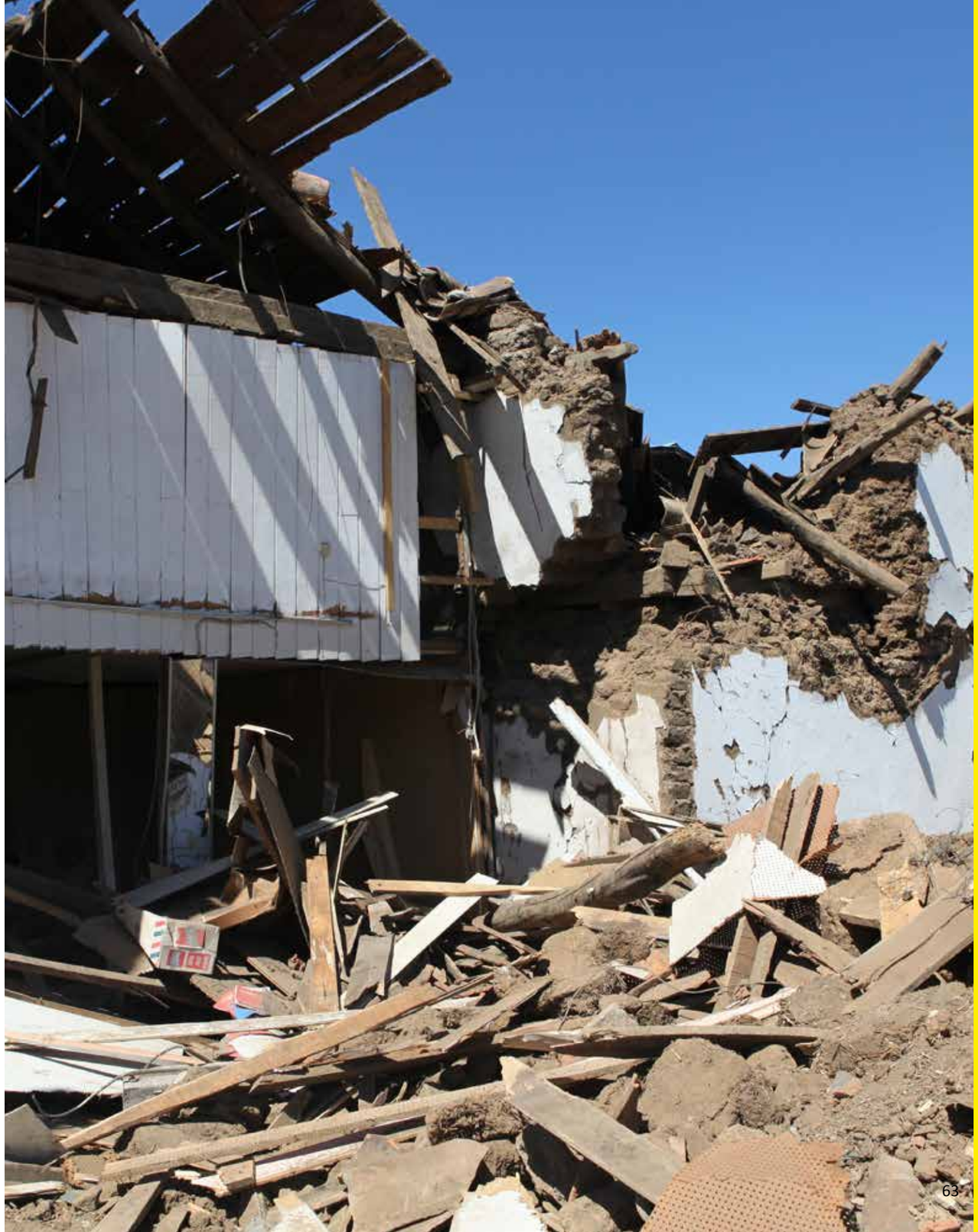
[40:09] Considering the whole cycle of risk, emergency recovery mitigation/preparedness, and enhanced education as a risk management tool is really the Japanese model. We are trying to follow this model, especially the part about how education is a very powerful tool for risk management. For example, in 2010 we had this huge earthquake and tsunami. Our society and our generation had not experienced a tsunami -- it was something abstract. We had a kind of crash of the individual memory, the collective memory, the institutional memory, with the geological memory. Chile as a territory knew our tsunamis, but as a society we forget. That is part of our weaknesses.

[43:00] The second lesson is how we need to move from simply a seismic culture towards a more multi-hazard culture. Chile is very proud of its seismic activity; we are very proud to have earthquakes. It's funny, that is true. When we have an earthquake here, if it is under magnitude seven, nobody will move because it's not cool. And everybody knows how to gauge the magnitude; like "Oh, this is 6.5" and it will actually be around that. We have been educated about seismic aspects, but the main thing we need now is to be re-educated for the multi-hazard culture. This is connected with culture. We need to manage culture in a new way and education about risk management.

[45:00] Chile's building codes are one of the best in the world because of all the experience with disaster. We are really bad for planning but we are very good for reacting. In Chilean society, when we have an event, we improve; when we don't have an event, we just wait. But we still have all the underlying problems. This is why we need to move forward to multi-hazard culture that considers local and indigenous knowledge, and future construction should incorporate new technologies and dynamic performance. To change something without a disaster, we need the system to improve.

[46:34] Because we have all these experiences, especially with earthquakes, we are very good at reacting. But why do we want to do this over and over again, is it a psychological or sociological thing? It is like society is trying to forget and is already thinking about the future. But that is a problem. Because we are putting a lot of money and effort in the emergency, but we are not really putting in the energy to be prepared for the future.

So, it's really important to accept disasters as a part of your own life. But how do you actually integrate such kinds of unusual, bad things in your daily life? This will be the key to the creation of a more resilient society.



A one hundred year old adobe building in Talca, Chile suffered near-total collapse during the M 8.8 earthquake on Feb. 27, 2010. Adobe, which is made of clay, sand and straw, is no longer used as a building material in Chile, but ancient structures are still common and can pose a hazard to their occupants.

Walter Mooney. *100-Year Old Adobe Building Destroyed*. Photo. U.S. Geological Survey. March 14, 2010. Public Domain.

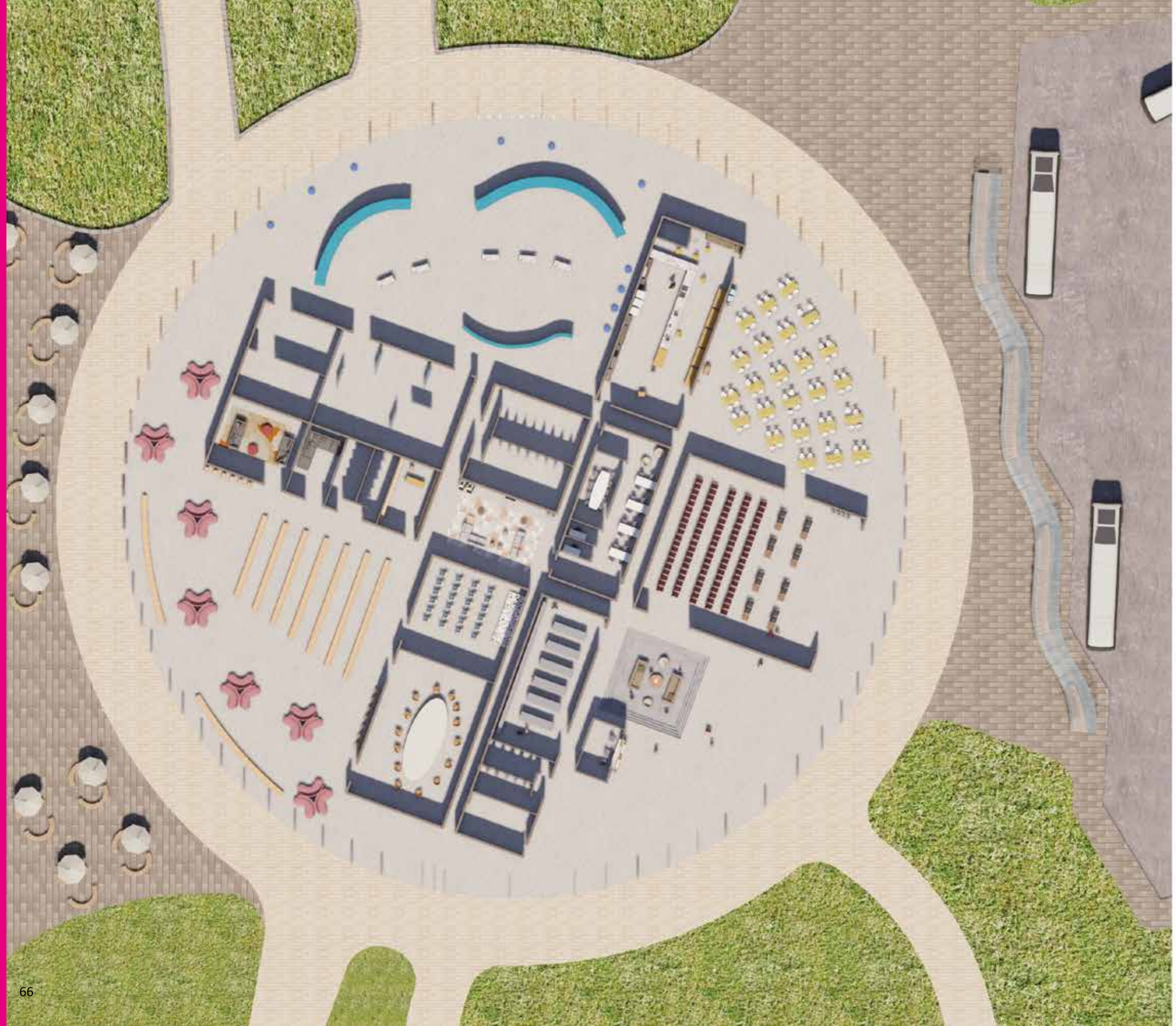
Archipelago: Public Hub

Yuqi Zhang

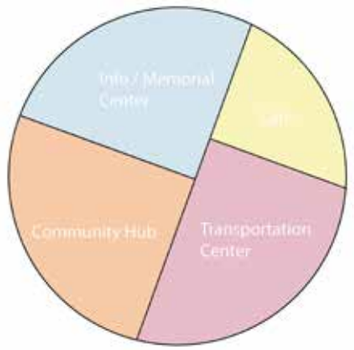
Fire City Research Studio
Instructor: Hitoshi Abe

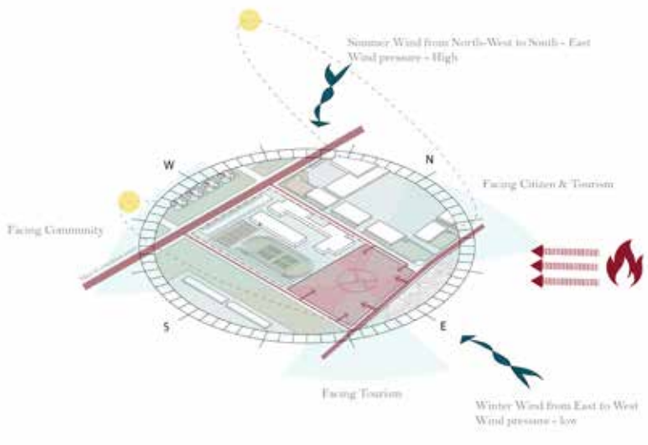
This project focuses on memory, education, and disaster-preparedness within the community that suffered from Camp Fire in 2018. Located in Paradise (Cluster 25, Zone 1), Archipelago Public Hub proposes a multi-dimensional strategy to foster community activities around resiliency by employing public events, educational initiatives, and leisure activities.

One of the specific roles of the hub is to commemorate the community that suffered during the Camp Fire devastation and provide the site for remembrance and renewal. With this in focus, the educational strategy becomes an integrated measure to inform the public about the past events and prepare the community for future fire occurrences.
A combination of programs allows the hub to become functional during various stages of disaster preparedness. The node hosts public educational events during the off-fire season and serves as a transportation center. Public events organized in the building incorporate activities with a strong fire-resiliency and community fostering focus. The node undertakes several critical functions during the fire season — it provides on-site emergency information, space for emergency community gathering, and a site for organized evacuation measures and transportation measures. The piazza surrounding the building becomes a fire-protective buffer zone during a fire emergency.




INFO / CAMP FIRE MEMORIAL CENTER
SCHOOL / COMMUNITY CENTER
TOURISM / TRANSPORTATION CENTER


Info / Memorial Center
Community Hub
Transportation Center


Summer Wind from North-West to South - East
Wind pressure - High
W
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Facing Citizen & Tourism
Facing Community
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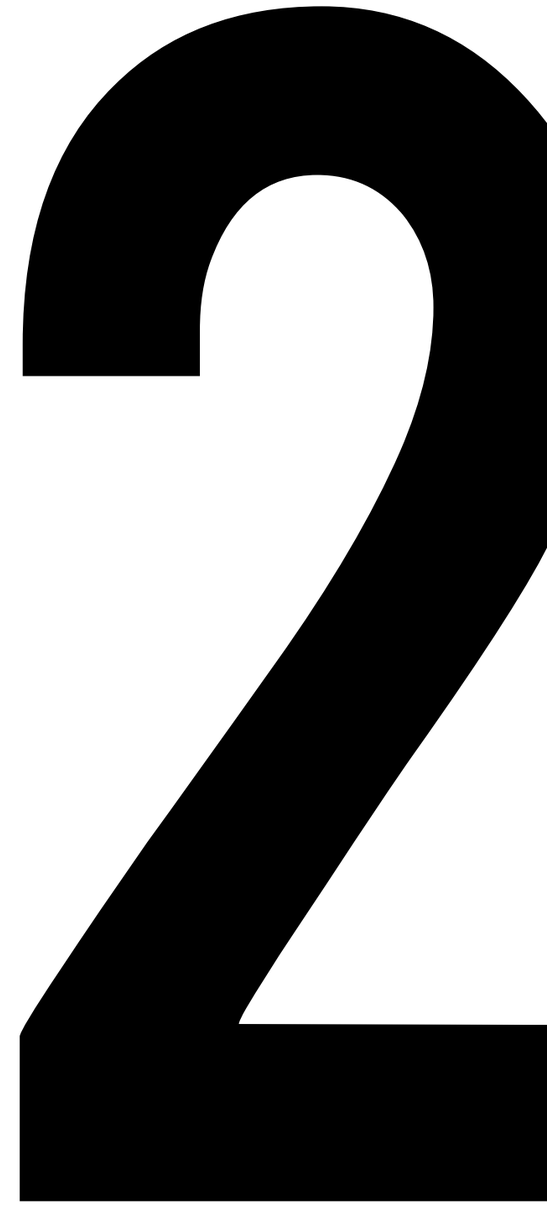
Facing Tourism
Winter Wind from East to West
Wind pressure - low

Multi-dimensional strategy



Jeffrey Inaba
Greg Kochanowski
Jeff Brown
Henk Ovink
Yasuaki Onoda
Elizabeth Maly
Tomasz Groza + Jenn Peterson + Yiwen Song
Jean-Paul Previero + Nickson Chan
Amy Robles + Anabella Rosa
Yenchun Lai + Yejin Choi

LAnd First

Jeffrey Inaba

In LA, the infrastructure bows to topography: freeways, rail lines, and street grids yield to the land in a yin-yang flow with nature.

LA is about enjoying the land: courtyards, gardens, patios, parks, playing fields, walking and biking paths, and trails – all outdoor urban spaces created by designing the ground.

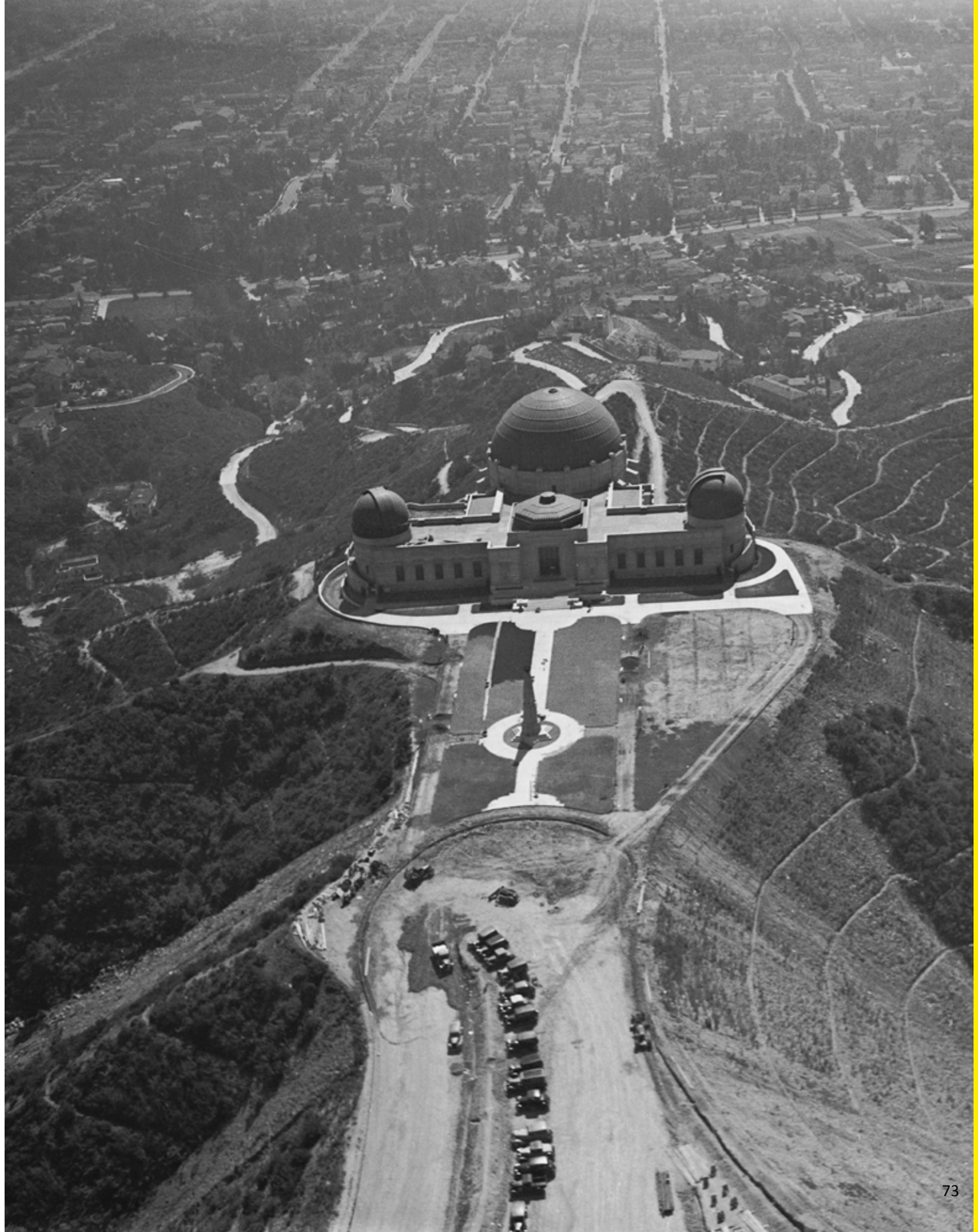
How do we go about shaping a better city? How can land use and urbanism be explored to create solutions for pressing urban problems? Can multidisciplinary approaches to urban planning help create new ways of defining and shaping urban growth? Jeffrey Inaba analyzes the historical urbanism of Los Angeles through land transformation.

Photo: Iwan Baan.

Topography is the city's organizing principle. Some metropolitan areas are laid out on a grid where streets follow a geometric order as if the ups and downs of the terrain weren't there. In LA, the infrastructure bows to topography: freeways, rail lines, and street grids yield to mid-city hills, canyons, gentle foothills, and mountains in a yin-yang flow with nature. Roads wind and dip to arrive at clearings, ridges, or immersive experiences in nature. Land structures everyday activities.

Similar to the clay used by a sculptor, the earth is shaped through a process of addition and subtraction. It's dug from one area and added to another, forming bowls, plateaus, and vistas. 'LAndmarks' are the best example of outdoor environments built by shaping the land. The Hollywood Bowl, Griffith Observatory, Greek Theater, Dodger Stadium, Getty Campus, and Civic Center were cut and filled into landscapes for relaxation. The Griffith Observatory's surrounding acres, for example, were terraced for trails and vegetation, a kind of landmark as much as the observatory building itself. The construction of reservoirs involved excavating and terracing soil for recreation as much as for basic infrastructure (Silver Lake, Echo Park, Hollywood, Stone, Franklin, Sepulveda, Encino, etc.).

Terraforming the city for the public's enjoyment was the idea behind Olmsted and Bartholomew's LA plan (1930) – a continuous network of parkways connecting the Southland through the simple gift of being outside. An urban plan that was based on landscape and not buildings, it was a vision perfectly suited to the region's climate and foreshadowing the city's active way of life 100 years ahead of its time.



Los Angeles Times. Griffith Observatory near completion, bird's-eye view facing south, Los Angeles, 1935. Photo. University of California, Los Angeles Library, Department of Special Collections. Creative Commons License (CC BY 4.0).

Land is LA's medium. LA's urban design is really land design.

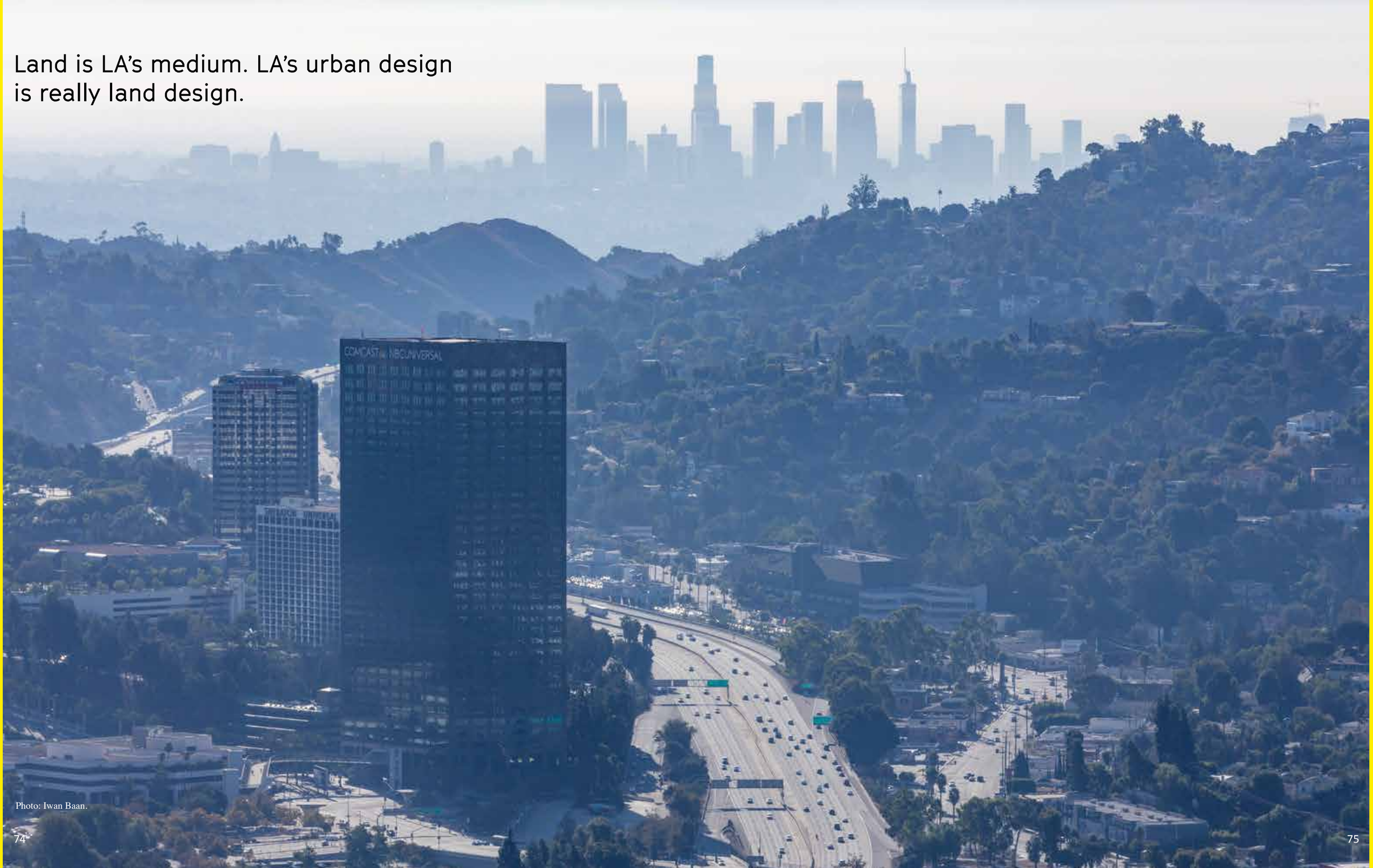


Photo: Iwan Baan.

Land is for living and working. New York set the standard for live and work architecture in the past. The apartment building (Rosario Candela) and the office skyscraper (SOM) are perfect types of buildings for the dense urban grid: enclosed and efficiently planned. LA is the host of residential and business experiments which are extroverted and generous. The single family home / ADU complex and the work campus put outdoor space front and center. Land is the common ingredient for relaxation and productivity.

Land will better the city. We can use the substance that's the identity and content of the city to manage climate change effects. Cities are the central site of all design, and urban design,

Olmsted and Bartholomew's Plan for Los Angeles (1930) was based on landscape and not buildings. It was a vision perfectly suited to the region's climate, foreshadowing the city's active way of life 100 years ahead of its time.

Jeffrey Iaba. *Olmsted Bartholomew's Plan for Greater Los Angeles (1930)*. Map. Copyright Inaba Williams Architects, 2022.

the creation of plans for large areas of infrastructure, buildings, and landscapes, is the one field that operates at the scale required to effectively respond to climate change threats. The land-based strategies proposed in this book take aim at the dry hot conditions that lead to big, difficult to control blazes. Dual-uses for aiding fire prevention and biodiversity patching to support fire recovery for example, will help reduce wildfire spread and damage.

Such land-designed areas will be key infrastructure during times of disaster while offering additional spaces to appreciate the outdoors during the vast majority of time. As a land-first city, LA ought to build upon its urban history of infrastructure and spaces for enjoyment by using land as its mainstay for survival.

As climate change advances, LA will experience more wildfires within its city limits. Land-based strategies will help to reduce their impact.

Vgan, *Griffith Park Observatory Fire, 2007*. Photo. Flickr. May 8, 2007. Creative Commons License (CC BY 2.0).

LA's infrastructure doubles as space for public enjoyment. In an era of urban wildfires, this land use strategy can be its mainstay for survival.

Photo: Iwan Baan.

Latent Land Systems + WUI Development

Greg Kochanowski

Greg Kochanowski's lecture reframes the issue of wildfire in the western United States as part of an ecology engrained with economic, political, and historical implications. He speculates on how designers, and landscape architects can approach the problem of wildfire as it relates to development in the WUI and best practices for integrating natural and cultural systems within wildland territories.

Joshua Stevens. Hill and Woolsey Fires. November 9, 2018. Photo. NASA Earth Observatory. Public Domain.

[04:14] This is a summary of some work I've been doing over the past six or seven years that culminated in a publication with the LA Forum and LA County Arts Commission entitled The Wild. I wanted to begin to think through what could be the design community's role in responding to issues of fire and debris flow.

[07:42] This satellite photo of the fires of this past September 2020 shows how we are starting to experience fires not in just a particular locale but rather, we're seeing systems of fires along the west coast. This September demonstrated that this is not only a local condition or regional condition, but a national condition; this is a relatively recent way of thinking about fires in the contemporary sense. Looking at their impact not only on a particular area, but on air quality via the airstream that can carry smoke from west coast fires across the entire country and even out into Europe and other parts of the world. It's interesting to note that one significant fire in California essentially wipes out the emissions gains from policy in the state. Therefore, there is a direct correlation between advancement trying to be gained through emissions policies and wildfire that occurs in the state.

The issue of fire is not just one of local destruction. Of course it has that -- in terms of people, property and habitat -- but it's also critical to understand these fires within the overall climate crisis and its feedback loop on the gains that are trying to be achieved globally through policy.

[10:38] In looking at fire in Los Angeles, these are landscapes that have had fire going through them for centuries and the repetition of fires occurs over and over in more or less the same places.

This is because these are landscapes where fire is part of the ecology. Fire has existed here before people were here.

As we begin to think through an understanding of fire we need to keep this in mind: that fire has existed here and will exist into the future. Therefore, development patterns, zoning patterns, and ways of building need to begin to adapt to those realities instead of being a super imposition on the land and ignoring this reality. Really, this is about the interface between development and fire: what's called the Wildland Urban Interface.

This text is derived from a lecture recording, not intended to be published as an article.

[16:45] We're going to step back now to 1869 - 1878 with John Wesley Powell, who traveled the country for these nine years mapping the western portions of the United States. His map depicting the watersheds that exist along the "Arid Region" of the western United States demonstrates a re-understanding of territory at that time from one of political boundaries or ownership boundaries (of which you can slightly see here the outlines of the various states and subsequently counties and so forth) to mapping the systems and resources that move irrespective of those boundaries as well as the processes of natural ecologies that are occurring irrespective of ownership lines or political boundary lines. So actually, the discussion starts with water here.

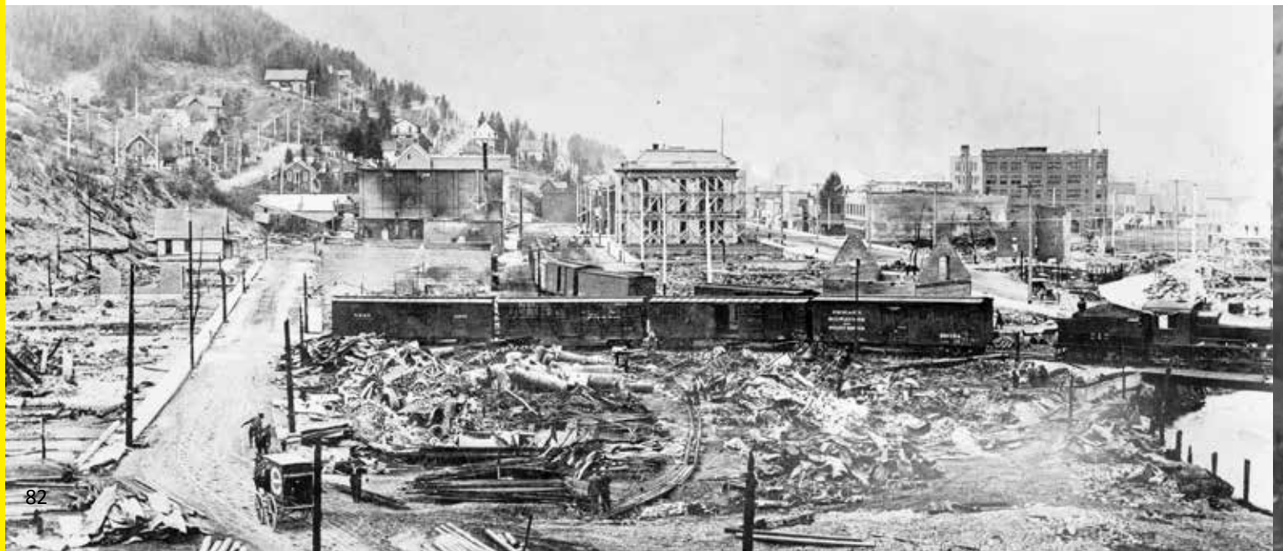
To envision the landscape for fire, we need to engage with and understand the latent, somewhat invisible systems that are irrespective of our understanding of land and land ownership.

[18:45] That leads us to the Great Fire of 1910 when most of Montana, Wyoming, Idaho, Colorado and Washington state were destroyed. This event ushered in the contemporary thinking of the federalization of fire suppression both in terms of protecting lives and property but also really initiated -- through Teddy Roosevelt in collaboration with John Muir -- the conservation movement and the establishment of the National Park System. This happened through the preservation of land and the taking of wildlands and making them open to all across the country as well as prohibiting development within them. However, it's not as though people weren't living there and it's not as though there weren't people inextricably tied to these lands. Through the process of the conservation movement (which is generally seen as beneficial), many indigenous cultures were extricated from their land. While there was a gain of public lands, there was a loss of an understanding of these lands since the people who were extricated had deep knowledge of how to live on, maintain and sort of control them. In that sense, the advent of fire suppression as a methodology and as an ideology in a certain way was starting to have greater impacts on the landscape.

[21:01] This photograph from Sequoia Kings National Park in California on the left in 1900 and then the same image in 1995 shows, on the left, a healthy forest meaning it does not have a contiguous canopy and actually has a spotty canopy. This is because healthy forests are affected by fire and other natural processes or even controlled or managed logging processes. But over time, as fire is suppressed and as a healthy maintenance of this forest does not occur, the result shown here is a forest in which the canopy grows together which creates contiguous fuel for fires while it also deadens the understory of the forest floor and creates conditions for ladder fuels, further exacerbating the problem. Looking at these issues, we can begin to understand how investment in forest management is critical and we can start to reimagine, from a policy standpoint, how to engage this type of thinking.

[21:01] The 20th century propaganda and campaigns with Smokey the Bear talk about how fire is dangerous; it is destructive; it is something to be avoided. This results in a characterization of fire as something that is not supposed to be part of our human existence versus the Native Americans who, prior to the 1910 Great Fire, were actually burning several millions of acres every year. This was primarily a land management process for agriculture and so they thought of fire as a creative process, as a catalyst for life and growth as opposed to something to be avoided. Obviously this was in the form of a controlled burn and with the understanding that fire is one of the four elements. Therefore it is one of the elements through which we exist on the earth and is something that, if properly utilized, can be actually quite productive.

U.S. Library of Congress Prints & Photographs Online. *Wallace Idaho 1910 fire*. Photo. Wikimedia Commons. 1915. Public Domain.

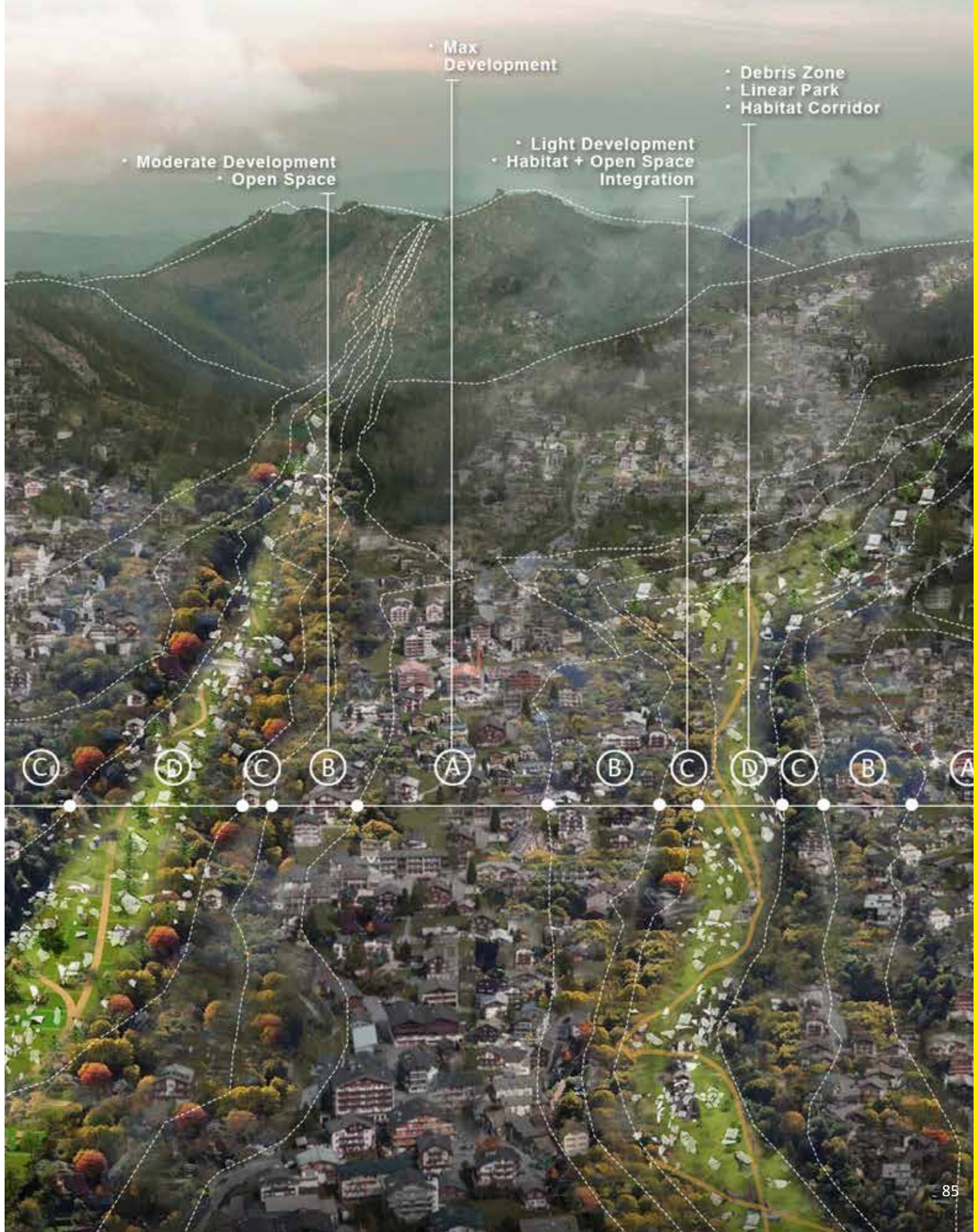


Middle Fork of the Kaweah River, Sequoia & Kings Canyon National Park.

Greg Kochanowski. *ArcDR3 Guest Lecture by Greg Kochanowski, Middle Fork of the Kaweah River, Sequoia & Kings Canyon National Park*. xLab. Youtube video screen capture, 21:06. November 3, 2020.

[25:33] What this talk ultimately wants to get at is how do we begin to develop and how do we as architects, designers, landscape architects and planners begin to integrate with some of these conditions in these territories and these latent systems that exist within landscapes. As we're thinking through the problem of fire, we can understand it as an issue of land planning and land zoning as much as it is individual technologies of building.

As designers and as a design community, it's not enough to just think through the organizational and physical manifestations of fire and development in the WUI because they're inextricably political and economic problems.



Greg Kochanowski. *'Debris-Sheds,'* The Wild, 2020. Courtesy of the author.

Multiscalar Network Initiatives: Community Resilience to Wildfire Disaster

Tomasz Groza, Jenn Peterson Ruiz, Yiwen Song

Fire City Research Studio
Instructor: Hitoshi Abe

Mark Thibideau. *Firefighter with drip torch on Algoma Prescribed Fire*. Photo. Pacific Southwest Forest Service. USDA. October 22, 2018. Creative Commons License (CC BY 2.0).

Disasters are affecting towns and cities with increasing magnitude and frequency due to climate change and are exacerbated by unchanging modes of urban development. Understanding the inevitability of recurring disasters is crucial to planning responsible development that strengthens existing communities, while providing a framework for new inhabitants to live in the area without assuming the same levels of risk. This is a process by which we can begin to improve and replace unsustainable forms of development with more resilient ones and what we understand to be the goal of Regenerative Urbanism within the context we presently live in.

Transformative resilience projects need to start by considering the community that resides in a particular area. What means do the members of this community have? What connections exist between them? What levels of agency are they able to exercise on their surroundings as individuals or as groups? Land, property, time, and wealth are primary determinants of an individual's means. Community's means are determined by how much of their own resources individuals are willing to share. During a disaster individuals are connected by shared misfortune and the empathetic response makes them more willing to help others. One way to ensure this phenomenon translates into community resilience is by establishing network connections between individuals to facilitate sharing resources. The complementary goal of developing these interconnections within an area is promoting social cohesion within a community as both a product and process of networking. Social cohesion can be broken down into four components which include: social relations, task relations, perceived unity and emotions. Those who form strongly cohesive groups are more inclined to participate readily and to remain within the efforts pushed forward by the community.[1] Social cohesion has a promise of functioning as a basis of agency outside of disaster scenarios as is to ensure that residents of a community have a shared experience within which they can identify with the lives of others. This emergent agency of a community needs to be framed by laws of relevant jurisdictions to avoid discord.

1. "Social Cohesions," Healthy People, last accessed March 2, 2022, https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-health/interventions-resources/social-cohesion.

Los Angeles Context

The places most often affected by recurring wildfires in Los Angeles County are the unincorporated. "More than 65 percent of the County, 2,653.5 square miles, is unincorporated. For the 1 million people living in those areas, the Board of Supervisors is their 'city council' and the supervisor representing the area the 'mayor.' County departments provide the municipal services. There are approximately 120–125 unincorporated areas."[2] Within the fire context, Third District is the most affected, it extends from Malibu to Los Feliz, and from Venice up to San Fernando encompassing 431 square miles of unincorporated land. These

2. "Unincorporated Areas," County of Los Angeles, last accessed March 2, 2022, https://lacounty.gov/government/about-la-county/unincorporated-areas.

areas are not as developed as incorporated cities but they do include significant residential development within Wildland Urban Interface organized as villages that include Cornell, Topanga Canyon and Monte Nido/Cold Creek. With most of the flat land in the LA region already thoroughly built out, new single family homes are developed on the fringes of urbanized areas and pushed further into the hills.

The development patterns there follow that of typical suburbia. They include self-reliance centered on single family home ownership, isolation of car-centered planning, and weak or nonexistent local governance. As a result, the wealth is concentrated in the property and land, local connections are weak, and residents' agency is limited to their private property. Motivated by the relative affordability of homes in the Wildland Urban Interface (WUI), homeowners are not ready for the constant confrontation with nature that puts their investment in real estate at risk. Wildfire disasters are difficult to predict and communities are limited to assessing disaster risk in vague terms like low, medium, high; issuing "red flag" warnings for broader areas. The reckoning often comes when fast moving, wind-driven fires sweep over the dessicated shrubland covering the slopes and effortlessly jump to the wood-framed residential buildings beside them. Those who put years of investment into owning a house can lose their home in hours.

Community Adaptations

Living under the jurisdiction of Los Angeles County means that residents do not have local control of development and services the way residents of incorporated cities can rely on their municipality recognizing local needs. Communities are forced to adapt by: (1) organizing local volunteering networks, (2) entering into agreements with larger authorities with existing presence in their areas and (3) public private partnerships that leverage investment to build critical infrastructure.

While community organizations are started to address resilience efforts in vulnerable areas, what emerges are neighborhood networks that connect people with a goal of working on shared resilience. Those transformative forms of organization are a budding medium for self-governance that requires infrastructure, funding and recognition. Ultimately collective organization does not have to rely on volunteer organizations that are limited to those who are able to contribute their time to planning efforts. Though they are an important step, naturally they should give way to more inclusive structures of decision making that include public civic spaces, local budgets and jurisdictional boundaries.

Topanga

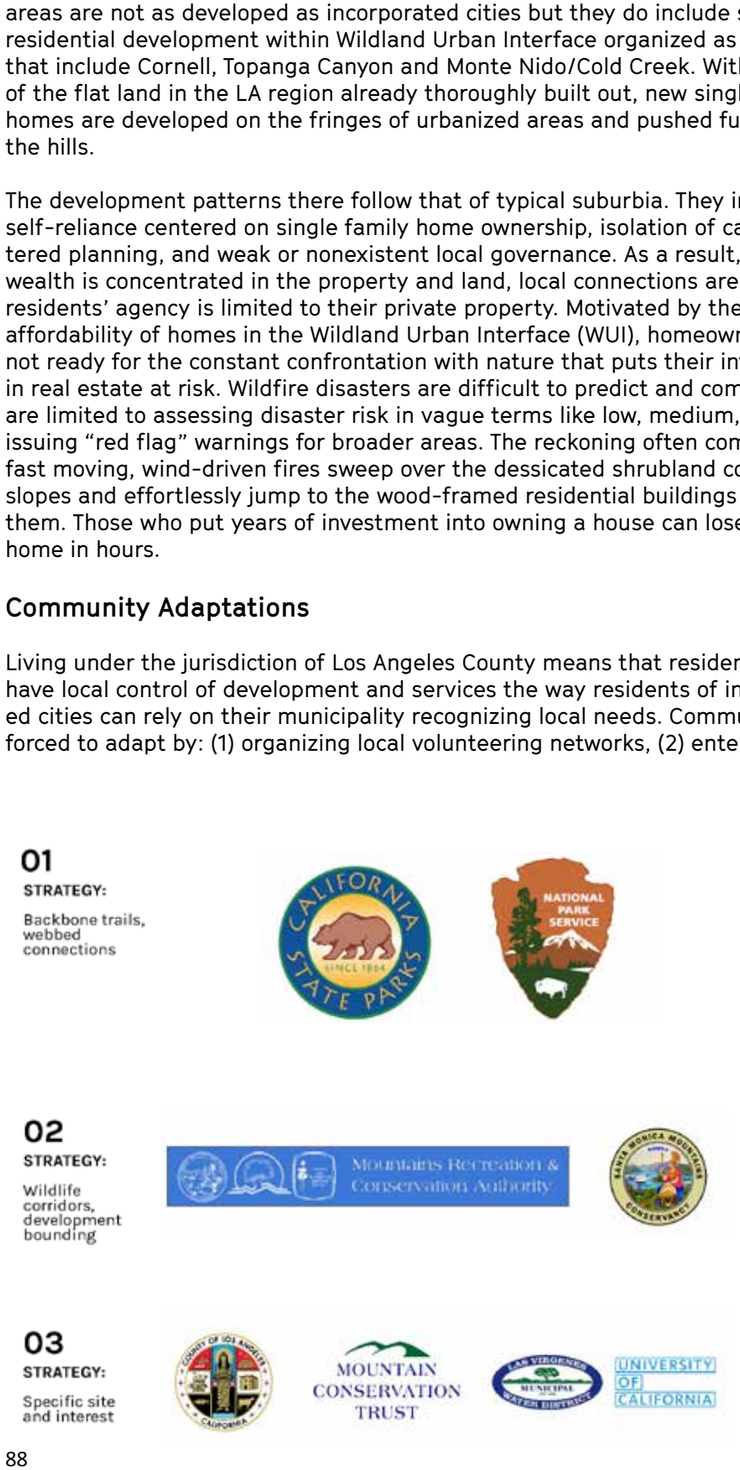
A transition from volunteer organization to a community inclusive one can be observed in the unincorporated community of Topanga. Topanga has a history of being a self-organized hippie enclave, just outside the boundaries of Los Angeles city proper. Residents currently organize within a range of volunteering efforts which include Fire Safe Councils (FSC) and emergency preparedness teams. In general, FSC activities focus on removing fire hazards from public areas, educating the community about wildfires, and educating residents on securing their property from fires.[3] The Topanga Coalition for Emergency Preparedness (T-CEP), founded in 1993 following a very active fire season, is an organization that builds on FSC principles with diverse projects that include distributing informative survival guides to the community, organizing a Disaster Radio Team, and laying out a framework for making local connections called Neighborhood Network.[4,5]

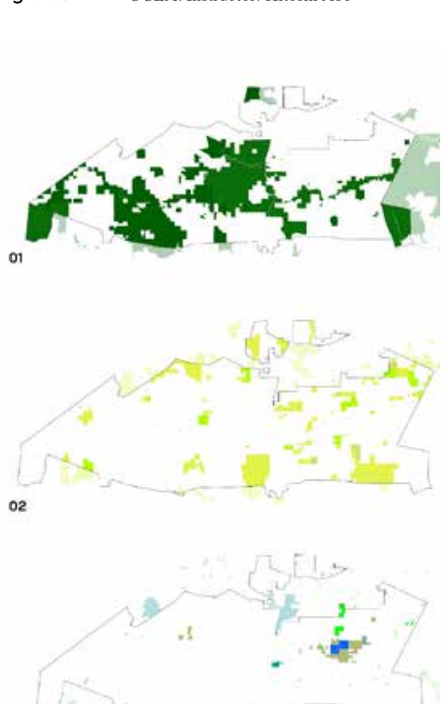
Tomasz Groza, Petterson, Jenn and Yiwen Song. *Santa Monica Mountains Land management study*. Fire City Research Studio. AUD UCLA. Instructor: Hitoshi Abe

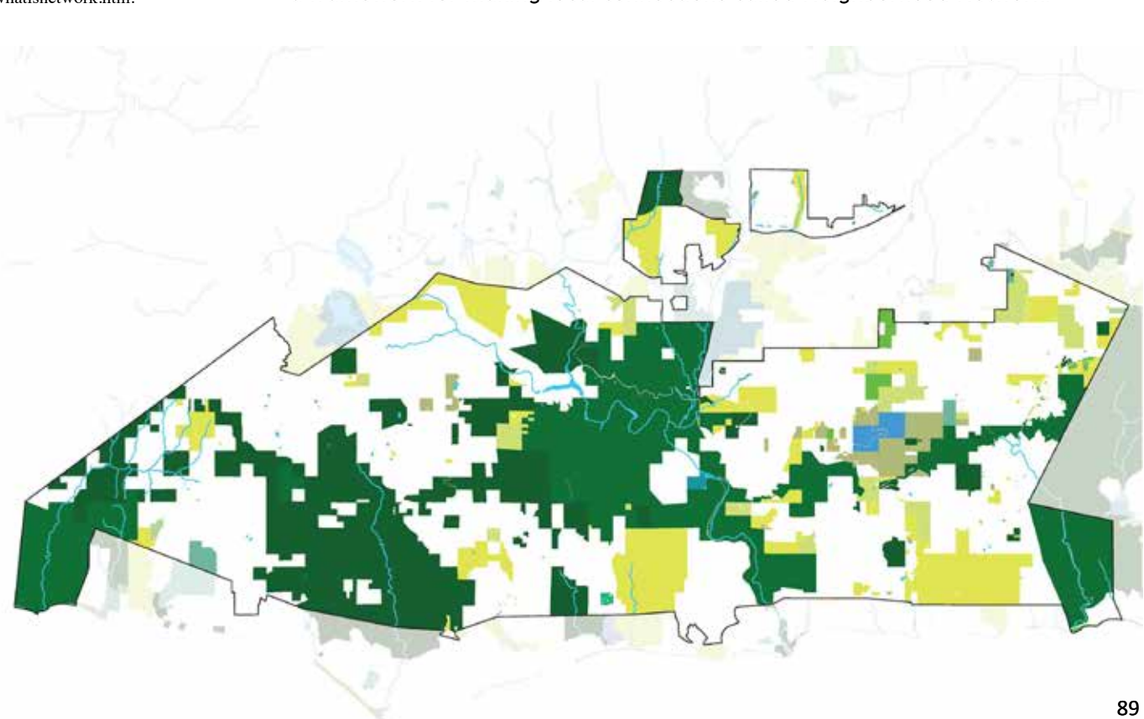
3."About the TCFSC," North Topanga Canyon Fire Safe Council (NTCFSC), last accessed March 2, 2022, https://sites.google.com/site/ntcfsc/about/about-the-tcfsc.

4. "About T-CEP," Topanga Coalition for Emergency Preparedness (T-CEP), last accessed March 2, 2022, http://t-cep.org/about.htm.

5."Neighborhood Network," Topanga Coalition for Emergency Preparedness (T-CEP), last accessed March 2, 2022, http://t-cep.org/whatisnetwork.htm.







The Neighborhood Network is Resilient Network at an interpersonal scale. It provides a template for a self-organization of "a group of residents in a geographically close area who have agreed to share contact information, special skills and equipment so everyone can stay informed and help support each other in the event of a disaster."[6] As part of the Neighborhood Network organizing structure T-CEP encourages the residents to be trained in emergency response by federally funded, (by FEMA,) Community Emergency Response Team (CERT). Coordination of residents allows access to resources beyond volunteering in the form of funds from donations and state and federal grants. These organization activities naturally require a civic space, and in 2012, the Topanga community was able to bring that about in the form of a public library.[7]

Mountains Recreation and Conservation Authority

Santa Monica Mountains is a major natural recreation area. Organizations that maintain the relevant infrastructure control a large percentage of the wildland and residents of the adjacent areas are generally supportive of conservation efforts that open spaces to recreational activities. In addition to ensuring safety of visitors, these organizations are well placed to manage the fire hazards within the land in their control. Mountains Recreation and Conservation Authority (MRCA) "manages more than 75.000 acres of parkland that it owns or that is owned by the Santa Monica Mountains Conservancy … [and] provides operations, ranger services, fire prevention and protection services, outreach, and community-based planning to improve its parks and to encourage all Southern Californians to experience nature…[and] is devoted to buying back land from private owners to protect natural wilderness."[8]

Conservation is a noble effort, but scientific analysis and historical research show that wildland areas that burn periodically require active stewardship that manages the build-up of dry vegetation that fuels most destructive fires.[9] In its founding mission, the MRCA is a local government public entity with a narrow agenda. Its jurisdiction over the maintenance of wildland areas is a challenge to local communities that are not able to plan development in their surroundings, perpetuating a hard edge condition between wildland and urban areas. In the eastern part of Santa Monica Mountains that lies mostly within the City of Los Angeles, residents passed Local Measure HH, which funds MRCA fire resilience activities with a yearly fee-per-parcel in the covered area.[10] Those funds are primarily devoted to fire hazard mitigation and are undertaken with community oversight. Strategies for reducing fire hazards are locally limited to mechanical extraction which is a challenging and labor-intensive process that involves cutting down trees and removing dry brush from around roads and structures. Though it may seem that this activity runs counter to the mission of conserving the natural world, in many places, the proximity of urban development means that there is not enough space for residents to make the safety perimeter within their own property. Through measures such as this community organizing initiates a resilient network with cooperation of trusted local agencies on a regional scale.

Helipad Bravo 69

In challenging conditions, novel approaches to development need to be explored to address fire hazards. Since the hillside areas attract wealthy residents with means, there is plenty of potential for public-private partnerships to bring about projects that tackle the risks. One example of this is Helipad Bravo 69,[11] a joint project between LA County Fire Department (LACoFD) and an entrepreneur, Simon T. Located on a strategic piece of real estate on a mountain peak near the community of Topanga, this facility features autonomous water refilling stations

6. Topanga Emergency Management Task Force, *Topanga Survival Guide* (Los Angeles: The Los Angeles County Board of Supervisors, 2017), https://topangasurvival.files.wordpress.com/2017/11/disastersurvivalguide2017complete.pdf.

7. Zev Yaroslavsky, "New library tells Topanga's story, too," Zev Yaroslavsky's Blog, last modified January 17, 2012, http://192.241.223.29/communities/mountain/new-library-tells-topangas-story-too.

8. "About," The Mountains Recreation and Conservation Authority (MRCA), last accessed March 2, 2022, https://mrca.ca.gov/about/.

9. Dan Ng, "Wildland Fire: What is a Prescribed Fire?," National Park Service, last modified March 19, 2020, https://www.nps.gov/articles/what-is-a-prescribed-fire.htm.

10. "Fire Prevention Measure HH – 2020," Mountains Recreation and Conservation Authority (MRCA), last accessed March 2, 2022, https://mrca.ca.gov/measure-hh-2020/.

11. Matt Stiles, "Inside a wealthy L.A. man's effort to help pilots fight wildfires from a remote mountain base," Los Angeles Times, last modified November 3, 2019, https://www.latimes.com/california/story/2019-11-03/fire-helicopter-water-base-santa-monica-mountains-simon-t.

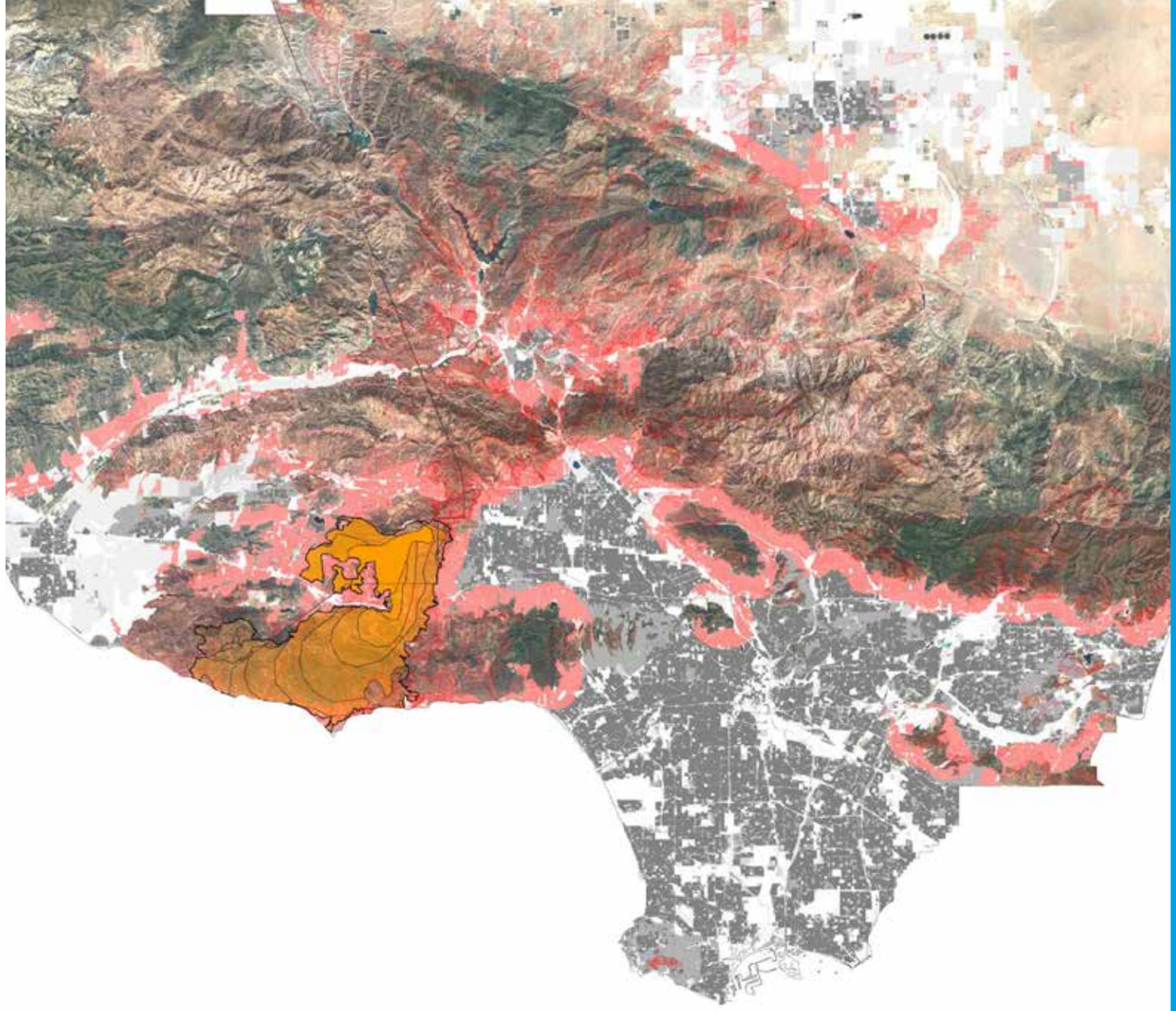
Eddie Siguenza. *California National Guard*. Photo. Flickr. July 13, 2017. Creative Commons License (CC BY 2.0).

Google Maps. *69 Bravo LaCoF Helipad*. Map. March 10, 2022.

that helicopters can use without landing, shortening their round trips to and from fires. The project developed from an initial 2010 county proposal to the landowner for a helipad at the location, to a unique firefighting base that also serves as a local evacuation area. In 2018, it was handed over from the landowner to LACoFD. Initial development by the landowner included building switchback roads up the peak which had previously made access possible. It concluded with additional amenities for the firefighters and a refueling station is to be added in the future. Press has been vocal about the area needing more people like Simon T, who use their means to build resilience infrastructure for the community. His enthusiasm for the project prevented the property from being developed into another lavish mansion instead of a crucial public amenity. Projects like this are a evidence of community members with means being able to greatly improve community resilience in coordination with local authorities.

Conclusion

Wildland Urban Interface areas are the fastest developing areas nationally, state-wide, and locally. In Los Angeles County, these areas are very often unincorporated, meaning that residents do not have local governance to implement plans tailored to their area. They rely on a patchwork of measures that include volunteer organizations, collaboration with conservation efforts, and public-private partnerships to counteract the push for unsafe development. We see community agency expressed in projects that become a tangible infrastructure. Here, there is an opportunity to integrate much needed communal resilient infrastructure within these small communities and wildland areas to promote specific densification. It's presence strengthens the community cohesion, reducing the burden of individual decisions addressing fire resilience and provides models for safe development within the Wildlife Urban Interface. Much more of such infrastructure is needed.

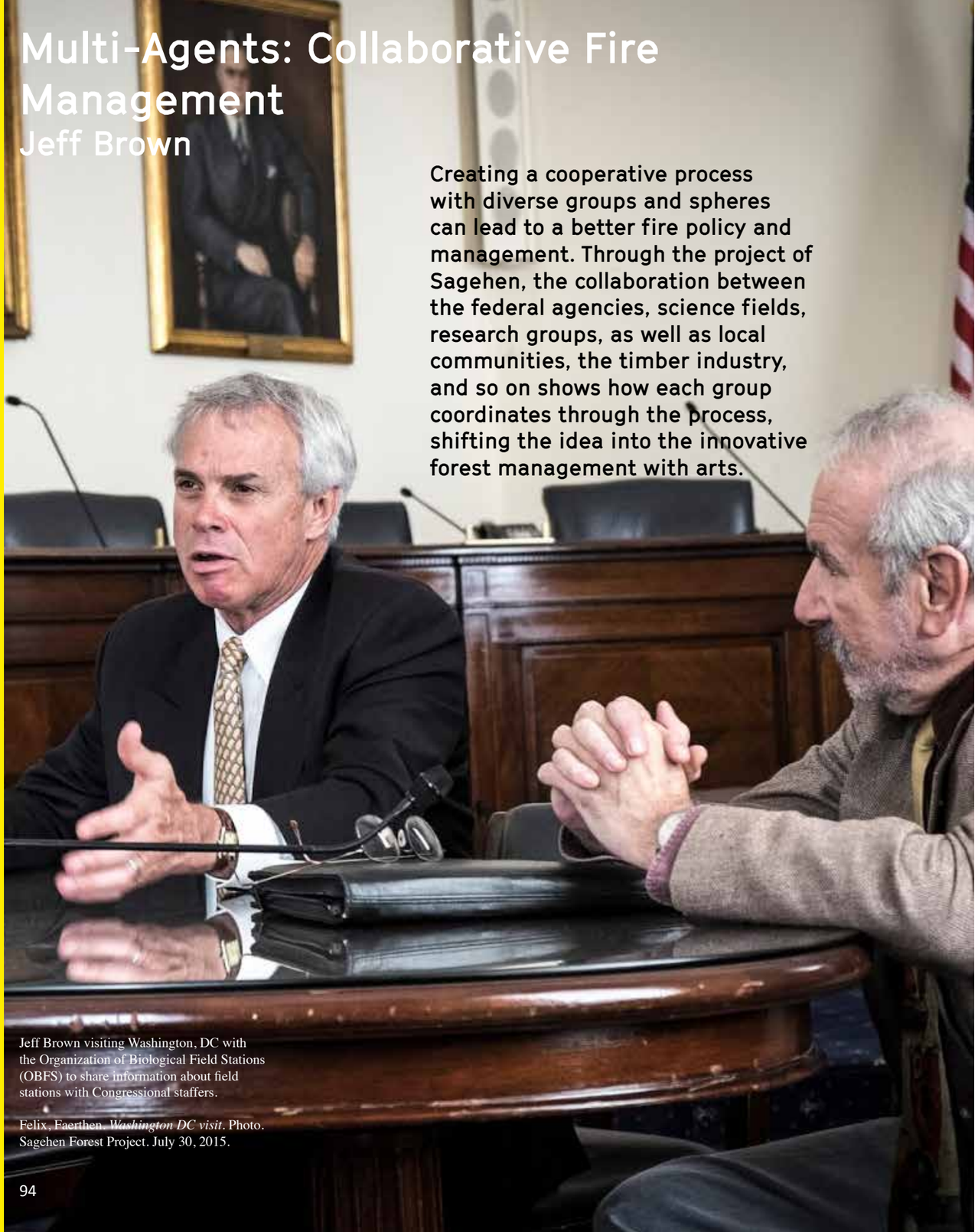


Groza, Tomasz, Petterson, Jenn and Yiwen Song. *Woolsey Fires scar overlapped with Fire Hazard Zones*. Fire City Research Studio. AUD UCLA. Instructor: Hitoshi Abe

Multi-Agents: Collaborative Fire Management

Jeff Brown

Creating a cooperative process with diverse groups and spheres can lead to a better fire policy and management. Through the project of Sagehen, the collaboration between the federal agencies, science fields, research groups, as well as local communities, the timber industry, and so on shows how each group coordinates through the process, shifting the idea into the innovative forest management with arts.



Jeff Brown visiting Washington, DC with the Organization of Biological Field Stations (OBFS) to share information about field stations with Congressional staffers.

Felix, Faerthen. *Washington DC visit*. Photo. Sagehen Forest Project. July 30, 2015.

Jeffrey Inaba: Could you explain to us what would be the best way to manage woodlands in California, and how you tirelessly tried to shift the thinking on that and your innovative way of thinking about forest management?

[21:28] **Jeff Brown:** Great, so maybe what I ought to do is just tell the story. (...) For about a year, when the science side and the management side were at meetings, you could see that there was no camaraderie, there was really no respect. For example, the land managers, they're the experts, they know how to manage the land, they really don't want other people telling them what to do. Then the science folks, they're just trying to do their science parts. Everybody just wanted to get through this. So there really wasn't this cross, this connection (between the land managers and the scientists), that it takes to really get things to shift. They didn't seem to have anything in common.

John Battles (the lead science person on the team) mentions that the model run results they get using Agency data do not match the results they get when using the forest structure data that they have collected. And I say," Well, John, why don't we go out into the forest with their people (land managers and scientists)? And we'll have this little flip chartbook, the book that the Agency uses when classifying forest structure, and we'll just stand there and see if we're on the same page, see if we're looking at the forest through the same lens." And so we did. And the other thing that we noticed when we started sharing our modeling runs with them is that the results that they were getting really didn't match what they were seeing on the ground.

So as we're standing there flipping through the book, we realized that we were all on the same page. And then it was like, maybe it's not us against each other, maybe we can work together to try to make this a better tool that they would have more confidence in and doing their jobs. Let's focus on seeing if we can get the model to do a better job. That was a pivotal moment and a big deal. From then on, we now had this mutually respectful relationship between the science side and the management side. And that was really critical. [...]

This text is derived from a lecture recording, not intended to be published as an article.

[29:54] […] JB: And if you think about it, if you do anything to save the forest and keep the same spacing between trees, and you have a fire, it pretty much all goes. Whereas if you have this patchiness in the system, you're probably not going to have full destruction, you're going to have parts of it survive.

[…] And we know that the (government) agency doesn't have the expertise to do this. And we know the science folks don't have the expertise to do this. Maybe it makes sense to bring a whole bunch of people together to see if we could do this collaborative design. And the idea was if we could get everybody to agree on the problem, and then if we were to set up a system for moving through that, what would happen?

So we did. We had all the Federal agencies there, we had all the State agencies, and there were a lot of NGOs, nonprofits folks interested in forest. We had the environmental interests there, we had the timber industry, people there, and we had concerned citizens. And we went through about a year and a half process.

[32:53] […] JB: So we thought it'd be critical to make sure that the environmental groups had a strong voice in the planning of the project. And so we invited Craig Thomas from Sierra Forest Legacy. And we brought him in because I wanted to make sure that we're going to be doing things that are environmentally sound. And also, different people will bring in very different perspectives than you might have, and you might end up with a better outcome.

[…] It took us a full day for people (local communities, NGOs, nonprofit groups, etc.) to realize that we really didn't have a plan that we're going to try to jam down their throats. And that we really did want their input.

So we went through that process, and it was awesome. Scott Conway, who is the Forest Service vegetation management person, said, "Well, we're using these terms in all of our meetings, but what kind of picture does that paint in your brain?" So he (Scott) said, "I better do some little plot demonstrations." We can use those to calibrate the words we're using and the images because we could all be using the same word but with different imagery. So we did. And we actually use it as a great way to calibrate our terminology. And to make sure that we're all on the same page.

So, we've written the whole thing up, and the Friday before our last collaborative meeting, Joanne, the Ranger, called up and said: "Hey, Jeff, I have new information." I could tell from her voice that she wasn't happy. I said: "Oh, god, what is it?" She said: "Well, Jeff, we found a goshawk.

Nest babies are in the middle of the most important unit of this whole project." So in our mind, we're dead, we're completely dead in the water. So what do we do? We have decided that we will come Monday and just share the information with the group and see what they think.

[36:08] […] Monday rolls up, and we are all standing in a big circle, celebrating this year and a half experience that we've had because it was really positive. Then Joanne shares the new information, and you could just watch the energy crash. I say, "Craig, hey, what do you think?" He goes, "Well, this has not been a waste." He says, "We've done two things here. And any one of them on their own is worth the efforts. One, we've shown that land managers and scientists, and the public can work together. That is a big shift. The other thing is, what we're trying to do here is to make this place better for everything, not just one thing."

[37:03] […] So they, the Forest Service went through the NEPA process, which is a closed door, nobody can be part of that, and that's a chance for a surprise. The document came out, it matched what we had written as a group. And all the prescriptions match what we had all suggested. It went to the decision. They were in the public comment process, they got three letters, the timber industry in support, the environmentalists in support, and the University of California in support, no negative letters, only time it's ever happened. And it's the only time these three groups that ever agreed on anything. So that was really positive.

[…] Well, we weren't done. We don't have a timber industry left. So we have really very few people that could actually take trees out. And the timber industry that we do have left can work on processing big trees. So it's like, now we have to step up and solve this other problem. We are starting now to work with more Forest Service like the Lake Tahoe Basin, they launched the big collaborative for the West Shore based on what we did at Sagehen. So we're part of that, and the Sierra Nevada Conservancy is now an agency. And they're starting to get a lot of bond money to spend on forest work.

[…] So our ideas are getting a larger voice. We're now working at the State agency level. […] And, if you notice, the State and the Forest Service just agreed to manage California forests, collaboratively, and for ecosystem functions, a big step.

[41:15] […] Public hates smoke, even if it's low level smoke. So, we need another shift, we need a cultural shift. And so that's where the arts roll in. So I think of this problem as having five different things. And I'll just do them Alphabetically.

We need to shift culture. And the way you shift culture is through the arts, that's where you can get culture to shift. We need the business; we need an industry that can deal with the material that we need to pull out the return function, and that small diameter, timber. We need management, we need the people who are managing these forests to think the same, and to think across broad landscapes. So these things work together, not against each other. Policy, we need to make sure that our policy, the laws and regulations, and all these things are moving at the same speed as other things so that they don't become roadblocks and stop it. Finally, we need science, we've got to continue to collect the data and then process it. We need a way to figure out if we're doing a good thing, or if we're doing a bad thing. I mean, I don't know if we're doing the right thing, we are giving it what I'd call our "Best Shot", time will tell.

Sagehen is a member of the Organization of Biological Field Stations (OBFS). They got the National Science Foundation to fund the National Academies of Science, to think about us (Field Stations and Marine Labs) and what we need to do to be relevant. So they came out with a great document. And Jerry Schubel, who was the head of the Aquarium of the Pacific in Long Beach, said basically there are five steps to change.

The first one is to collect data, which science does. Second, you turn the data into knowledge, which science also does. The fourth is to change policy, which [can] lead to change. In the middle is step three, which is to create an connection with the public. Science is specifically designed to pull emotion out. You wonder why the public does not resonate with science, it's because it doesn't matter to them. If you don't grab them by the heart, you won't get them passionate about anything. So if you can create this empathetic connection with the public, now you've got advocates, and that's what leads to changing policy. And that's what then leads to real change. So that's what got us playing in the arts.

[41:15]

[...] It forces us to get out of our silo and create connections and relationships because we have to create these broad consortiums. To help us put the energy and resources to work at the scale needed. And that's happening. And to me, it is really exciting.

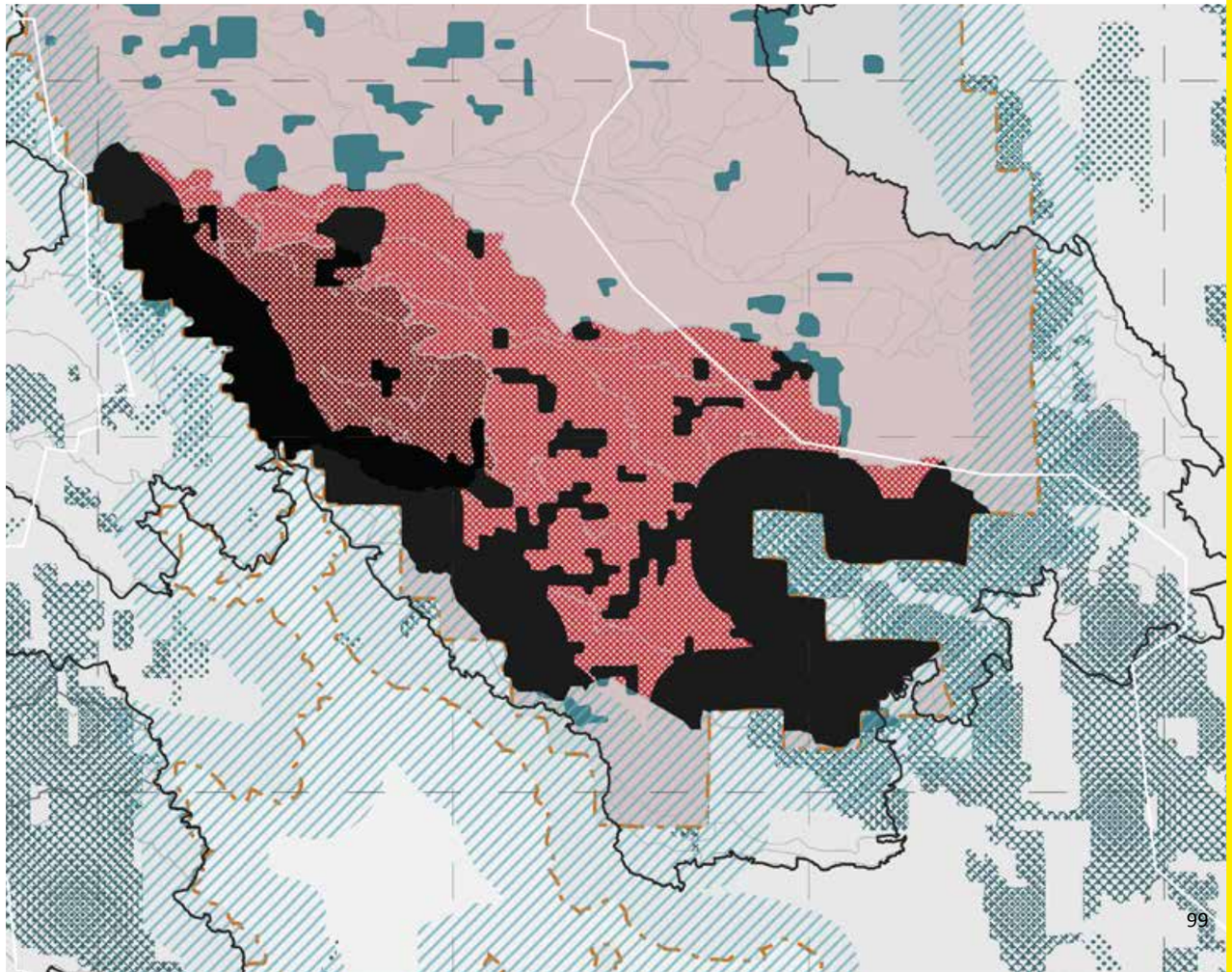
So what role did Sagehen play?

I think we were the networkers. But we were also the reality check because we could call a spade a spade. We can say that "Nope, we need to be thinking differently." And it was really fun to be involved in that world. And it was really good for me personally to think that we were able to shift a large ship a little bit in direction.

And what's sad is that it took 20 years. (Laughter) So what you guys do, you are a way to show how this could work. And I think that's the gauntlet that we need to drop on the table.

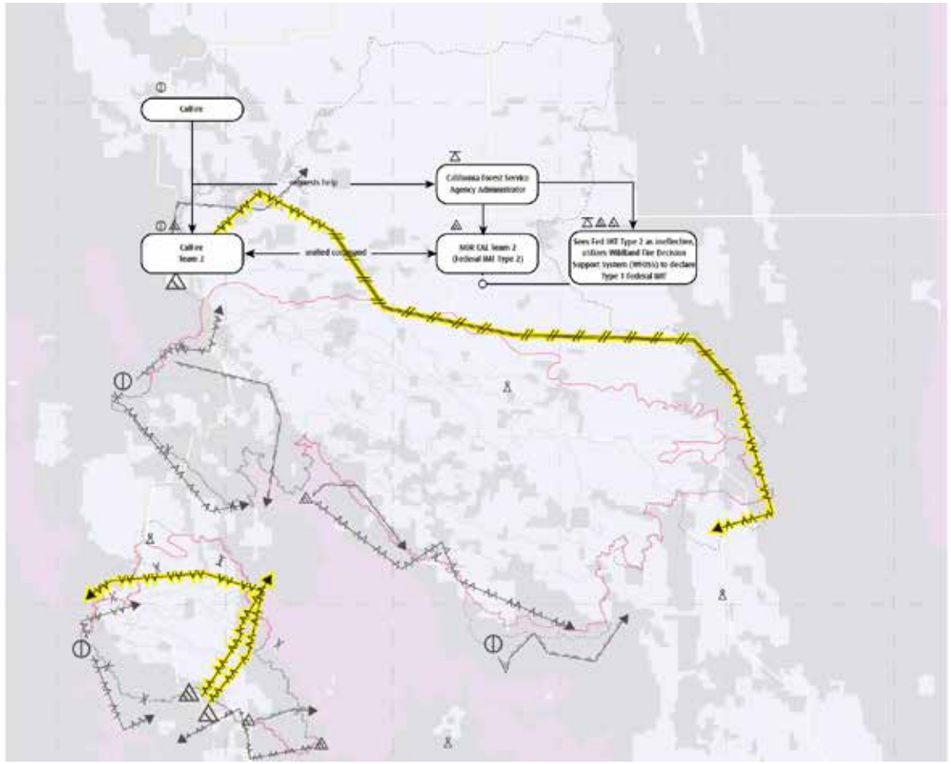
It takes other people from other disciplines to show us a way out. We're humans, we need to see something. And I think that's the role that your world plays.

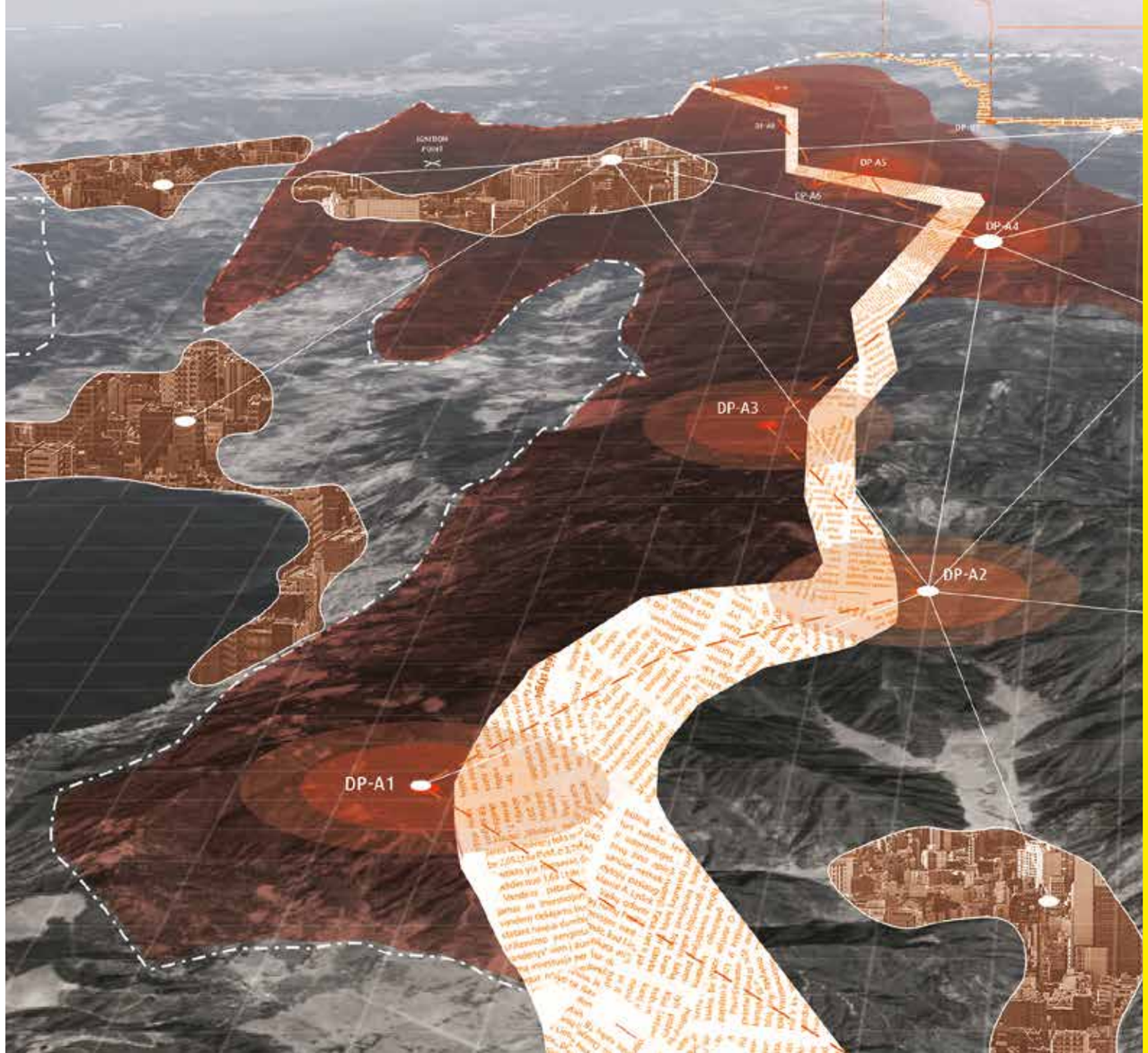
Kuo, Tasha, Choi, Yejin and Yenchun Lai.
Fire Complexity analysis. Mendocino Fire.
Wildfires don't stop at jurisdictional Boundaries.
Tech Seminar "The Map is not the territory."
AUD UCLA. Instructor: David Jiménez Iniesta



Proposal for a new system of managing land during Wildfires disasters.

Kuo, Tasha, Choi, Yejin and Yenchun Lai. *Mendocino Fire. Wildfires don't stop at jurisdictional Boundaries*.
Tech Seminar "The Map is not the territory." AUD UCLA.
Instructor: David Jiménez Iniesta



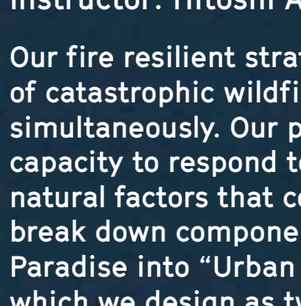


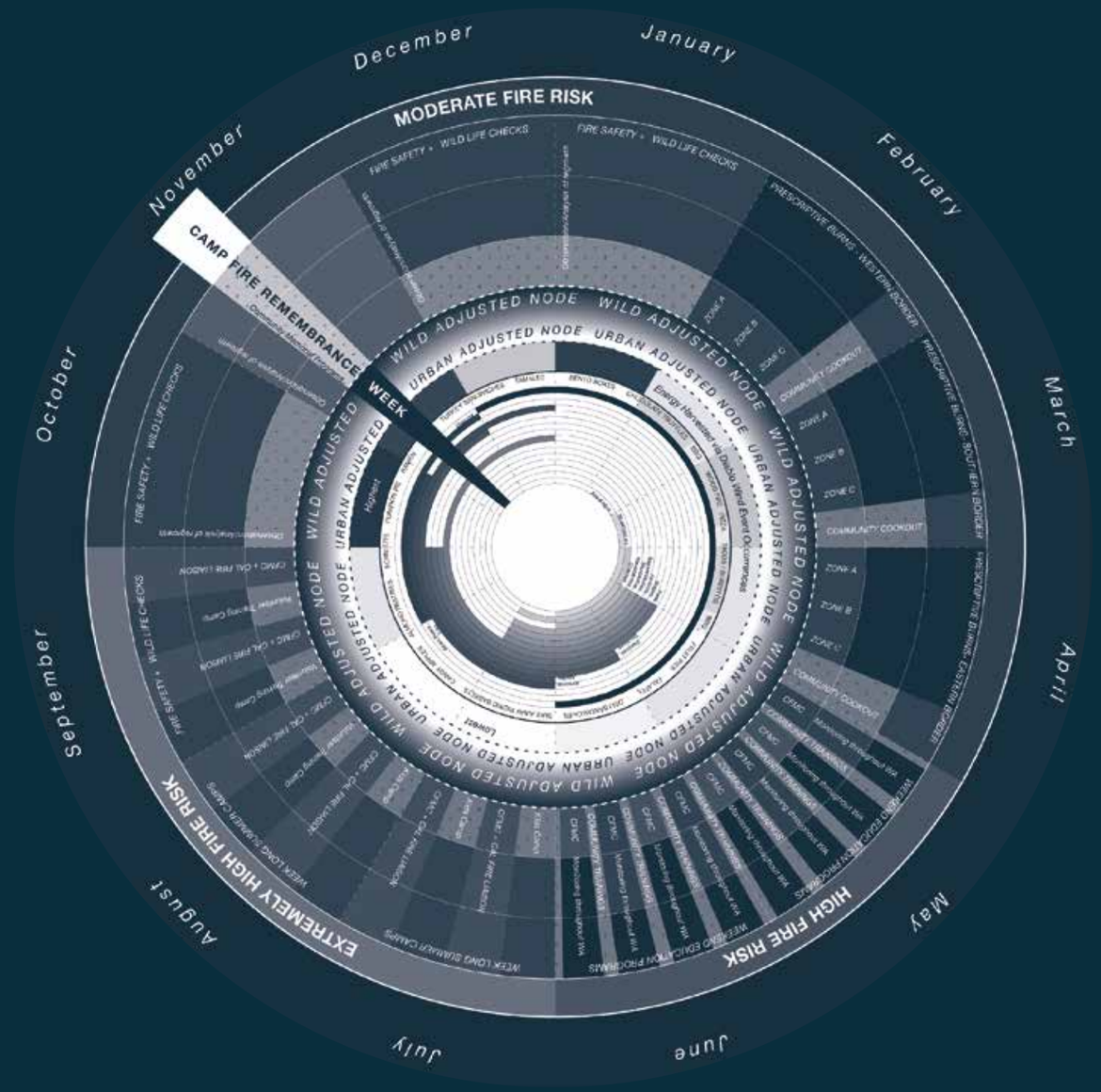
Editing Edge: Redisigning the WUI

Amy Robles, Anabella Rosa

Fire City Research Studio
Instructor: Hitoshi Abe

Our fire resilient strategy approaches the issue of catastrophic wildfires from two standpoints simultaneously. Our project seeks to increase human capacity to respond to fire while also decreasing the natural factors that contribute to fire ignition. We break down component parts of the WUI surrounding Paradise into “Urban Adjusted” and “Wild Adjusted,” which we design as two different environments that address community resilience (human factors) and wildfire mitigation (natural factors). The urban adjusted node emphasizes a sense of community, facilitation of responsible development and invests in renewable energy sources for public use. The wild adjusted node focuses on continual maintenance of the landscape through prescribed burns on a clear schedule, and is also bordered by a fire access road for use during emergencies. In this node, community members learn about how fire can be part of a healthy ecosystem and will witness the practice of fuel reduction.

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MODERATE FIRE RISK
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CAMP FIRE REMEMBRANCE WEEK
WILD ADJUSTED NODE
URBAN ADJUSTED NODE
FIRE SAFETY + WILD LIFE CHECKS
PRESCRIPTIVE BURNS - WESTERN BORDER
PRESCRIPTIVE BURNS - SOUTHERN BORDER
COMMUNITY COOKOUT
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CFMC + CAL FIRE LIAISON
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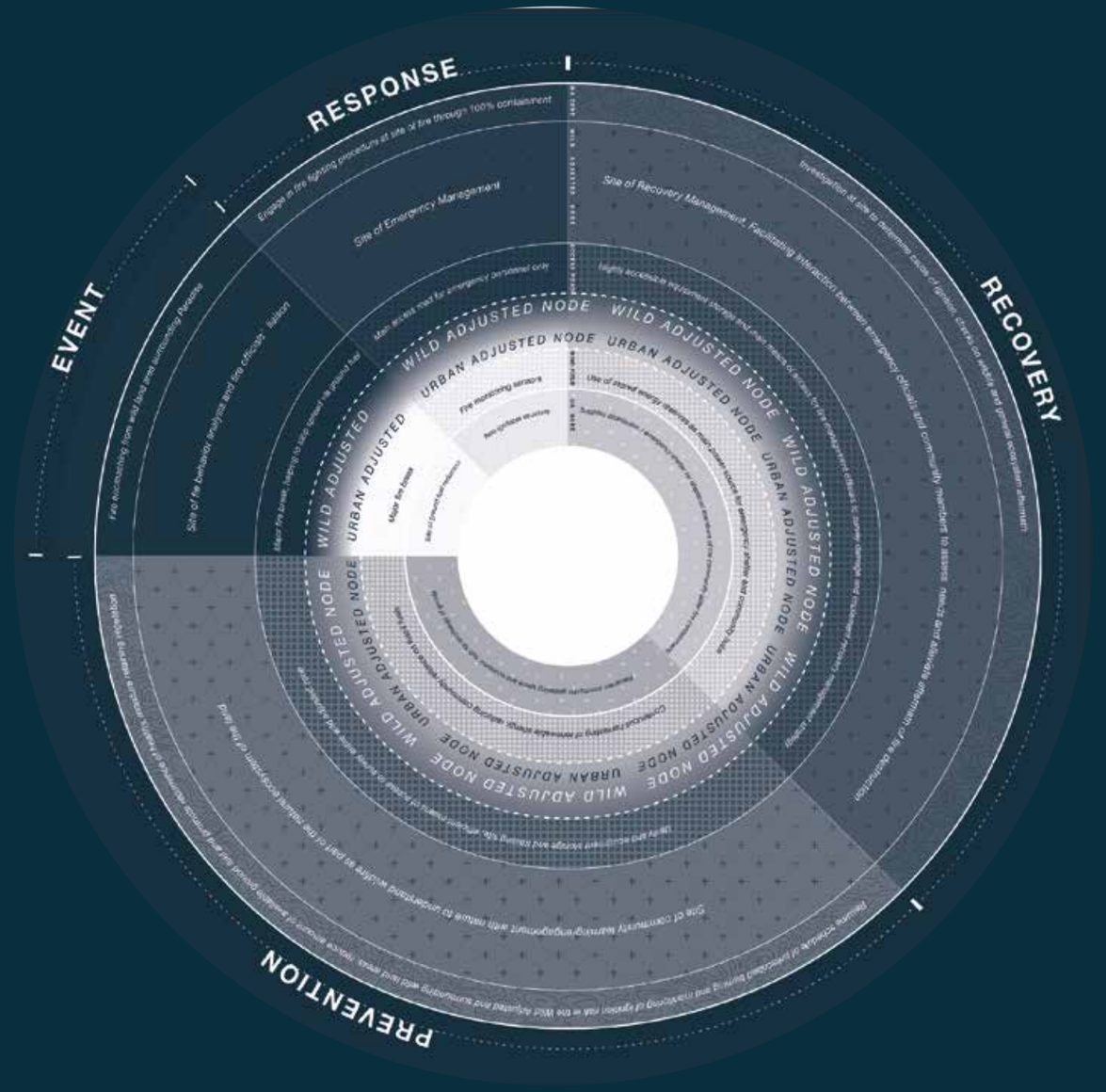
WEEKEND EDUCATION PROGRAMS


EVENT
RESPONSE
RECOVERY
PREVENTION
Engage in fire fighting procedures at site of fire through 100% containment
Site of Emergency Management
Site of Recovery Management, Facilitating interaction between emergency officials and community members to assess damage and promote recovery
Main access road for emergency personnel only
Highly accessible key/defined storage and origin points of access for fire equipment, crews and supplies
Fire monitoring sensors
WILD ADJUSTED NODE
URBAN ADJUSTED NODE

URBAN ADJUSTED WILD ADJUSTED

Supporting Natural Ecology

Energy Autonomy

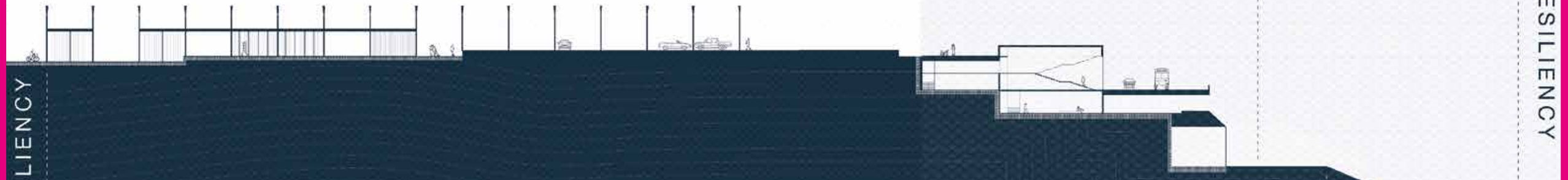
Human Engagement with Nature

Economic Growth

Collective Learning

Community Gathering

LONG TERM RESILIENCY



Physical Fire Barrier

SHORT TERM RESILIENCY

Disaster Management

Flexible Use

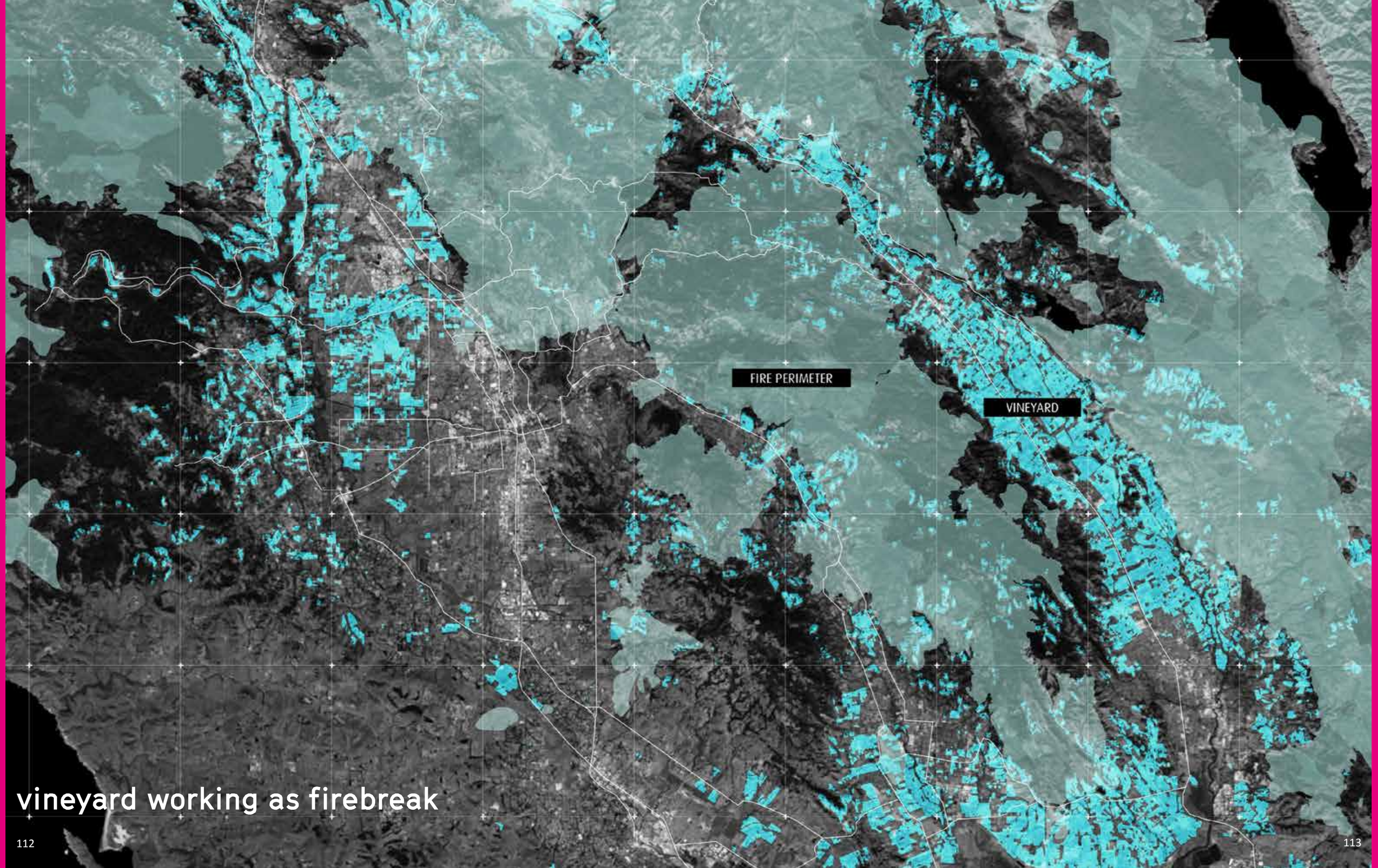
Fire Management

Agri-CULTURE: Integrating Wine Industry and Temporality

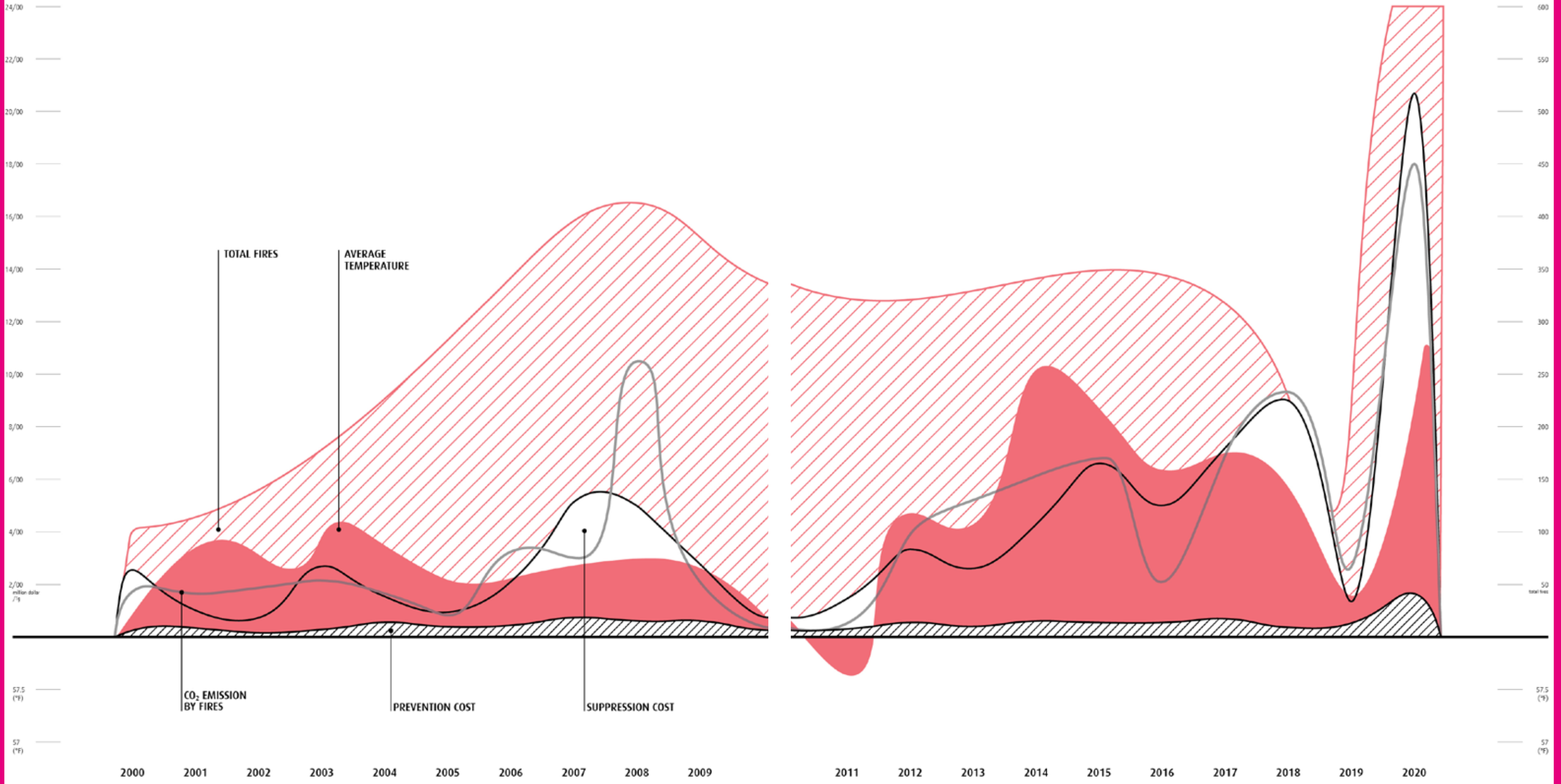
Yenchun Lai, Yejin Choi

Fire Land Studio
Instructors: Jeffrey Inaba and David Jiménez Iniesta

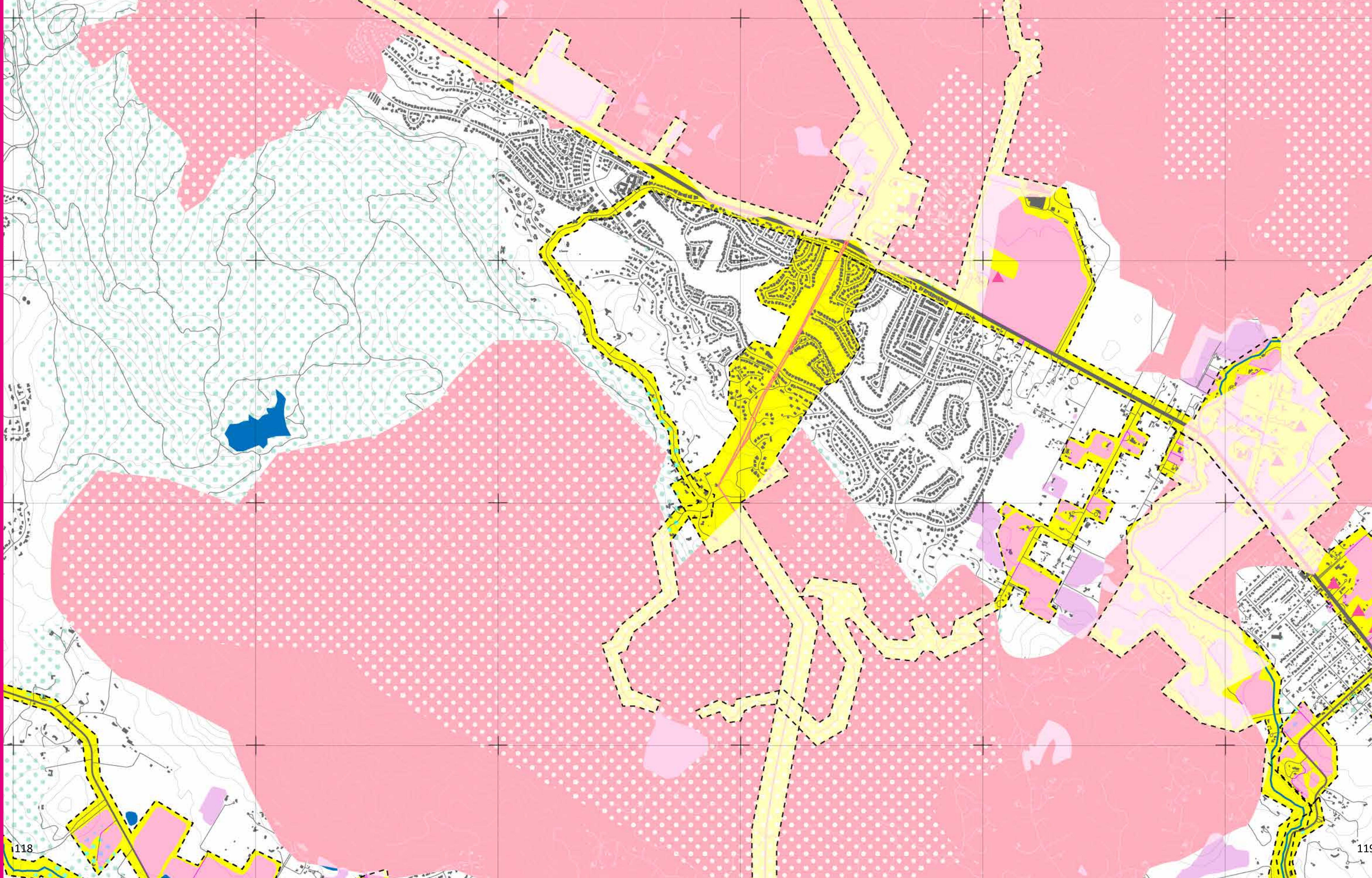
Agriculture is a main connection between humans, nature, urban, and wildland. In Northern California, the wine industry larely takes place in the WUI and is an irreplaceable contributor to the state's economy. In the case of wildfire, the wineries sustain damage but also protect the region against it. This project proposes a novel urbanism with virtuous cycle in the region which addresses the problem of wildfire, economic aspects, and social issues in Northern California.
Winery activities can play a proactive role in mitigating fires through the collaboration between public and private sectors. Merging winery and fire protection programs ensures the activities within the spaces are efficient and safe. This project also draws on the temporality of the wine industry and wildfire by proposing dynamic, flexible programs and spaces that can react to the seasonality of fire.
Eventually, we envision that this development pattern could be applied not only on wineries in Northern California but also on the other industries throughout the state in following years, leading to a smart urbanism in WUI with pre-fire management.

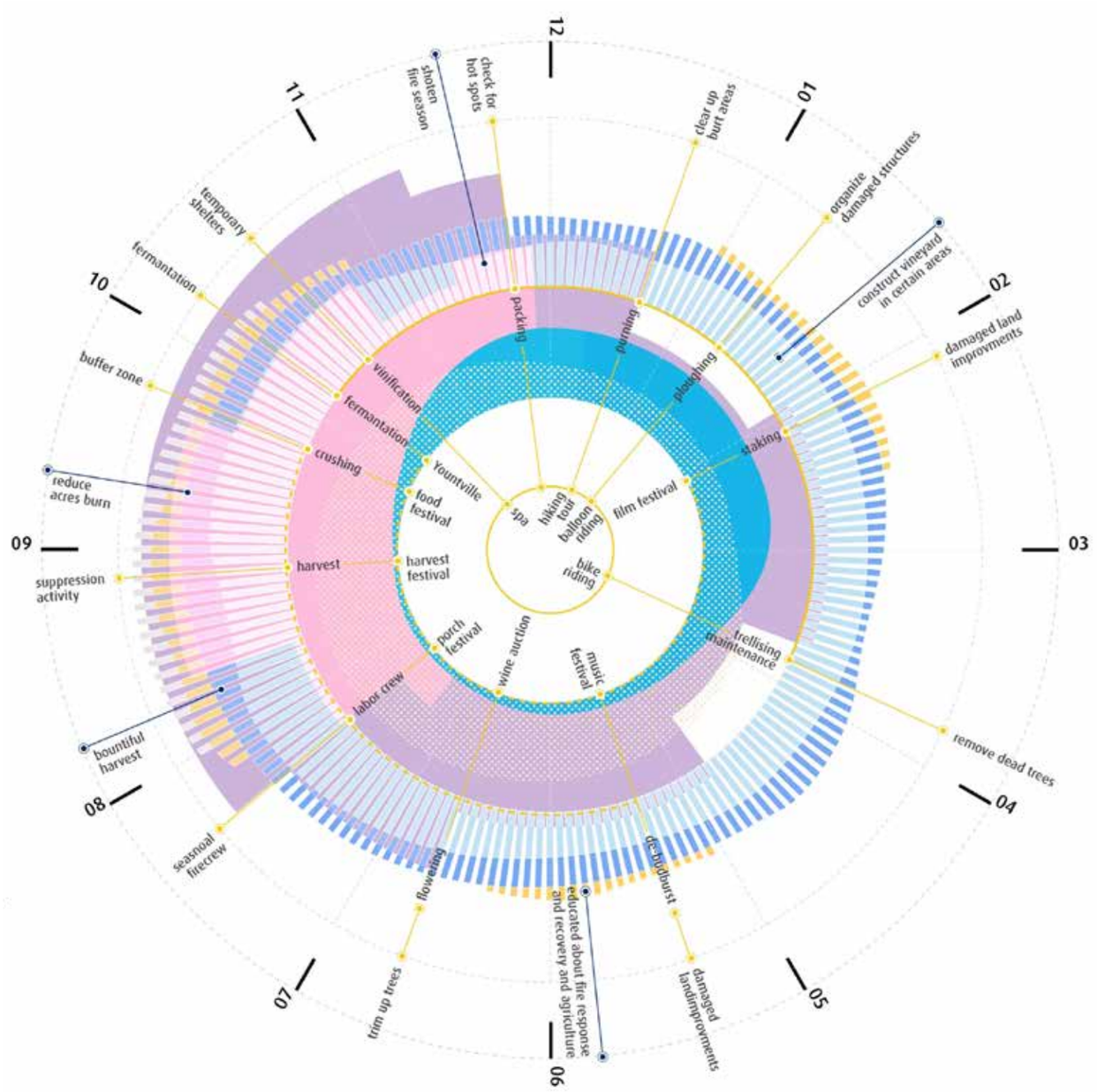


vineyard working as firebreak



excessive fire suppression cost compared to the fire prevention cost





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- acres burnt
- winery utilization rate
- labor
- tourist
- firefighting personnel
- persions evacuated
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DIABLO WIND
EMBER STORM
COMMERCIAL
RECEPTION
WINE MACHINE
WINERY COURTYARD
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LOADING SPACE & STORAGE
WORK PARKING & LOADING
STORAGE
WINE MACHINE
WORKER'S SPACE

KITCHEN & DINING
TOILET
BEDROOM
WORKER'S SPACE
WINE MACHINE
SHOWER
STORAGE
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TOILET
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Regenerative Urbanism: Disasters as Catalysts for Resilience through Community Networks and Policy Implementation

Jean-Paul Previero, Nickson Chan

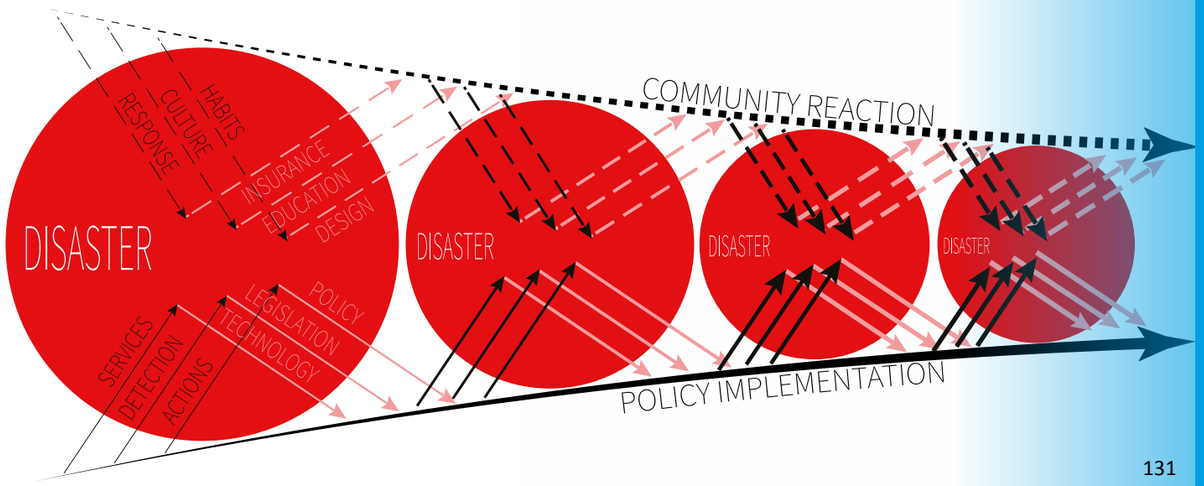
Fire City Research Studio
Instructor: Hitoshi Abe

Introduction

Disaster is a crisis that we have to protect ourselves from, as well as an opportunity to recognize the shortcomings and avoid future damages. However, it is reasonable to conclude from the chronology of Californian wildfires[1] that there is plenty of room for potential improvements. In 2017, Tubbs Fire brought disastrous damage and was recorded the most destructive wildfire in California history at the time. Its level of damage was surpassed only a year later by the Camp Fire. Recently, the record-setting wildfires made 2020 the largest wildfire season recorded in California – just the August Complex fire alone had burnt over a million acres. Figure 1 shows how contemporary U.S. society has been experiencing disasters as independent events. The Californian wildfire situation proves that existing approaches are ineffective in mitigating damages.

Under the aspirational term “Regenerative Urbanism,” figure 2 proposes a crisis-driven model to capture opportunities for improvements arising from each disaster, along two major lines of progress. The Policy aspect (solid arrow) illustrates administrative and legislative actions. The Community aspect (dotted arrow) includes citizen-led engagements and any non-governmental involvement. During a disaster, both aspects contribute actions (arrows pointing inward) to address the immediate emergencies. What is key here are the lessons learnt from each disaster (arrows pointing outward), which are important takeaways formulated to strengthen future resiliency. It is a dynamic process that allows cross-sector interactions. In other worlds, community involvements would motivate policy implementation, and vice versa.

1. “Top 20 Largest California Wildfires,” California Department of Forestry and Fire Protection (CAL FIRE), last modified January 13, 2022, https://www.fire.ca.gov/media/4jandlhh/top20_acres.pdf.



Case Study: The automobile industry

Knowledge transfer and the look for relationships within different fields apparently distant in method and approach is what drove us into analysing the successful[2] evolution through time of the automobile industry. In response to a series of vehicle related disasters over time, there has been a very active series of community reactions and policy implementations that lead to the improvement of the safety of the users and to a society that adapted its habits to a more responsible behavior.

With tragic events due to DUI (Driving Under Influence), there has been a mobilization of community organizations led by mothers and fathers who lost their children in alcohol or drug related accidents. For example, the MADD[3] organization (Mothers Against Drunk Driving) is led by Candace Lightner whose13-year-old daughter was killed by a drunk driver. At the government level, new measures were then implemented such as the lowering of the permissible blood alcohol content levels and a tightening of the penalties to include imprisonments, which eventually led to more responsible driver behavior. In this case, the community's proactive action helped to push forward policy implementation. Moreover, the high rates of deadly accidents during the 1970's triggered the implementation of new laws, like the mandatory use and implementation of seatbelts and airbags and other technologies. At the same time, public awareness campaigns once only promoted by local organizations are now implemented in many schools where children and teengaers learn from a young age the car-related risks.

Finally from an environmental point of view, the automobile industry is a leading sector in aiming to reduce CO2 emission. For instance, policies such as incentive schemes for owners of hybrid or electric cars and limited vehicle access in city centers[4] promoted the development of more eco-friendly types of transportation.

Within this context, governments and local communities played a major role for the successful evolution of the automobile industry through the imposition of tighter laws and policies and the active engagement of non-profit organizations.

2. "2019 FARS Data Publication," National Highway Traffic Safety Administration, last accessed March 2, 2022, https://www-fars.nhtsa.dot.gov/Main/index.aspx.

3. "About Us," Mothers Against Drunk Driving (MADD), last accessed March 2, 2022, https://www.madd.org/about-us/.

4. La TV di Milano e Lombardia, "Milano: Sosta gratuita per chi viaggia in elettrico," last accessed March 29, 2022, tvmi.it/2021/08/22/milano-sosta-gratuita-per-chi-viaggia-in-elettrico/.

5. "Progetto," MOSE, last accessed March 18, 2022, www.mosevenezia.eu/progetto/.

6. StraNotizie, "Il miracolo (in ritardo) di Venezia. Dopo vent'anni il Mose ferma l'acqua alta," last modified October 3, 2020, https://www.stranotizie.it/il-miracolo-in-ritardo-di-venezia-dopo-ventanni-il-mose-ferma-lacqua-alta/.

Case Study: "Acqua Alta" of Venice

Within the urban context, however, not all disasters trigger successful responses. The case of the recursive floods of Venice, Italy is an example of negligence, corruption, and bad project management coupled with a lack of a strong and active local community.

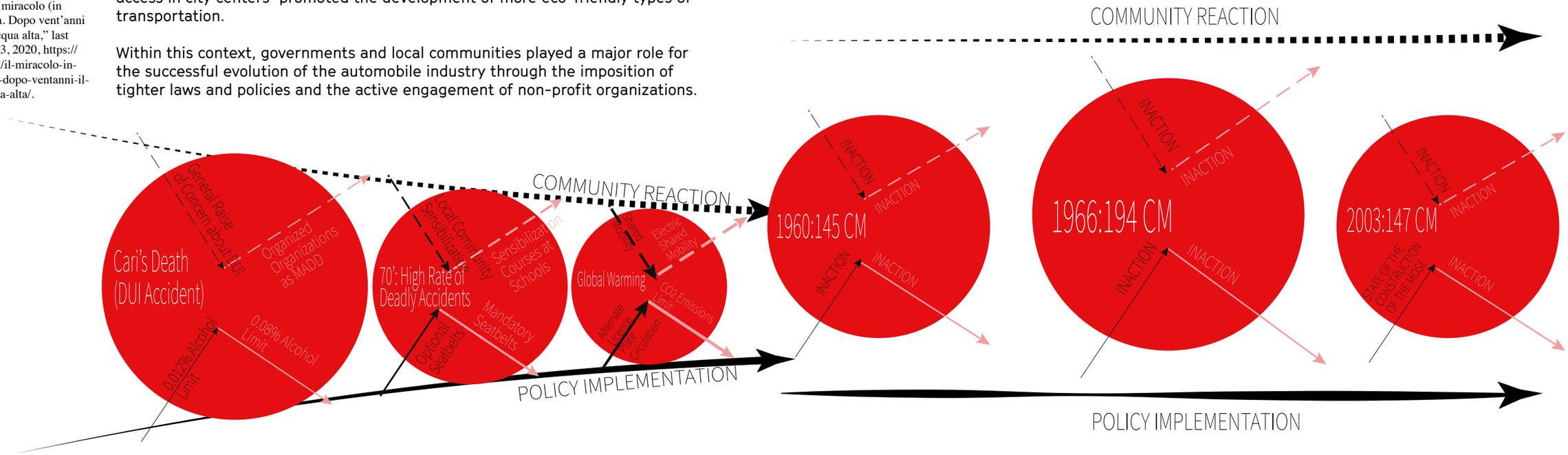
The combination of astronomically high tide and strong southerly winds, especially in the winter season, can cause a major inflow of water into the lagoon and thus a rise of water level up to 140 cm. This causes heavy damage to the buildings and deaths related to electric-water accidents. After decades of inactivity the "Mose"[5] – a system of mobile gates to prevent the inflow of water into the lagoon – was activated on October 03, 2020[6]. Despite having successfully prevented the rise of water of a low/medium event, the "Mose" is considered a failure in terms of the performance and cost of the engineering project. In 2002 the year before the start of the construction, the estimated cost was 3.6 billions of euros, in 2020 the costs levitated for a total of 5.5 billions[7,8.]
A different project was proposed based on the Rotterdam mobile gates with a cost of 1.3 billions, but it was finally discarded[9]. Corruption hindered the project development, and in 2014 there had been 35 arrests for corruption in relation to the subcontracts, and more than 100 persons were investigated.[10]
The Mose is a compelling example for disasters to mobilize great investments on infrastructure. Unfortunately this can also trigger unethical and illegal actions without supervision by special commissioners and well-organized community efforts.

7. Nadia Francalacci, "Mose: storia, costi, ritardi," Panorama, last modified June 5, 2014, https://www.panorama.it/news/mose-venezia-tempi-tappe-costi-ritardi.

8. Alessandro Cipolla and Martino Grassi, "Mose Venezia: quanto è costato e quando sarà pronto," Money.it, July 20, 2021, https://www.money.it/Mose-Venezia-quanto-costato-quando-pronto.

9. Luisiana Gaita, "Acqua alta, ecco come funzionano le paratie mobili di Rotterdam: "Il modello Mose fu scartato per la manutenzione costosissima," Il Fatto Quotidiano, November 17, 2019, https://www.ilfattoquotidiano.it/2019/11/17/acqua-alta-ecco-come-funzionano-le-paratie-mobili-di-rotterdam-il-modello-mose-fu-scartato-per-la-manutenzione-costosissima/5565632/.

10. Il Fatto Quotidiano, "Venezia, il Mose non entra in funzione e la città è sott'acqua: piazza San Marco allagata – Video," last modified October 4, 2021, https://www.ilfattoquotidiano.it/2021/10/05/venezia-il-mose-non-entra-in-funzione-e-la-citta-e-sottacqua-piazza-san-marco-allagata-video/6343823/.



Case Study: Hurricane Sandy

The 2012 Hurricane Sandy killed 233 people and cost 68 billion dollars, and it drove actions for preventing future losses. President Obama issued an executive order adopting stricter building and siting standards to reflect scientific analysis that projects future flooding being more frequent and even more intense than Sandy, thus the Rebuild by Design competition was launched as part of the combined efforts. The early involvement of architects and planners represented a shift in disaster planning, adopting comprehensive research to address complex problems. Ten interdisciplinary teams of scientists, engineers, designers, and architects developed projects to improve the region's resilience.

Working with communities collaboratively was proven successful because they carried with them first-hand experiences and collective memories about past disasters, which would help ensure public acceptance and practicality of proposals. In 2014, then-HUD Secretary Shaun Donovan announced the award of $930M to seven winning ideas.[11] Winning ideas collectively formed a master plan that involved ecological and landscape design techniques to address issues such as coastal storm surges and inland flooding of low-lying areas.[12]

Locally, New York State Governor Cuomo and Legislature passed an unprecedented three billion dollars "Restore Mother Nature" Bond Act8, in response to a post-Sandy coalition of local interests that alert the State of the growing need to address the disastrous need, while globally the Rockefeller Foundation's Resilient Cities Networks[13] developed international partnerships for sharing knowledge and driving innovations. None of these would have happened if the government authorities and various communities had not recognized the importance of evaluating takeaways from the Hurricane.

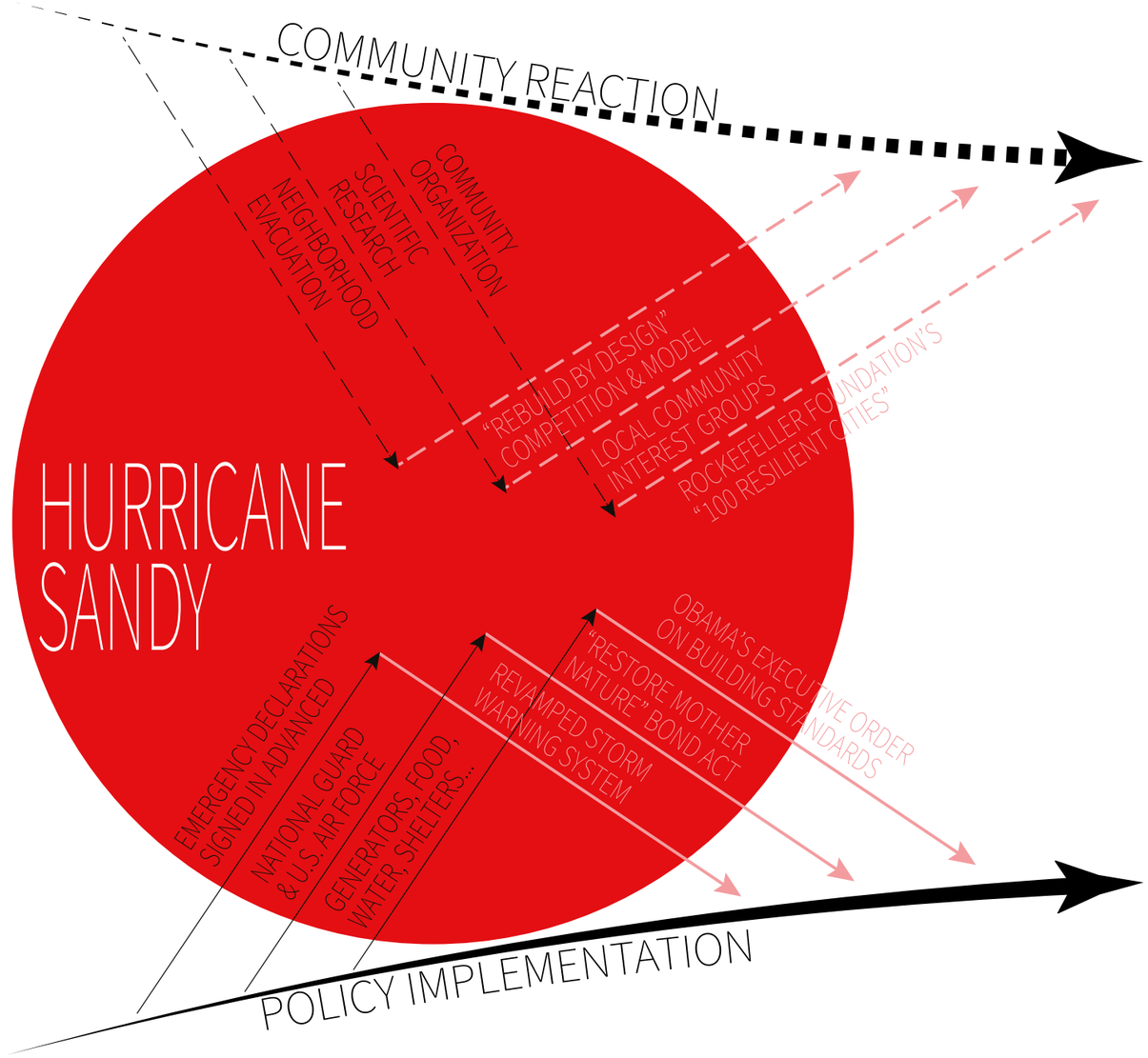
Takeaways and Conclusion

The proposed Regenerative Urbanism strategy envisions a strong synergy between community engagement and policy implementation, which would be strengthened through learning from each disaster. The MADD organization, analysed in the case study of the automobile industry, is a compelling example on how building a cohesive community can affect policies and mitigate the outcomes of disasters. As we saw in the case study of the Mose in Venice, disasters can require huge investments and trigger unethical behaviors. To protect the design process against personal interests, it is crucial then to engage independent supervisors to assess the most promising and effective strategies to be implemented. The post-disaster organization of Hurricane Sandy serves as a good case practice on collaboration between the government, community groups, and designers. Their partnerships improved the local area and brought global influence among coastal cities. Early involvement of architects is proved to be crucial in designs that thrive on strong communities and incorporate technical expertise.

11. "Rebuild by Design," U.S. Department of Housing and Urban Development (HUD), last accessed March 8, 2022, https://www.hud.gov/sandyrebuilding/rebuildbydesign.

12. Nate Berg, "How a Design Competition Changed the US Approach to Disaster Response," The Guardian, last modified January 18, 2017, https://www.theguardian.com/cities/2017/jan/18/rebuild-by-design-competition-disaster-respone-climate-change.

13. New York-New Jersey Trail Conference, "Restore Mother Nature Bond Act Could Impact Trails + Our Mission," March 23, 2020, https://www.ny-njtrailconference.org/news/restore-mother-nature-bond-act.



Fostering a Culture of Collaboration in Design

Henk Ovink

Henk Ovink lays out the three pillars of comprehensive action, which fosters a culture of collaboration with local communities to create a comprehensive long-term approach. When it is part of the design process, it can lead to a project with more innovative, catalytic, equitable, and pragmatic solutions.

Tom Sturm. *Map of Pettaquamscutt Cove*. Photo. USFWS. July 2, 2014. Public Domain.

[14:16] The International Panel on Climate Change (IPCC) “Land and Climate Change” report has two main foundations. The first explains that almost everything we do, we build and invest in, is increasing climate change; with more carbon, a bigger footprint, etcetera. So everything we do as humans across the world is increasing climate change.

The second pillar explains how we do it makes us more vulnerable too; the way we develop our cities, how we develop our economy, how our planning, design, urbanization, economic development, and the investments in the infrastructure are developed. So next to what we do, it is also how do it. We are developing our societies in the wrong way, destructing our natural systems. Increasing climate change, inequality and biodiversity decline at a scale and speed hard to reverse.

[22:52] So the foundation on why we’re going the wrong way is explained very well, but the upside of this is explained very well, too. If we change course and plan and develop radically different – inclusive, comprehensive, and sustainable – we can actually change course, and you – designers and planners – are instrumental to that.
In order to really invest in the future, we have to take the future as our reference. And those scenarios’ ambitions (from Sustainable Development Goals and the Paris Agreement) should inform the actions that we take proactively, collectively together, […] and we need your help for this comprehensive action.

The first pillar of comprehensive action is people.

We too often start with the result, the project, but developing novel projects starts with investing in the process, in the people, in the enabling environment.

There is enough capacity around the world -- in institutions and communities, individuals, and experts -- and that enabling environment is alsovery collaborative and inclusive. An enabling environment is about the capacity of people, not so much about the implementation of projects.

This text is derived from a lecture recording, not intended to be published as an article.

It is about collaboration and capacity building, but it is also about consistency in that approach, about the continuous commitment from all stakeholders, to drive the initiatives that are cross-cutting. Economists confirm investing in the process upfront maximizes opportunities. And those maximized opportunities have a higher performance. So it is critical to invest in the process before we start to invest into projects. It takes millions to spend billions in the right way.

Second, we need capacity that is transformative.

I call on to focus on water because water has a connecting capacity across all Sustainable Development Goals. Investing in water trickles down across the full SDG agenda: Better life below water, climate action and life on land, driving food security, but also equality. It are the women and children who walk the wells every day for hours, not the men. With water security for their communities, the women are the powers that drive prosperity and the kids go to school to become innovative and real, better new generations. And with sanitation facilities in the schools, the girls are no longer monthly dropouts.

[25:00] So water and sanitation and hygiene are not only a first line of defense in the context of this pandemic, but they are a driver for economic prosperity and equality for women and girls. So water ticks across all these different aspects of our economy,environment, ecology and the many social issues. Understanding that complexitycomes first, valuing water across all needs and opportunities, across all SDGs comes second, and only then can we find opportunities to manage water inclusively with everyone across all needs and interests.

Now, the third pillar is about integration from a comprehensive approach;

[...] looking across the full 2030 agenda, inclusively with everybody leaving no one behind; and sustainable for the long term. For a long term comprehensive approach, we need to make sure that the future informs our innovative interventions in the short term. Because the plan can only work with the projects in place, you need that plan forthe future. The projects by themselves won't make a difference; only a holistic set of interventions in the context of such a comprehensive approach will work. Otherwise, these projects become siloed one-offs. And the external negative impacts only will negatively impact a resilient and sustainable future. So the plan needs the projects as much as the projects need the plan. To make this work we need collaboration. We need to reach out, we need to set up partnerships, organize things together across communities, across stakeholders, across partners, across borders, across interests. This must be done in a transparent way as well. That not only makes us accountable as partners, it also helps develop the business cases in the context of all these values we must accomplish. Doing this right will help develop a programmatic approach, develop capacity at the individual as much as institutional level, driving the so much needed enabling environment.

[27:15] Now tying these (three pillars) together starts with design and the inspiration of planning and innovation. Why do we need you in this?

One, we need solutions that are innovative, catalytic, pragmatic, that help us drive this agenda. Second, we need solutions that have the capacity to connect across scales, from your front yard all the way to your river system and your oceans. Across time and looking back, definitely looking ahead, finding the right answers for future problems today. Connecting across vested interests, across sectors, across silos, across organizations, across individual needs, building and enabling environment, a coalition that has the capacity to actually spark and propel these innovations.

And the third part of the design capacity is of course political, with its aspirations and inspiration it can tell the narrative of the future. And that is the future that we want. Design can help us inform that the future we want and the future we need is also the future we can develop. So it's not only informing what we need to do today, it's actually telling us how we can work together in the decades to come.

[29:05] Next to the focus on the enabling environment and the projects in this very innovative way, we have to understand how to get there. In literature we call it soft space, which are places in a physical environment where you really make room for innovation and collaboration. I always call them safe spaces. Take the example of Rebuild by Design, the program I developed and lead for president Obama's Hurricane Sandy Task Force, where we really brought everybody together. People that did not trust each other, people that had suffered because of Hurricane Sandy, people that wanted to look ahead but had a hard time finding grip on the future, and only looked around to see a devastating impact of a disaster, and people that were really vulnerable.

[30:00] Not only vulnerable in the sense of their income, but vulnerable emotionally, vulnerable in their societal capacity, vulnerable across the board. Bringing them together in an environment where we could start to build trust across the different stakeholders, partners, individuals in society, is critically important. It has to be a safe place where it is not about negotiation, where it's not about what I want, or what he or she wants, but what we can do together. Collaboration is different from negotiation. [...] With collaboration, there's a gain that is unexpected; you bring something to a partnership, and you're not even sure what you're going to get out of it. But you know for sure that you were trying to reach this common goal, there is a higher ambition of delivery.

We need the experts, but not only the experts, scientists and engineers, we need the expertise from the community. Its about bringing together the indigenous knowledge; local knowledge; knowledge from data, assessment and research; and knowledge from policymakers, investors,insurers, politicians, and businesses. We need talent across the whole of society to be connected.

[31:41] With Rebuild by Design, we designed the process stepping out of this lock-in in the institutional world, but also stepping back in, understanding that we have to create time to think differently, investing in people and their capacities. And then by building that understanding, developing the interventions together that actually can drive the change these regions and communities need, connecting that understanding and capacity back to drive institutional change.

[36:25] There is a culture in collaboration that we have to embrace. Only by being radically inclusive the projects and innovations will make sense and deliver for the communities at risk. And only if we scale up and replicate these types of approaches, that are collaborative and inclusive -- and therefore holistic and transformative -- can we help change the world and change course. We have no time to waste. We have to take action now.

Designing the Process

The Task Force, with a core group of advisors and staff, created a unique structure for the competition. A successive and connected set of stages was established to orient the design process around in-depth research, cross-sector, cross-professional collabora tion, and iterative design development. The design process incorporated a variety of inputs to ensure that each stage's delivera bles were based on the best knowledge and talent, and that the final proposals would be replicable, regional, and implementable.

Making room for a collaborative and innova tive approach was a side step away from the institutional world. A detour around negotiations, the process aimed to build understanding and trust.

1 TALENT

Objective Gather the talent of the world to work with the talent of the Sandy-affected region.

Process Task Force issues a Request for Qualifications and Approaches calling for teams to assemble themselves in interdisciplinary partnerships to tackle the region's physical and social vulnerabilities.

To incentivize participation, the Federal Government pledges funding to implement the winning designs while private philanthropy pledges prize money for competitors.

Result Ten finalist design teams are selected comprising a diverse set of complementary skills and approaches.

2 RESEARCH

Objective Establish the broadest possible understanding of the region's vulnerabilities to future risks and uncertainties, to enhance resilience.

Process Rebuild by Design's local partner organizations create an intensive, three-month program of field research to introduce teams to a variety of local stakeholders, providing a comprehensive view of the storm's effects — the damage it created as well as the long-standing problems it uncovered or exacerbated.

A Research Advisory Board leads the teams through the region to learn from a variety of perspectives, and teams conduct additional research to supplement this on-the-ground work. Research is collaborative across teams and focuses on typologies as well as locations.

Result A public presentation from each team that includes three to five "design opportunities" describing conceptual approaches for interven-tions and an overall compilation of research submitted by all teams.

3 DESIGN

Objective Develop implementable solutions that have support from local communities and governments.

Process HUD Secretary Shaun Donovan selects, on average, one design opportunity for each team to develop. Teams then gather diverse local stakeholders into community coalitions, with whom they begin a four-month process of co-designing the final interventions. Using meet-ings, colloquia, charrettes, and non-traditional events to gain the broadest perspectives, they create solutions that not only address disaster scenarios, but also enrich the daily life of community members.

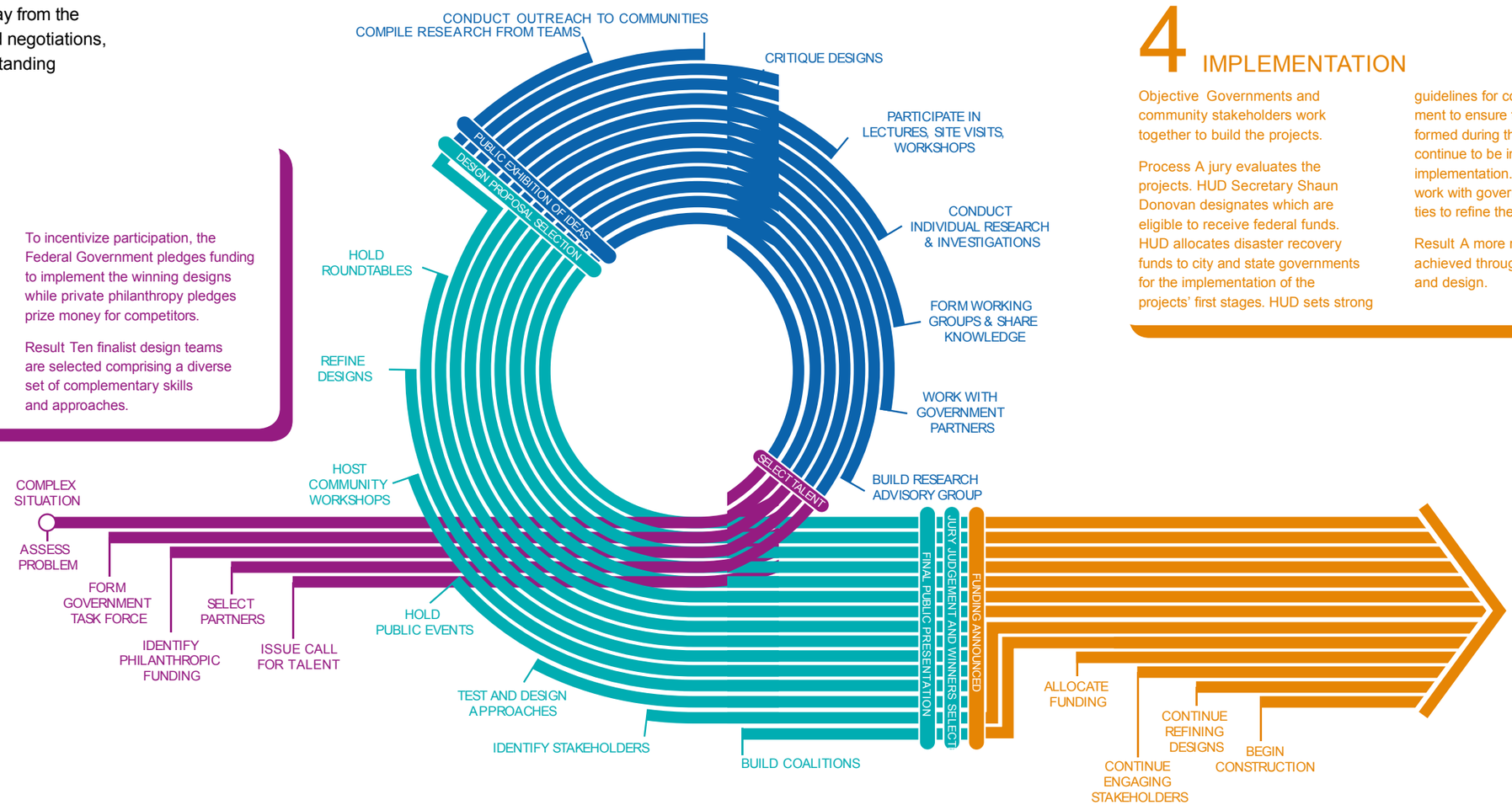
Result Ten fully developed, imple-mentable resilience proposals champion communities' visions for future development and have support from the local governments.

4 IMPLEMENTATION

Objective Governments and community stakeholders work together to build the projects.

Process A jury evaluates the projects. HUD Secretary Shaun Donovan designates which are eligible to receive federal funds. HUD allocates disaster recovery funds to city and state governments for the implementation of the projects' first stages. HUD sets strong guidelines for community involve-ment to ensure that the coalitions formed during the competition continue to be involved through implementation. Teams are poised to work with government and communi-ties to refine the interventions.

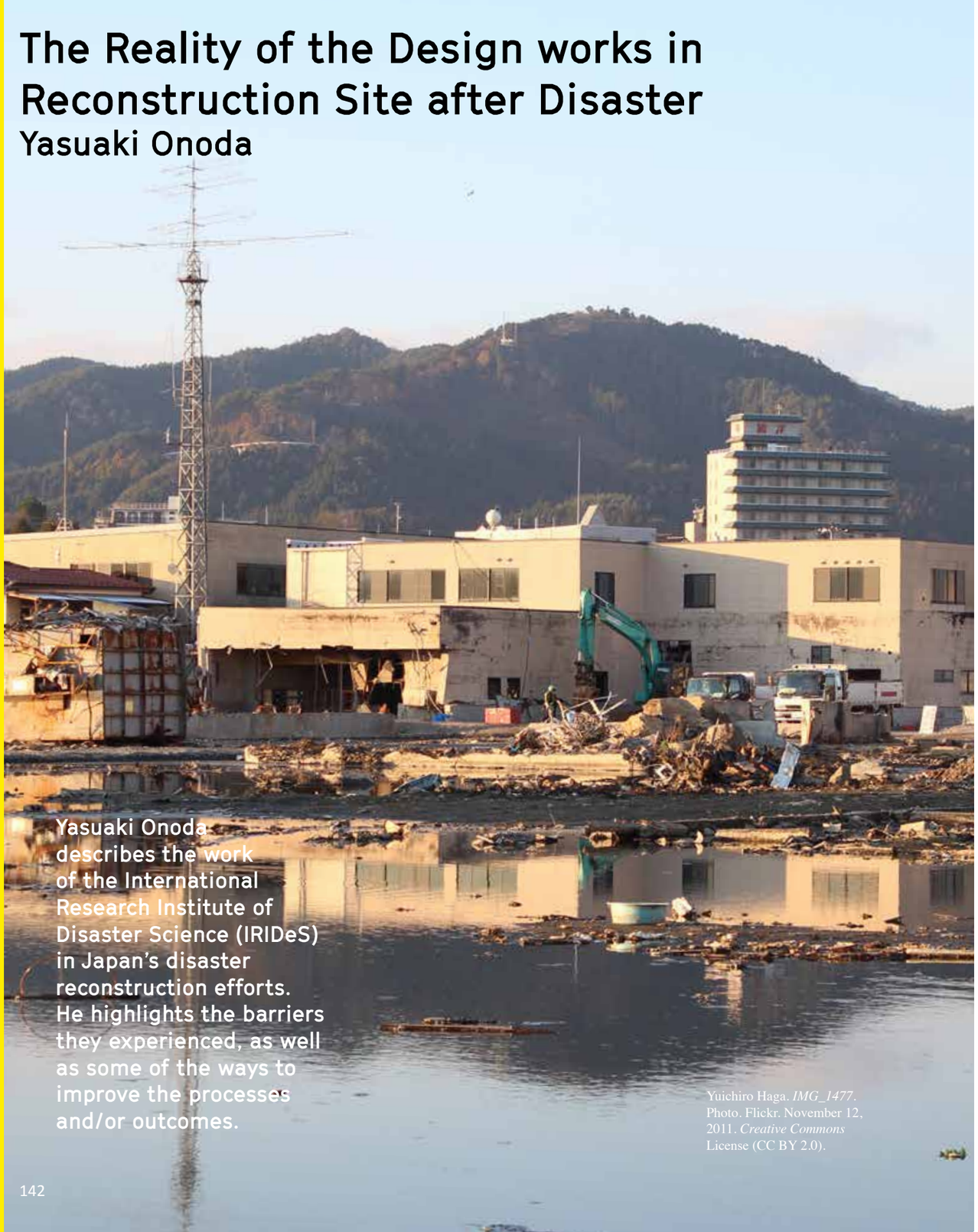
Result A more resilient region achieved through collaboration and design.



Scheme sourced from the Rebuild by Design Book, p. 26-27. Published under a Creative Commons Attribution-NonCommercial licen-se (CC BY-NC).

The Reality of the Design works in Reconstruction Site after Disaster

Yasuaki Onoda



Yasuaki Onoda describes the work of the International Research Institute of Disaster Science (IRIDeS) in Japan's disaster reconstruction efforts. He highlights the barriers they experienced, as well as some of the ways to improve the processes and/or outcomes.

Yuichiro Haga. *IMG_1477*. Photo. Flickr. November 12, 2011. *Creative Commons* License (CC BY 2.0).

[1:28:16] I prepared for you the six components, 1. The government structure, 2. The relationship between civil engineering and architecture, 3. Consensus building 4. Housing 5. Construction and 6. Memory. So first let me introduce myself, I am not an architect, but I have collaborated with talented architects, including Hitoshi Abe. People call my work pre-design because I have been setting up the condition for the client and for the architect to realize good design, good architecture, and therefore good circumstances.

[1:30:06] After the disaster in 2011, my life completely changed. I don't know if it's fortunate or unfortunate but it has changed. I had been living in Sendai, which is one of the closest big cities from the epicenter of the 2011 disaster. The length of the tsunami that attacked the coast was 500 kilometers, which is huge. After the disaster there are many things we need to do in collaboration with the government and scientists -- so we founded a disaster reconstruction design and management group: IRIDeS (International Research Institute of Disaster Science).This platform combines architects, civil engineers and urban planners. Fieldwork is an important part of IRIDeS.

[1:33:09] Part one is the governmental structure of reconstruction. The different reconstruction projects come from the different bureaus there are three layers within the local government, the municipality level, prefecture level, and central government level. In 2012 our government organized a reconstruction agency, but still after we established this there are so many vertically segmented administrative systems which is a basic problem of the governmental structure.

[1:42:04] We are thinking we need a platform to change the character of reconstruction, to soften the influence of this very crude system. That is why the architects {Hitoshi Abe, Kazuhiro Kojima, Yoshiharu Tsukamoto, Momoyo Kaijima, Atelier Bow-Wow and others} gathered on March 16, 2011 and founded Archi+Aid.

[1:44:18] The second issue is civil engineering and architecture. The Oshika peninsula was heavily destroyed during 3/11. In reconstruction efforts, architects are finding the Buddhist temple and shinto shrine and are emphasizing access to these sites. However the reconstruction planning by the government neglects such histories. So that's why the working architect, Kazuhiro Kojima, and the Archi+Aid people are doing very good research to respect these historical centers and creating the new center to combine not only architecture but also the sea embankment. This is a kind of collaboration between sea embankment, and architecture and history.

A local Japanese man walks past the police department littered with debris and wreckage on March 16, 2011, in Kamaishi, Japan. A 9.0 earthquake hit Japan on March 11, 2011, that caused a tsunami that destroyed anything in its path. 1st Combat Camera Squadron. U.S. National Archives & DVIDS.

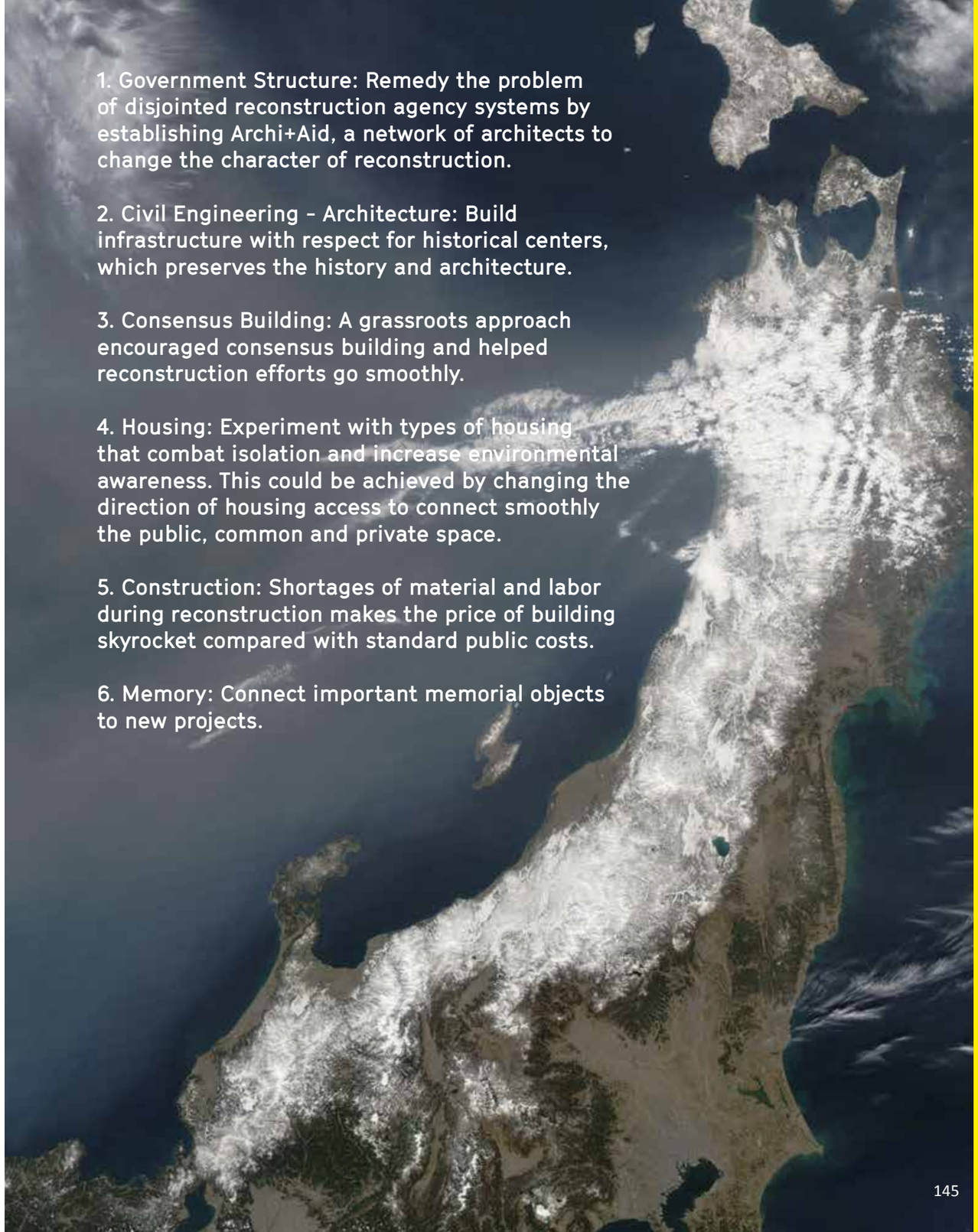
This text is derived from a lecture recording, not intended to be published as an article.

[1:53:42] The next issue is consensus building. There are two interesting examples that contrast good consensus building and difficult consensus building, involving the difference between a grassroots approach and a top-down approach. Natori hired a very cutting-edge architect and also a famous urban planner while in Iwanuma we are taking a grassroots approach. In Natori, there are so many contradictions meeting with the city mayors so that's why they stopped their reconstruction works. On the other hand in Iwanuma, we succeeded in producing the reconstruction process very smoothly and also we can succeed in the competition about public housing.

[1:56:08] Housing is also a very important issue of reconstruction. We have a history of many disasters. Each disaster has different issues and also there is so much important knowledge about how we should reconstruct housing. Especially the issue of solitary death after the Hanshin-Awaji earthquake (1995) which was an issue because the reconstructed public housing project was very segmented and very isolating. So after the 2011 disaster, the lessons of Hanshin really applied. We are working on important experimental housing: The Arai Public Housing Project, which attempted to increase environmental awareness by changing the direction of housing access to connect smoothly the public, common and private space.

[2:02:00] The fifth issue is construction and cost. The situation with reconstruction is there are so many projects and also there is a shortage of material and shortage of labor. That's why the price of building skyrockets to almost two times compared with standard public costs.

[2:06:30] The last one is memory. There's a 38 hectare site for a memorial park. So we worked on this project in a studio at the University of Hong Kong and we are finding how to connect the park design with the existing school, the former elementary school, which is an important object to keep. So I'm very proud of our work with the Hong Kong University students to impact the decision of the local government.



Jeff Schmaltz. *NASA Satellite View of Northeastern Japan on March 13, 2011*, Photo, Flickr, March 13, 2011. Creative Commons License (CC BY 2.0).

Resilience Policies in Japan Following 3/11

Elizabeth Maly

Elizabeth Maly describes housing recovery policies and new infrastructural practices that occurred in Japan after the Tōhoku earthquake on March 11, 2011. She also highlights the need for multiple defenses to protect against disaster impacts that may deviate from the predicted scenario.

Elizabeth Maly. Massive manipulation of the landscape for the recovery plan of Rikuzentakata. Photo. July 2016. Courtesy of the author.

[02:18:56] I will mostly be talking about the events of 3/11, however I want to mention a couple things about the Kobe Earthquake because I think the contemporary housing recovery policy in Japan can be traced back to the experiences of Kobe. In 1995 the Great Hanshin Awaji Earthquake struck the city of Kobe and fires erupted and destroyed a lot of the low-rise wooden housing areas. As the first major disaster in an urban area since World War II, Kobe's recovery set the foundation for modern post-disaster housing recovery policies in Japan. These include three phases: 1) evacuation centers set up in municipal buildings; 2) temporary housing that's provided by the government -- typically prefabricated but we've seen some changes recently; and 3) permanent housing recovery support that includes either people rebuilding on their own or government support for housing reconstruction (typically in the form of public housing).

[02:23:41] To move to 2011, as you already heard, Japan has a lot of experience with disasters and has experienced many earthquakes. The northeast coast of Japan had already experienced several major tsunamis notably in 1896 the Meiji Sanriku Tsunami and in 1933 the Showa Sanriku Tsunami, and then the tsunami from the earthquake in Chile in 1960 -- so about every 30 to 40 years this region had experienced a massive tsunami disaster. You've already heard and seen a lot of this information about March 11, 2011 when we had the massive complex disaster including earthquake, tsunami and fires that broke out, as well as the nuclear meltdown in Fukushima. The scale of the disaster was huge, the number of casualties was close to 20,000 people, the damage was devastating and the number of people who evacuated and had to rebuild their housing was very large. Along with Japan's history of experiencing many disasters, there are established precedents, examples, and methods of the government response and policies. After 2011 there were some new aspects of policies that were created and some new methods of implementation, but fundamentally I would argue that the policies reflected and reused the existing policies that had been used after previous disasters. Another constant is the three phases of emergency evacuation, temporary housing, and permanent housing in the recovery process.

[02:34:56] Municipalities have a really strong responsibility for not only the response but also the planning process; the municipal city government, or town government, is the one responsible for doing the planning process and responsible for the implementation of the related projects.

Typical recovery projects to support housing include, sometimes combined with other projects, collective relocation for disaster mitigation.

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I think it's a uniquely Japanese approach that includes two parts: the government buying former residential land in the lowland area that was damaged, from the people who want to sell it, and then providing new residential lots in the highland area. Those lots can be used for residents to build their own house using their own money or with some small subsidies. That's very different from what we have in the United States for buyouts, which are often for flooding. In the U.S., the government would designate the target area for buyouts, and basically one property transaction occurs to give residents money for thier former land if they want to sell; then you're on your own to find new land area/housing. That's really different from the Japanese government's approach, which provides both compensation for the former land and access to land in new residential areas.

The project, called Collective Relocation for Disaster Mitigation, emphasizes that the project's purpose is relocating the community. The logic is that its purpose is supporting the community rather than a property transaction.

The other really unique and specific Japanese approach is the construction of disaster recovery public housing. After 3/11 a lot of other related projects included land readjustment, which meant readjusting the property ownership map parcels as well as land raising and mountain cutting – really extreme modification of the natural environment and structure. I think it's important to reiterate that before 2011 we had mostly considered what is now called level one tsunamis -- tsunamis that would occur maybe every 30 years or 40 years or within 100 years. To protect against these tsunamis, the main approach is building physical barrier infrastructure (such as levees and sea wall structures) with the idea that the physical infrastructure can protect everything perfectly. But the change in thinking that happened after 2011 is that maybe we shouldn't be relying on infrastructure to protect 100%. For a larger disaster or larger tsunami, expected once in 1000 years, of the scale of 2011, the issue is that we can't predict everything.

We need to change our thinking about disaster prevention from looking at what is predicted, and then preventing exactly that scenario; to something that's a little bit more fluid and responsive, and accepting that we're not going to be able to protect against all kinds of events.

For coastal defense thinking we still include some physical barriers and infrastructure to protect against Level One events, but in the case of a Level Two event (something similar to what we experienced in 2011), the tsunami would be expected to be larger and would pass over the physical structure at the coastal area. In this case there can then be a series of multiple defenses or strategies including land use planning, highland relocation, buffer zones and mountains to mitigate the disaster impacts of that kind of event.

Image was featured in Liz Maly's ArcDR3 Guest Lecture at UCLA. Youtube, uploaded October 26, 2020. Screen Capture (2:24:18) https://www.youtube.com/watch?v=J7hQSExKcUQ
The image was created following an earthquake; popular belief at the time was that earthquakes were caused by giant underground catfish.

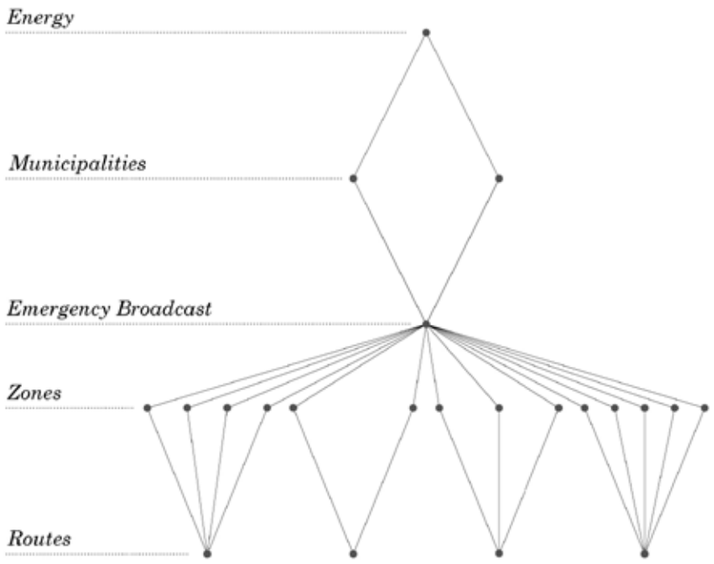
Tokyo University Library. *Shin Yoshiwara ōnamazu zukai or "The cause of the great catfish at Shin Yoshiwara"*, namazu-e ni miru Edo Meiji no saigai jōhō - Ishimoto collection kara. Public Domain.

Archipelago: Community Hub

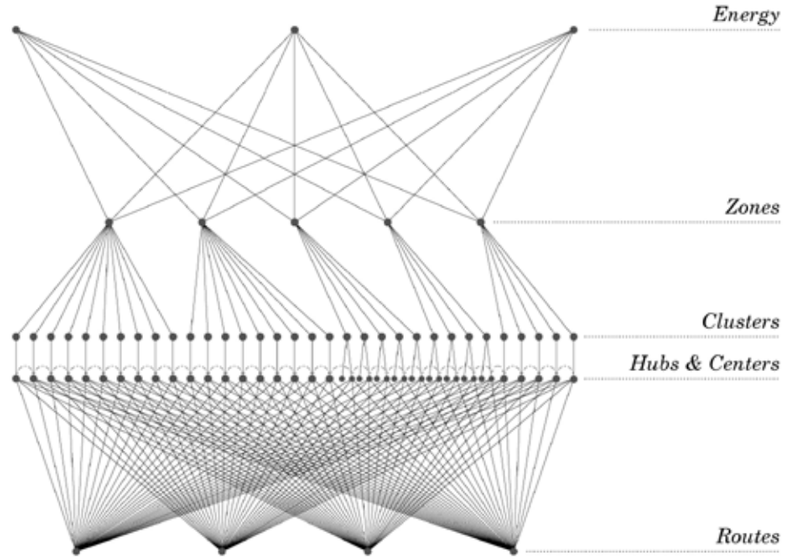
Andy Gonzales

Fire City Research Studio
Instructor: Hitoshi Abe

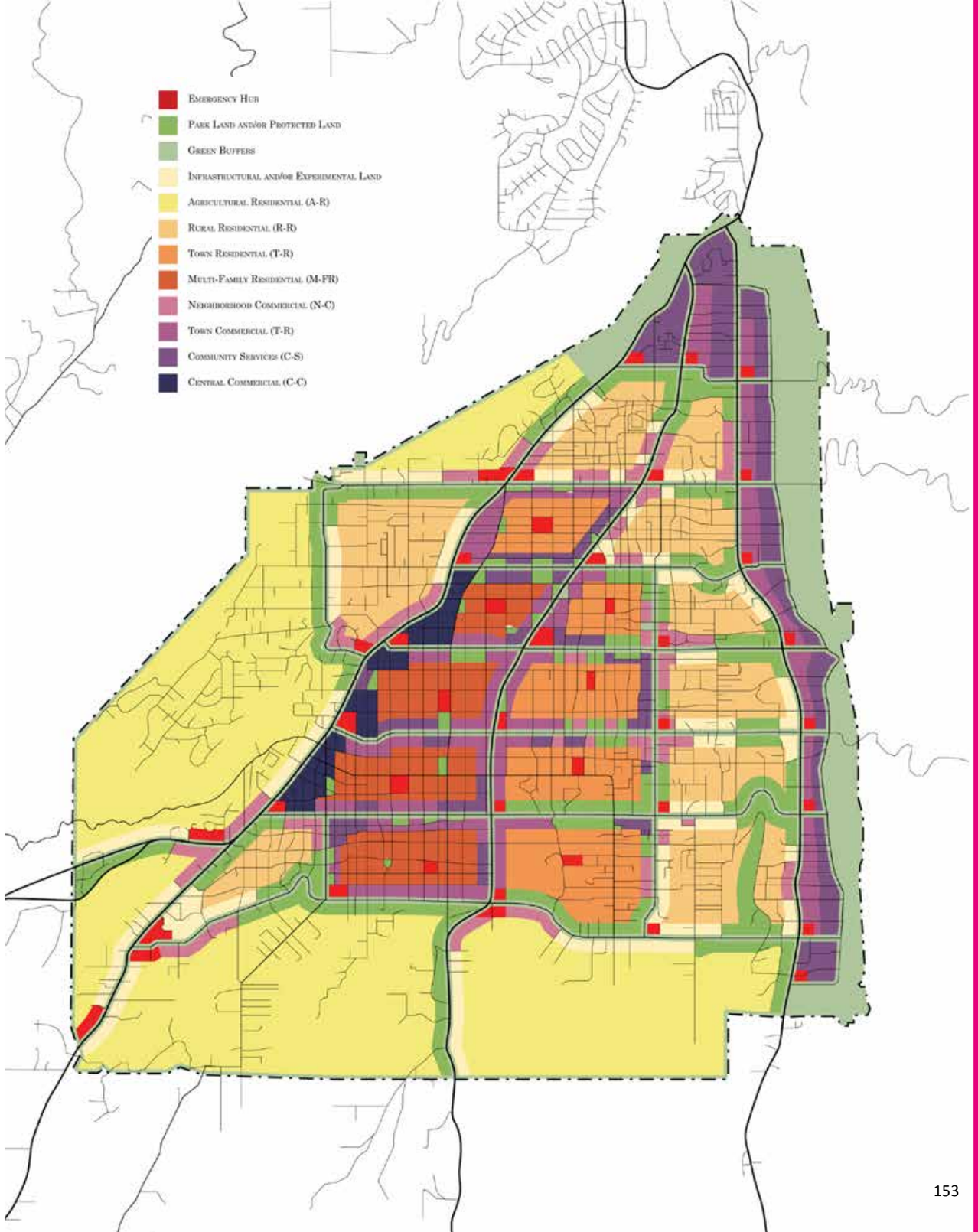
The project takes advantage of the tabula rasa condition of Paradise, CA post-Camp Fire and encourages an entirely new form of development. It compartmentalizes the town into semi-autonomous clusters, pulls back residential growth from the city's unprotected edges in cluster-zones, and implements multi-scalar fire safety measures for clusters, zones, and the city as a whole. Clusters are characterized by a core residential neighborhood, a ring of commercial or public programming and a green-belt/fire break that doubles as an additional fire evacuation lane. Each cluster also contains resilience hubs that respond programmatically to their immediate cluster needs and activate as emergency hubs during crisis. Zones take the cluster concept and distribute them throughout the city, adjusting residential/non-residential programming relative to their fire-risk. They are organized primarily by large north-south fire evacuation routes. A massive recreational green belt encompasses the north and east edges of the city, marking the WUI and providing further fire protection for the entire city. This new organizational strategy addresses the physical and social infrastructural failures of the Camp Fire, and theorizes a new, focused strategy for urban growth in highly unstable natural and man-made conditions.



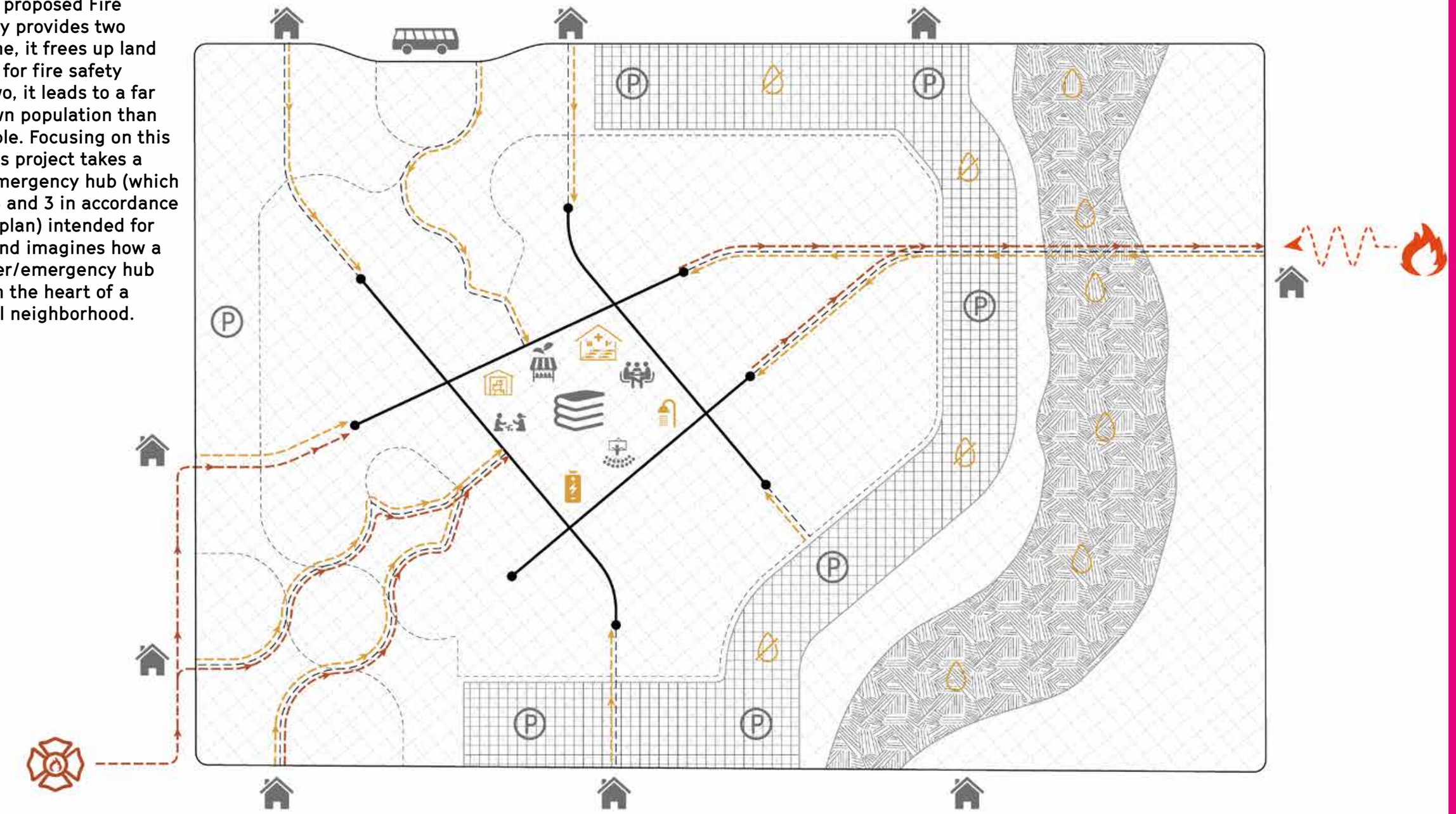
Town of Paradise & Unincorporated Areas
Emergency Preparedness System



Proposed Town of Paradise
Emergency Preparedness System

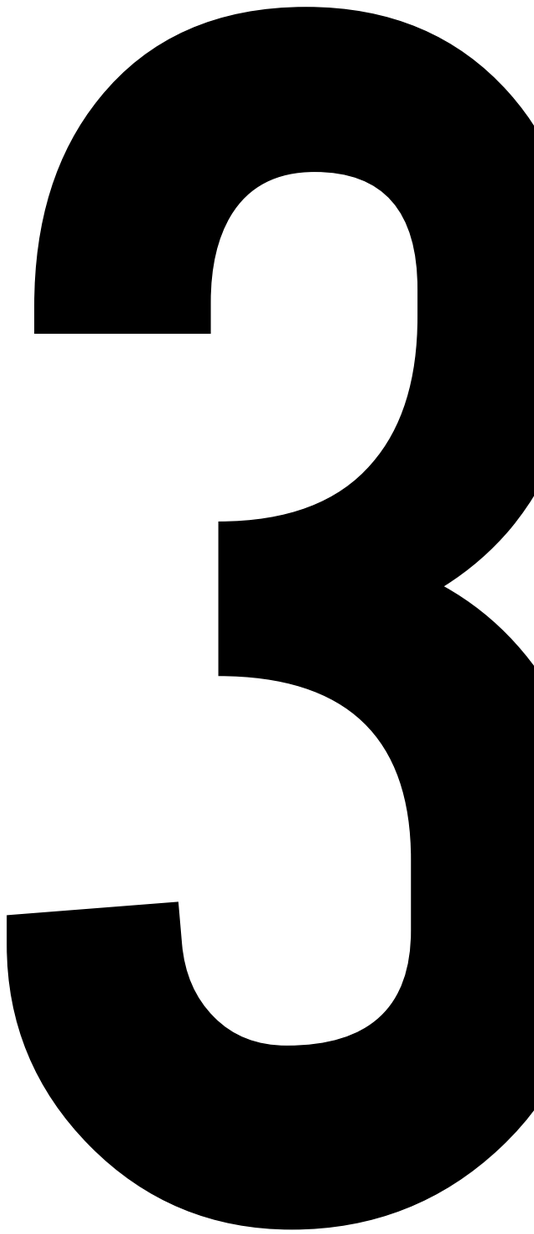


Redistributing the population of Paradise per the proposed Fire Resilient Strategy provides two opportunities: one, it frees up land at the perimeter for fire safety practices, and two, it leads to a far denser inner-town population than previously possible. Focusing on this second point, this project takes a center-cluster emergency hub (which exist in Zones 2B and 3 in accordance with the master plan) intended for residential use and imagines how a community center/emergency hub might function in the heart of a dense residential neighborhood.



Incorporating natural systems in risk reduction and development

Jeremy Alan Siegel
Christy Cheng
Jack Cohen
Montserrat Bonvehi Rosich
Seth Denizen
Jean-Paul Previero + Nickson Chan
Austin Ng + Molly Yiwei Qian
Daniel Lee + Hanxue Wu + Tianyang Xu



Using Design as a Collaborative Medium

Jeremy Alan Siegel

Design is a synthetic activity that translates the underlying reality and pushes a project forward, which can influence policies and other disciplines in the city. The project “BIG U” by Bjarke Ingels Group as part of the Rebuild by Design competition shows how the collaborative process with local groups and government can lead to a better design solution by mediating and embracing diverse interests.

The BIG Team explored the problem of how flood protection could be designed for the coastline of New York City without creating a seawall that segregates the life of the city from the water around it.

THE BIG U. Image courtesy of BIG. Josh Bisker, Amy Chester, and Tara Eisenberg, eds. Photo, Rebuild By Design, 74, American Printing Co, 2015, Creative Commons License (CC BY-NC 2.0).

The BIG U is composed of compartments much like the hull of a ship. The breach of one compartment would not lead to a failure of the system.

[3:55] It has been really interesting to see the role that designers are being asked to play in addressing issues that have typically been thought of as outside of the realm of design. Discussions that typically take place amongst policymakers, engineers, elected officials, etc., are now beginning to include designers, and I think there’s a reason for that.

Design is a really synthetic activity where you are forced to confront a series of existing, underlying realities and translate them into a step forward. I think that the synthetic quality of designers’ way of thinking becomes indispensable in some of these discussions. We find ourselves dictating policy – determining not just what things look like, but what we build, where we build, and why we build.

And I think it is an exciting opening for the discipline, and something that the discipline should really embrace.

[6:40] “The BIG U” was really conceived in the wake of Hurricane Sandy, which was a big shock to the eastern seaboard (the hurricane belt). And this is one of the moments where […] it became clear that the hurricane belt, which is typically relegated more to the equator, is expanding. And so in North America, that means that increasingly hurricane tracks are beginning to fall within the Northeast megaregion, which is this urban area that consists of New York, DC, Boston, Philadelphia, etc. which haven’t really had to deal with these kinds of issues.

[7:44] Hurricane Sandy caused tons of damage. It revealed the particular nature of the coastline in New York City. This geological formation is called the New York Bight, which is a 90 degree angle that actually channels storm surge directly into the harbor. And then you have a secondary surge coming from the Long Island side. And it ends up putting about 50% of the city’s total area at risk in the most extreme events. So there was a ton of physical damage to the city during that time, a whole lot of social and economic disruption, particularly for lower income neighborhoods, where residents weren’t able to leave town before the storm hit, and famously turned everything dark for almost three or four days at least, and in some cases more than a week.

[8:46] The origin of this project was Shaun Donovan, the Secretary of HUD, who was put in charge of the Hurricane Sandy Rebuilding Task Force appointed by President Obama. He met Henk Ovink, and they hatched this idea to have a design

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competition [...] where design teams would lead the thinking. And that's what was called Rebuild by Design.

Ten teams were selected to develop projects across the region, and they all had different geographic focuses. Our team's focus was dense urban areas. Naturally, we began to focus on lower Manhattan in this area that was coined SOPO after the event, meaning "South of Power."

[10:29] The city looked at the map of the FEMA flood zone and said a project needs to be done to elevate the coastline of lower Manhattan. But they were really looking at it in more of an engineering-only way. When we looked at it, we said it would be a disaster of another kind to create an impermeable barrier that begins to block people off from the waterfront. At the same moment, that New Yorkers are rediscovering the waterfront and a lot of development is happening along the waterfront as well.

So we thought about the Highline as an example of a retroactive version of this idea of social infrastructure. In the case of the Highline, a train trestle was decommissioned, and then paired with a park.

But in this case, our approach with the Big U was proactively making sure that resiliency infrastructure and all those massive investments are invested in people, invested in programming, and invested in the neighborhoods that lie along these areas.

In terms of scale, the coastline that we're dealing with is about 10 miles long and after that you get much higher ground to the north. (Image 04) So we looked at the scale of the existing neighborhoods. (Image 05) We also looked at the scale of what we call the pinch points. It's essentially very difficult to build a 10-mile long piece of infrastructure in one go.

By looking at the pinch points, there are natural points where you can turn the infrastructure inland and build the system up in pieces. And when you do that, you also build redundancy into the system, so that if one compartment fails, it's isolated, and the whole system works.

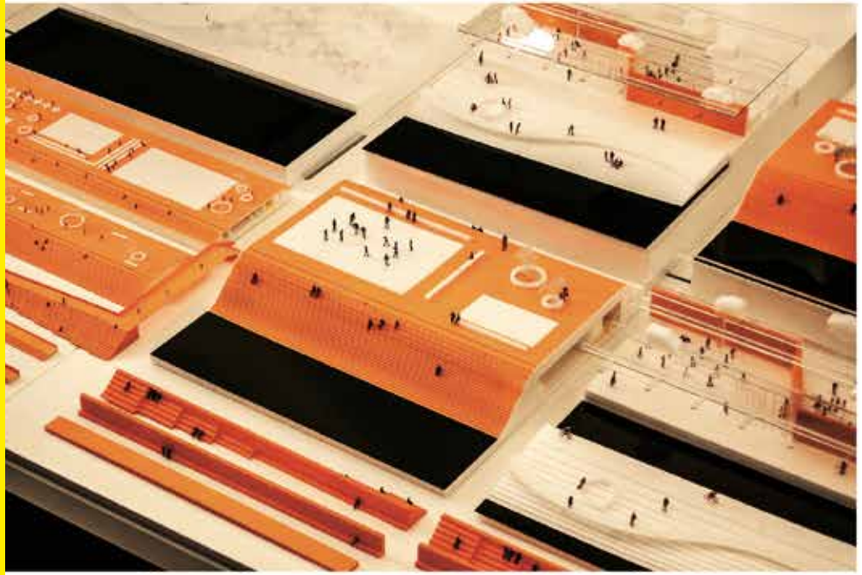
[12:27] So the BIG U is actually made up of a series of little U's, which turn up and inland. And it's been really interesting to see that this is precisely the way the projects have been rolled out by the city. Each compartment basically can be funded separately. It can be administered separately; often they're led by different agencies based on who has the most land in that particular area. It's a way to build the system up over time, and not rely on a single $20 billion investment. Instead you can do it in a few billions of dollars a piece.

[13:13] Our idea was that you can end up with a system that's not a uniform solution, like all the highways and things that have been built on the coastline by Robert Moses and so on, but we could end up with a series of projects that are designed in conjunction with communities that lie upland, and that in the end create a more diverse and rich experience.

Mapping of began New York's urban core.
THE BIG U. Image courtesy of BIG.

Josh Bisker, Amy Chester, and Tara Eisenberg, eds.
Photo, Rebuild By Design, June 2015. Creative Commons License (CC BY-NC 2.0).

For us, the Big U was like this scenario in which Robert Moses would actually collaborate with Jane Jacobs on a project. The scale of the issue was caused by these heroic scale moves of land reclamation, building coastal highways, and so on. But the scale of implementation that we need to look at is something that's more bottom-up to make sure that we don't repeat those same mistakes.



Top: *Interactive Models*.
Middle: *Build Your Own Waterfront*.
Bottom: *Collaborating With The Community*.

Image courtesy of Rebuild by Design and BIG.

Josh Bisker, Amy Chester, and Tara Eisenberg, eds. Photo, Rebuild By Design, June 2015. Commons License (CC BY-NC 2.0).

[14:07] In terms of design the question is dealing with storm surge, which is water rising from the ocean. The first question is how to build an elevated edge that reaches a certain height, based on projections of what heights certain frequency floods will occur at. And then the second question is how to create that edge, and what form the edge can take.

[14:38] Thinking about a number of different programming approaches, there's still a question as to what is appropriate where. And that's really where outreach comes in. And I would say that outreach has been a really key feature of all of our work in this arena. Wherever we're working we've found it is incredibly helpful to work with real people who live in these places. Often it's something that our client is not thinking about or even resistant to, and we have to push for it.

But we found that outreach really leads to better projects, not just about the design ideas, but really with the process, coordination, and argumentation and so on. This becomes more important the larger scale you work at, and the more stakeholders there are, the more people who are affected by your work. Coordination becomes a really key task of the planner, designer, and architect.

[15:45] In the case of New York City, we had to map out the political landscape. There are community boards that have a huge amount of power to approve or deny projects that were put in place after Battery Park City was built. So Battery Park City is kind of the last major project before the community board system.

[16:07] All levels of government are involved: City Council districts, State Assembly members, state senators, and US Congressional members. And then super importantly, the local nonprofits and community groups, particularly in New York, are so well developed and have so much knowledge and reach in the area that they really became our key stakeholder. That combined with the fact that most of the land along New York's coastline is fortunately publicly owned, meant that we had a very clear set of stakeholders to meet with. We had between 500 and 1,000 community meetings, briefings, workshops, in all kinds of formats, with all kinds of people.

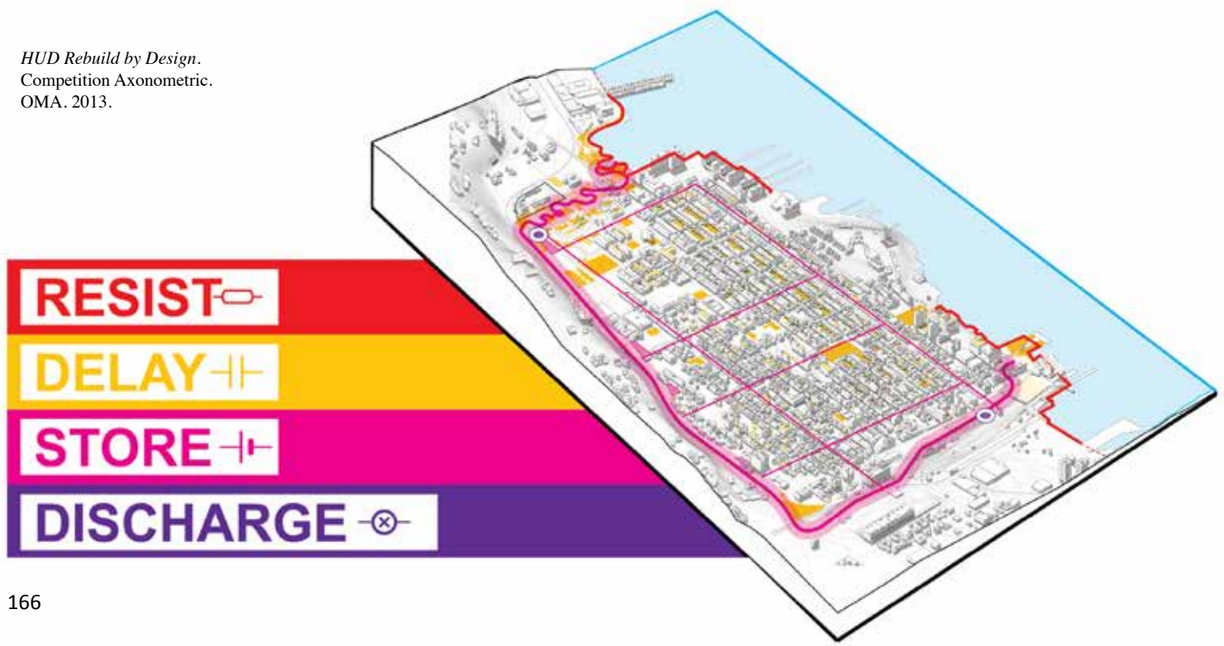
[22:00] When we started to work with members of local organizations, we talked about the various risk factors that come with these pieces of infrastructure. […] Rather than kind of hide these issues, try not to talk about them too much, and try not to scare people, we just put everything on the table so that people understood this might be more disruptive, there might be more construction for the next three or four years, but it's a safer bet.

Through our first series of workshops, […] people from local organizations were able to put themselves in our shoes and come to conclusions together with us. By the end we developed a design for three different compartments, and we were able to put forward a successful proposal for the first compartment to be funded.

Resist, Delay, Storage, Discharge

Christy Cheng

Christy Cheng explains OMA's proposal for the future of Hoboken Development. Cheng discusses the inherent risks of large scale disasters but also the smaller scale, more periodic events that also impact communities. OMA uses a multi-dimensional approach to facilitate Hoboken in being a more flood resilient community.



HUD Rebuild by Design.
Competition Axonometric.
OMA. 2013.

[02:24] Today I thought that I would talk about a specific project, particularly as we move into construction. This project is the Rebuild by Design, Hoboken implementation.

The thing to note about the OMA proposal, from the very beginning of the competition, was that it was always meant to be a comprehensive, holistic strategy. It was never only about preventing future storm surges, but also about how to prevent future flash floods and other natural disasters.

The project is called "Resist Delay Storage Discharge", and once again, is a comprehensive strategy.

In 2013, OMA partnered up with the City of Hoboken to start to develop this strategy for the city as well as for the neighboring cities of Weehawken and Jersey City. This area of New Jersey and the North Hudson area really became the area that we, OMA, started to focus on. And because of the particular location along the river -- the fact you have this confluence of the future risks, but also the location of quite high value areas like power stations and transit hubs -- if we intervened here, we'd really have a huge impact.

So when we're looking at the after effects of Hurricane Sandy, it was important to consider not just the effects from the storm surge. Of course with an event like Sandy, it brought huge amounts of water into the city, and you saw things like boats ending up along the streets; but also more periodic events like flash floods, that are happening more and more often. There are huge amounts of rainfall that result in quite a number of streets being flooded on a regular basis and we've continued to see this.

It's really not only the issue of the storm surge but the issues of the flash floods and overall flooding that happens very periodically within the city.

[09:13] So we knew that it couldn't just be about building a wall around the existing buildings and structures, and that it had to be a truly comprehensive strategy, but that it also needed to be a strategy that considered a number of different interventions in a way that helped to address all of these different issues. So our overall objectives in thinking about our Rebuild project for Hoboken were to manage water for both disasters as well as continued urban growth, and to help to mitigate flood insurance premiums in the future. Of course a lot of peo-

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ple saw their premiums grow significantly, but we also wanted to deliver back co-benefits, things like civic, cultural, recreational, and commercial amenities. Even if the different interventions were ultimately helping to protect the city and the local region from future climate events, we wanted to make sure that the citizens also felt like they were getting additional benefits.

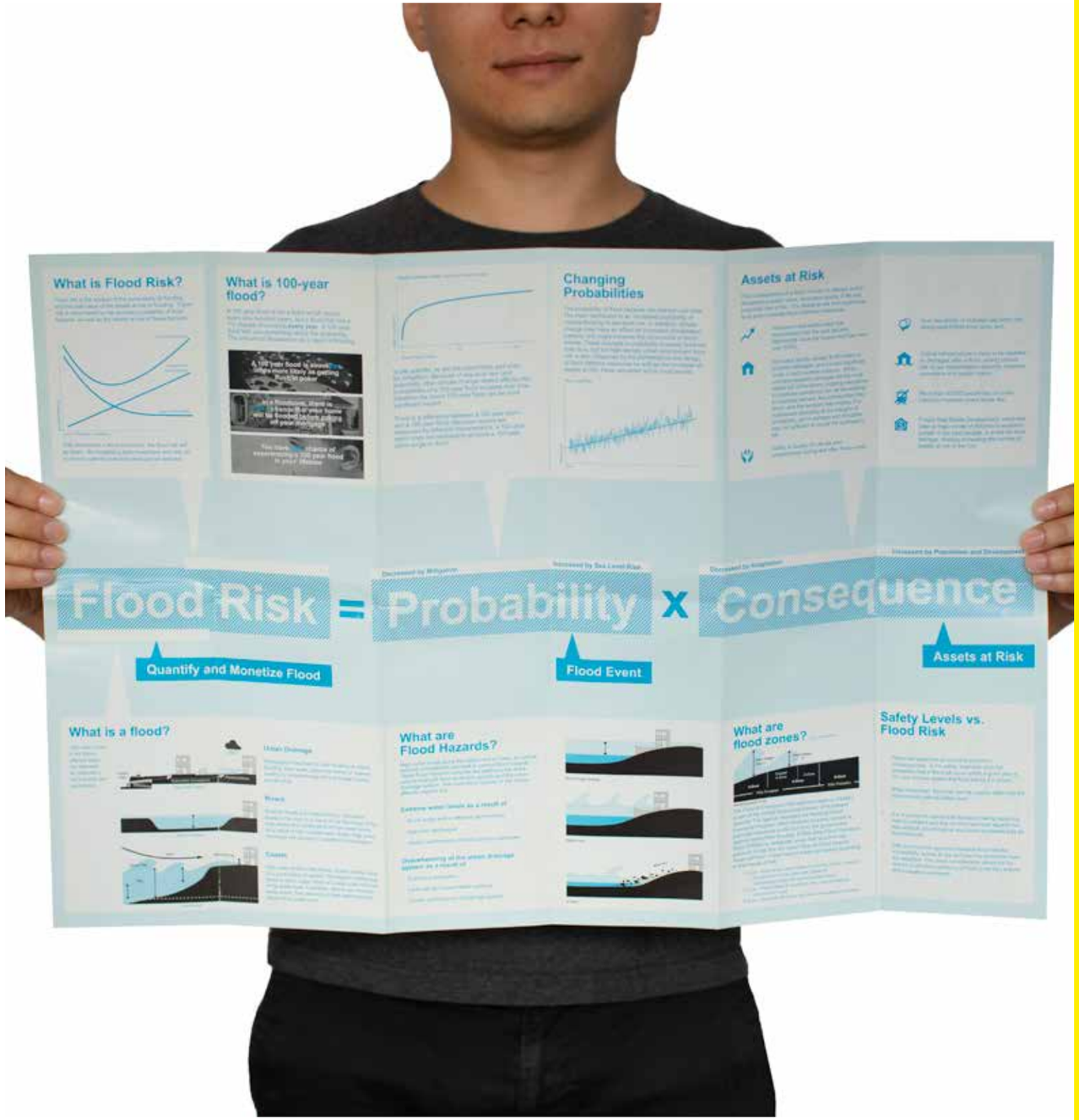
[12:38] So as part of this comprehensive strategy our proposed safety level would be a 500 year safety level for storm surge and again I mentioned flash flooding which is just as important, and so there would be a 10-year safety level for flash flood events.

[12:49] First, the resist structure. The resist structure is that hard infrastructure; things like terraced edges, bulkheads, or deployable flood walls that could help to protect the overall waterfront in future storm surge events. We were also interested in how these types of hard infrastructure could additionally provide co-benefits back to the community. So thinking about how infrastructure can have recreation layered on top of it -- shopping and retail, or even living, or cultural components like parks.

So again, there is this idea of the multi-function defense.

[14:02] Now i'll go into the delay, storage, and discharge components of the project: Delay included a number of different measures including additional park lands or terrace edges, the addition of green roofs, and then additionally also bioswales. So some of the initiatives that we worked with the city to start to develop were things like the city issuing guidelines to help to reclaim empty lots, also encouraging more permeable paving materials to be used, and through this also identifying seven acres of Hoboken that could be reclaimed and developed then into resiliency parks. Then we have the storage component of our comprehensive strategy. This includes things like stormwater cisterns, bioretention basins and constructed wetlands. Then discharge has to do with improving the overall stormwater sewage management system, adding additional stormwater pumps as well as storm drains. We always say the discharge would be invisible to most people, but it really had a huge impact overall.

So again, it was always about this comprehensive water strategy, so the resist, delay, storage, discharge, and how all of these different interventions could really help to protect the whole entire city of Hoboken.



HUD Rebuild by Design.
OMA. 2013.

The Wildfire Paradox

Jack Cohen

A message of hope is seen posted above the carnage in Coffey Park, north of Santa Rosa, California on Nov. 7, 2017. The U.S. Army Corps of Engineers Sacramento District has been spearheading cleanup efforts in the fire stricken areas of Sonoma, Lake, Mendocino and Napa counties.

Ed Coffey. Sonoma County. Photo. U.S. Army Corps of Engineers. November 7, 2017. Creative Commons License (CC BY-NC 2.0).

Jack Cohen explains the common ways in which wildfires both start and spread and how they differ from what one might expect. He emphasizes the impact that building in the WUI has on wildfires, and how built infrastructure contributes to the issue far more than the natural components for which we commonly blame.

[02:57] So when I say wildland urban fire disaster I'm talking about the many homes and businesses in general that burned to total destruction during extreme wildfire conditions. Well, to prevent wildland urban fire disasters and manage our natural resources we first need to understand wildfire as both a natural disturbance and, at the same time, a natural hazard.

[03:26] First consider wildland fire as a natural disturbance.

[03:31] We need to understand that wildland fires were ignited by First Peoples and lightning for thousands of years since the end of the Ice Age. These wildland fires were an ecological factor in the development and maintenance of most North American ecosystems during post-Ice Age ecological changes. Wildland fire was a principal natural disturbance of the ecosystems that greeted European discovery and benefitted European settlers. We need to accept wildland fire as an inevitable natural disturbance regardless of cause – whether from lightning or humans.

[05:15] So in the last ten decades wildfire suppression has largely kept 98% of wildfires small. We have largely eliminated the historical and ecological influence of fire in our landscapes.

A portion of the 2% of wildfires that escape initial attack develop extreme wildfire intensity and rapid fire growth conditions. This extreme wildfire behavior typically occurs during severe weather conditions, especially during strong winds. These high severity weather conditions occur less than one percent of the weather. So this has generated what has come to be known as the wildfire paradox; that is, our success at excluding approximately 98% of wildfires (beyond initial attack) has actually increased the potential for extreme wildfire conditions over extensive areas. And, wildland urban fire disasters only occur during extreme wildfires. Paradoxically, our intention to protect our society from wildfire is actually working in the opposite direction. It's working against us.

[06:36] Now consider wildland fire as a natural hazard, our society's common perception.

[06:43] Community wildfire destruction is nothing new. For roughly 50 years -- between 1870 and 1920 -- there were very large wildfires, particularly in the lake states, that destroyed numerous towns and villages along with civilian fatalities. The principal contributing factors to these destructive fires were logging large areas of this highly forested region leaving massive amounts of continuous woody debris, slash and burn agriculture that cut forests for crop cultivation, and the accompanying rapid human settlement in the same area. Thus, continuous woody fuels, with numerous fires to remove debris, with interspersed settlements resulted in disastrous fires when dry conditions combined with commonly

This text is derived from a lecture recording, not intended to be published as an article.

occurring strong winds from dry fall time weather fronts. Historians have called this period “the great barbeque.”

[07:06] The first notable wildfire of this period was the 1871 Peshtigo Fire in Wisconsin. Interestingly, the Peshtigo Fire occurred at the same time, October 8, 1871, and the same weather – dry, windy conditions – as the great Chicago, Illinois fire. There were over 2,000 civilian fatalities over the 50-year period, ending with the 1918 Cloquet Fire near Duluth, MN. But 1985 is the demarcation point of the current U.S. awareness of the wildland-urban fire problem when about 1,400 homes were destroyed primarily in Florida, North Carolina and California. This motivated national attention that generated the Wildland-Urban Interface (WUI) initiative involving federal, state, and local agencies. This led to programs such as “Firewise,” “Fire Adapted Communities,” “Ready, Set, Go!” and other programs.

[08:33] So, what’s been accomplished in the 35 years since 1985 by the high visibility and activities of the national WUI Initiative?

Well let’s take a look at a list of disasters where a wildland-urban (WU) fire disaster is defined as one-hundred or more homes totally destroyed during a particular wildfire. Most notably in 2018, the Camp fire occurred that was associated with the Paradise, CA destruction, along with the Woolsey Fire WU fire destruction in southern California. California 2018 WU fire disasters resulted in about 16,000 totally destroyed houses. By comparison, the national 10 year total between 1985 and 1994 was about 9,000.

Clearly, in this 35 year period, we had largely no effect on the occurrence of disastrous wildland urban fires. They’re increasing, not abating, with our efforts. That strongly suggests the approach of fire agencies is not effective.

Our efforts after each very large disaster primarily have been to increase the availability of local, state and federal suppression resources: more fire engines, water tenders, fire crews, firefighting helicopters and airplanes including very large air tankers. This has not abated WU fire disasters at increasingly high expense and at the same time has exacerbated the “wildfire paradox.”

Primarily, these wildfire suppression tools for protecting communities have enabled, rather than then reduced, the wildfire risk. We’ve actually increased the likelihood of extensive, inappropriate ecological effects in the wildland, and also increased the likelihood of exposing communities to extreme wildfires.

This emergency, wildfire suppression approach for preventing WU fire disasters threatens the quality of human life by degrading landscape ecological resources and the continuation of WU fire disasters.

So, we have a conundrum! How can we have increased occurrence of wildland fire as an appropriate ecological factor, and at the same time not have wildland-urban (WU) fire disasters? Do we even have an alternative of having an appropriate ecological occurrence of wildfire and not have WU fire disasters? So let’s consider the uncompromising natural reality: wildfires are inevitable, whether by lightning or by human cause; thus, extreme wildfire conditions are going to be inevitable as well. Does this mean that WU fire disasters are inevitable?

I submit – the answer to that is No! Given what we know about how homes ignite, WU fire destruction during an extreme wildfire does not have to happen. In fact, from what we know about our planet’s natural processes, disastrous results from natural disturbances (hurricanes, floods, wildfires and earthquakes), what we call “natural disasters,” are really human disasters associated with natural disturbances.

[12:23] We’re not just victims of wildfire; we currently understand how homes ignite during extreme wildfires and this reveals opportunities for preventing WU fire disasters without necessarily controlling extreme wildfire. We’re not just sitting here as victims, we actually have opportunities to prevent the WU fire disasters. When I propose this to audiences this is the typical reaction that I get: “Really?! We can prevent WU fire disasters without controlling wildfires?”. The general perception of how WU fire disasters and wildfires themselves occur, as indicated from media interviews, indicate that my assertion is inconceivable.

[13:44] Here are a few excerpts from public and fire professional interviews:

“The firestorm descended like a dragon from hell on the foothill neighborhoods and laid them to waste.”

“The wildfire swept through the community with a tsunami of flame.”

“The wildfire literally exploded houses in flames leaving destruction in its path. It was like a war zone.”

[14:04] But post-fire examinations belie those perceptions. For example, the catastrophic total destruction in Paradise. Drones were flown over the post-fire results, and this is what we see: total home destruction surrounded by unconsumed tree canopies. Very quickly after that, I had journalists calling me and asking me “can you explain the unusual pattern of destruction?” My immediate answer to this was, “It is not unusual; this is a typical pattern of WU fire destruction!” Typically when we’re being shown videos or photographs of WU fire destruction, what we see and what we pay attention to is the total home destruction with the perception that a tsunami of “superheated” gases swept through the community. The entire background of unconsumed vegetation remains unseen through a “willful blindness.” If we have a strong perception of how something must happen, we see what we believe. We have a mental model, we believe that the wildfire swept through the community, laying it to waste, and we completely miss the unconsumed vegetation. The typical patterns of WU fire destruction do not support the mental model of walls of flames sweeping through the communities to “vaporize” the houses. Wildfires don’t literally explode houses in flames.

Let's take a look: 1993 Laguna Fire in southen California during a Santa Ana wind the last week in October. We see a house that survived without protection. No fire protection was engaged in this particular neighborhood at that time, and the lone surviving house was dubbed the "miracle house." But when we look at this scene, what else didn't burn? The vegetation between the houses and the streets is unconsumed – the "miracle vegetation?"

[16:42] When we look at another location, in this case, Los Alamos, we see two adjoining homes where the houses are totally destroyed with continuous green, unconsumed pine canopies in the immediate background. A closer look beyond the home on the right reveals an unburned, wood split rail fence surrounding the property. Incidentally, the home was ignited by surface fire burning pine needles that spread under the lowest fence rail to continuously spread to contact the home's wood sided wall. The origin of the surface fire was a high intensity wildfire more than a quarter of a mile away, spreading parallel to the neighborhood. So let's take a look at a video of that street at the time the houses were burning. In this scene the homes are burning hours after the wildfire had passed the community. The high intensity wildfire never spread into the residential area. We are watching burning houses through unconsumed tree canopies.

[18:20] This is what it looks like when you have a home that's ignited by surface fire or fire brands. This is what a typical home ignition looks like from burning embers and from low intensity surface fires. Unconsumed tree canopies amid the total destruction of homes indicate wildfire flames did not spread through the community. From a post-fire examination and analysis, unconsumed trees surrounding trees burned adjacent to and over totally destroyed homes indicate the trees did not ignite the homes. Rather, the trees were ignited by the burning homes.

During fire photo - "Ignition resistant homes and communities mean..."

After fire photo - "having wildfires without community fire disasters."

Jack Cohen. Photo. USFS, Wedge Canyon Wildfire. Image coutesy of the author.

Redifining WUI

Jean-Paul Previero, Nickson Chan

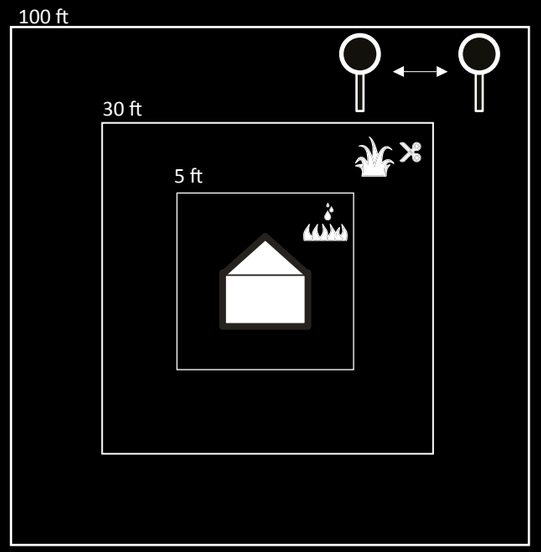
Fire City Research Studio
Instructor: Hitoshi Abe

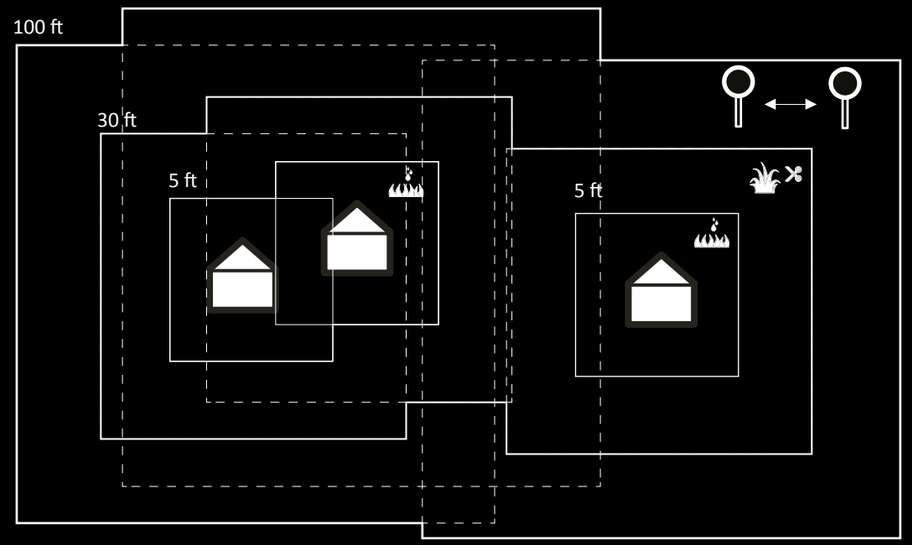
The project proposes to expand and reconfigure the latest research about fire defense as an opportunity to design a prototypical residential community adaptable to all the different types of Wild Urban Interface (the rural, the intermix, the interface and the urban).

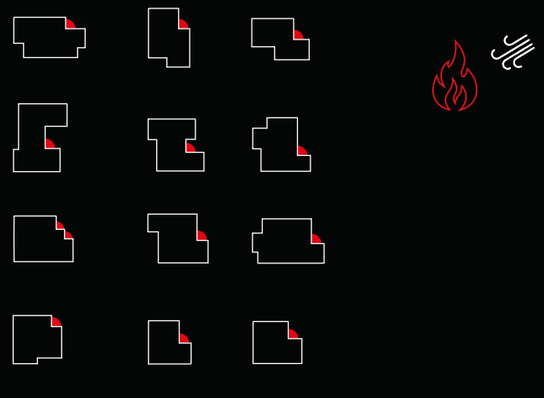
Into the specifics, the Home Ignition Zone study of Jack Cohen which prevents that the front of the fire reaches the residential units through a succession of buffer zones, is reconfigured to combine different households in a ringed shape.

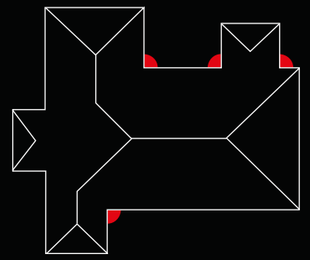
Community engagement is then enhanced by designing shared spaces that offer safety in case of fire and amenities for the every-day life. It is a synergy between community engagement and the application of fire resilient scientific research.

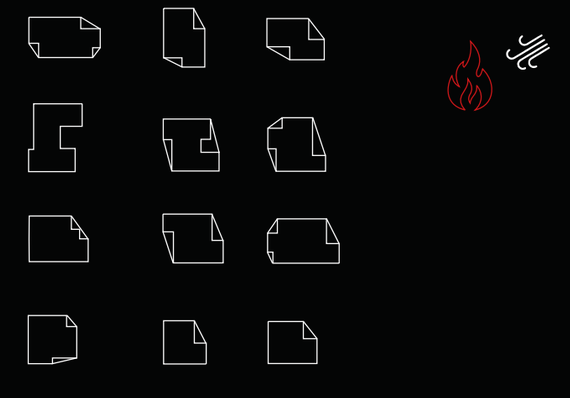
Buffer Zone Strategy

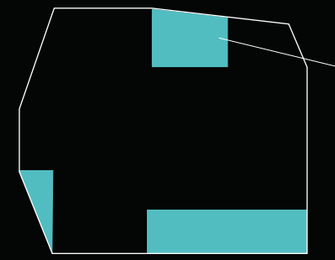


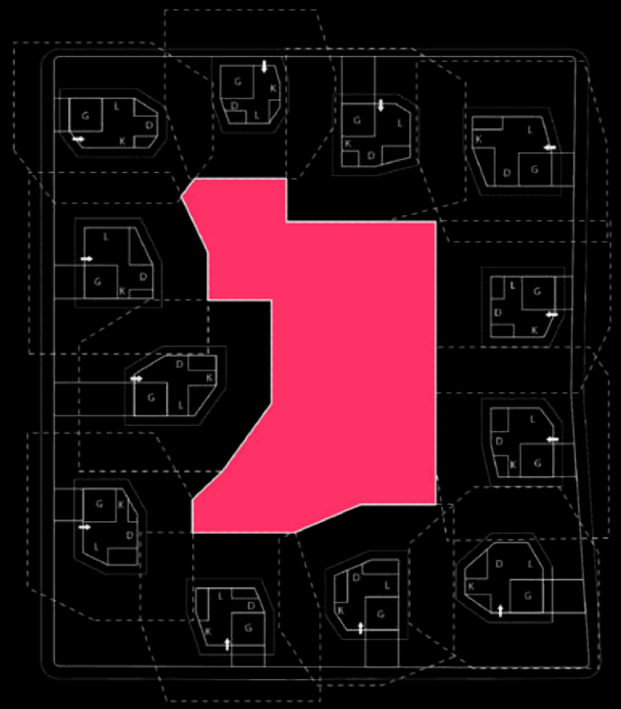


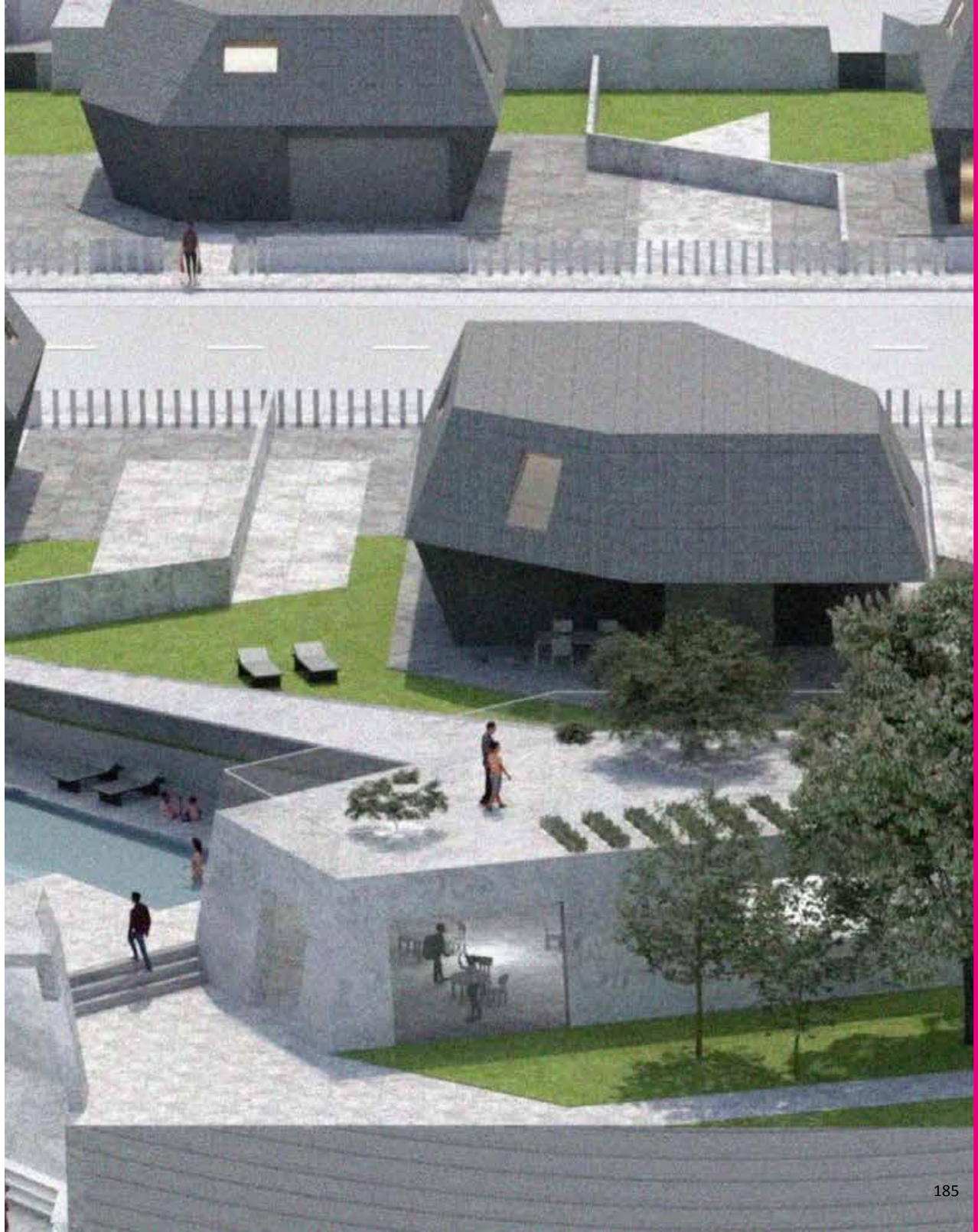







Sprinklers +
non-flammable
materials





Multifacted Ecologies

Montserrat Bonvehi, Seth Denizen

Montserrat Bonvehi and Seth Denizen discuss their research on wastewater treatment in Mexico's Mezquital Valley and how it exposes the complex ecological, social and political relationships between the Mezquital and Mexico City. Their research provides insight into the implications for design projects dealing with systems of an incredible scope of both human and natural factors.

The Right to Sewage: Agriculture, climate change, and the growing need for cities to embrace wastewater reuse. Course by Montserrat Bonvehi Rosich and Seth Denizen at GSD Harvard. September 2020.

[02:51] We're going to start by introducing you to the project site which is the Mezquital Valley in Mexico City. It's a bit of a complex site.

[04:50] To begin with an overview of the project and the kinds of questions that we're asking:

[04:55] In a country with extremely little wastewater infrastructure and serious health and sanitation challenges, we might ask: how, of all things, has a wastewater treatment plant provoked protests and civil disobedience? The answer to this question really requires an understanding of the Mezquital valley's history. Since 1901, all of Mexico City's untreated wastewater has arrived here to the mouth of this valley. Over the last century, the farmers of the Mezquital have used this wastewater to transform what was an arid landscape of Mezquital and maguey into one of mexico's largest and most productive agricultural areas.

[06:37] As the basin of Mexico's population transformed from just over 500,000 to half a million people at the beginning of the century to more than 20 million that it is today, the quantity of wastewater the valley receives has risen proportionally. What started as a lazy surface stream is today a torrent delivering 60 cubic meters of water per second through a six meter diameter pipe -- which is something like 100 meters below the surface of the city.

[08:32] For these farmers [of the Mezquital Valley] the wastewater is a kind of miracle. It makes life possible in the Mezquital, and although there are health risks associated with wastewater, poverty of course as we all know has its own health risks. But there's a sort of darker side to flooding the valley with such a massive quantity of untreated urban wastewater, which is that the soils start to accumulate heavy metals, pathogens, parasites, surfactants, antibiotics, and pharmaceuticals.

In other words, the Mezquital Valley, in its air, soils, surface water, and groundwater, has come to reflect in precise and intimate chemical detail the bodies of 20 million people and the urban fabric of their lives in the seemingly endless expanse of Mexico City.

[09:22] Part of what makes us interested in this very unique system is its global relevance. In a warming world where climate change will cause increasing uncertainty in the resilience of our fragile food systems, we really can't afford for wastewater agriculture to fail. Cities are going to continue to use water, and that water will continue to be a valuable resource for reuse.

This text is derived from a lecture recording, not intended to be published as an article.

[11:23] What we're trying to do in our studio and in our partnership through the SOM Foundation is to imagine a third option framed around two questions that we want to ask simultaneously as our design brief: The first is what would the city look like if it needed to produce a fertile agricultural soil from its waste? In other words, if this was the city's objective, what would have to change, and what would these changes look like? The urban design of Mexico City's streets -- its markets, sewers, pharmacies, everything about its urban and industrial life -- leave a mark on the wastewater it sends to the Mezquital. This all comes back to the city in the form of vegetables, dairy products, and meat, so the city has a profound stake in the answer to this question.

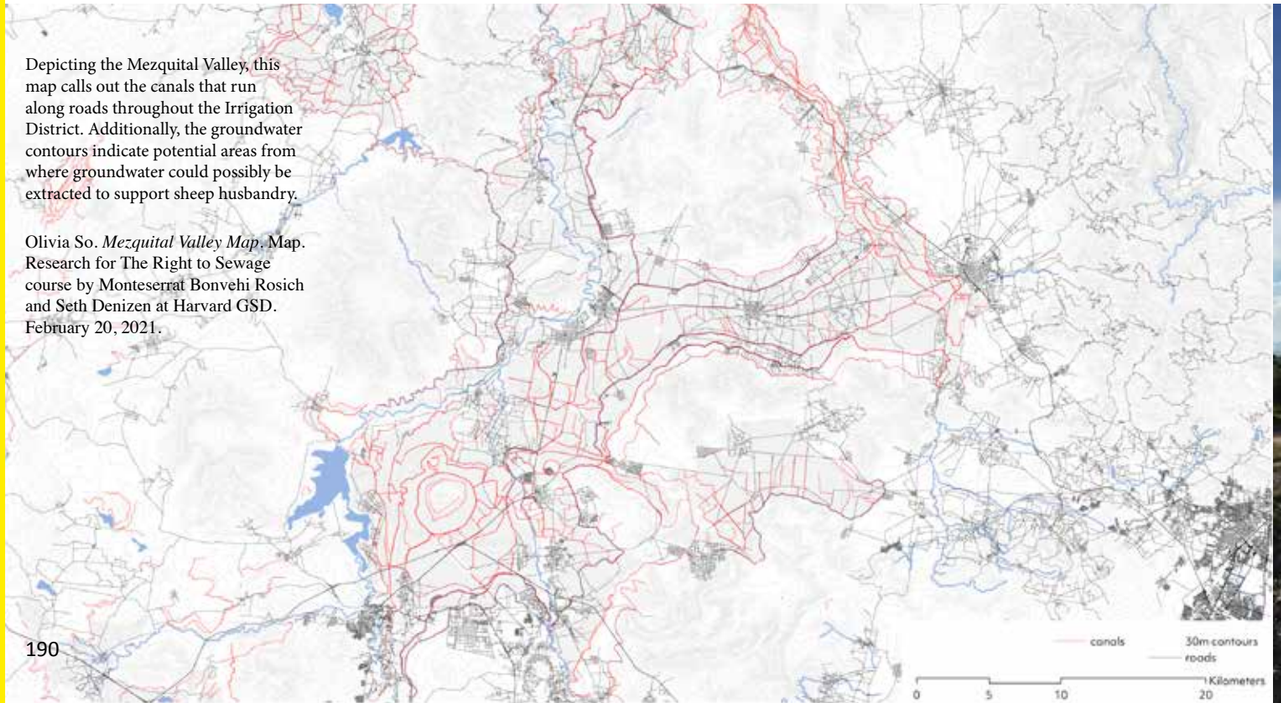
[12:18] But simultaneously, we also have to ask: what would the farm look like if it better anticipated its material connection to the bodies of 20 million people and the effluent of urban life? What kinds of agricultural practices, farming technologies, and health policies would be required to make wastewater agriculture safe? Because again, our central premise in this project is that in a warming world, we simply cannot afford for wastewater agriculture to fail.

In this sense, our question requires a design response that is not strictly an urban or rural response, but rather comes somewhere in between these categories in a geographical context, in which we should add, these categories have entirely lost their utility.

[55:18] From the audience:
Even if we are researching a very different topic, I think it shares a very similar approach and there's a lot of learning that we can extrapolate from here. The first thing is, I think it's fascinating how the project is about reading the context, and not about finding a problem and immediately asking for the solution, but rather reading the context as a junction of agents and as a super complex assemblage. To me, the interesting thing is that, at the end, it's an extremely local context that allows us to have a bigger discussion about the way water is treated globally. Knowing that, how do you feel that this project would translate to a completely different context? Meaning, what would happen if this project was developed in Denmark instead of Mexico?

[57:49] This is precisely the question that we've really been wrestling with ourselves as we try to think about what we want to do moving forward, and how we want to frame the work. We're really devoted to the context and to reading the specificity of the place, and we're committed to that for ethical reasons as a methodology. But then, of course, there is always this moment in which you want to try to show that what you've done is more meaningful or could be meaningful in other places. So, we've tried to make a list of what you have to consider anytime you do a wastewater agriculture project anywhere in the world. This list turns out to be pretty surprising. For instance the engineers who design Atotonilco [wastewater treatment facility in the Mezquital Valley], they're not thinking about the food system. For us, anytime you have a wastewater agriculture system, as a designer and as someone who is interested in that area, you have to question the food system: what are we growing, and why? And why do we eat the things that we eat? And why do we grow the things that we grow? The answer to that question is going to be different in different places.

[59:32] Another surprising thing is that anytime you have a wastewater agriculture system, you have to question the pharmaceuticals that your population is taking. That's also pretty surprising. We don't often think about agriculture as depending on diabetes treatment, but in fact that's the surprising connection that we find in Mexico. Mexico suffers from the highest incidence of obesity in any of the OECD {Organization for Economic Co-operation and Development} countries in the world. As a result, they take metformin to treat the diabetes and as a result of that, the soil in the Mezquital valley fills with metformin. Now, that's not going to be the same in Denmark, but the surprising insight of the work is that



Depicting the Mezquital Valley, this map calls out the canals that run along roads throughout the Irrigation District. Additionally, the groundwater contours indicate potential areas from where groundwater could possibly be extracted to support sheep husbandry.

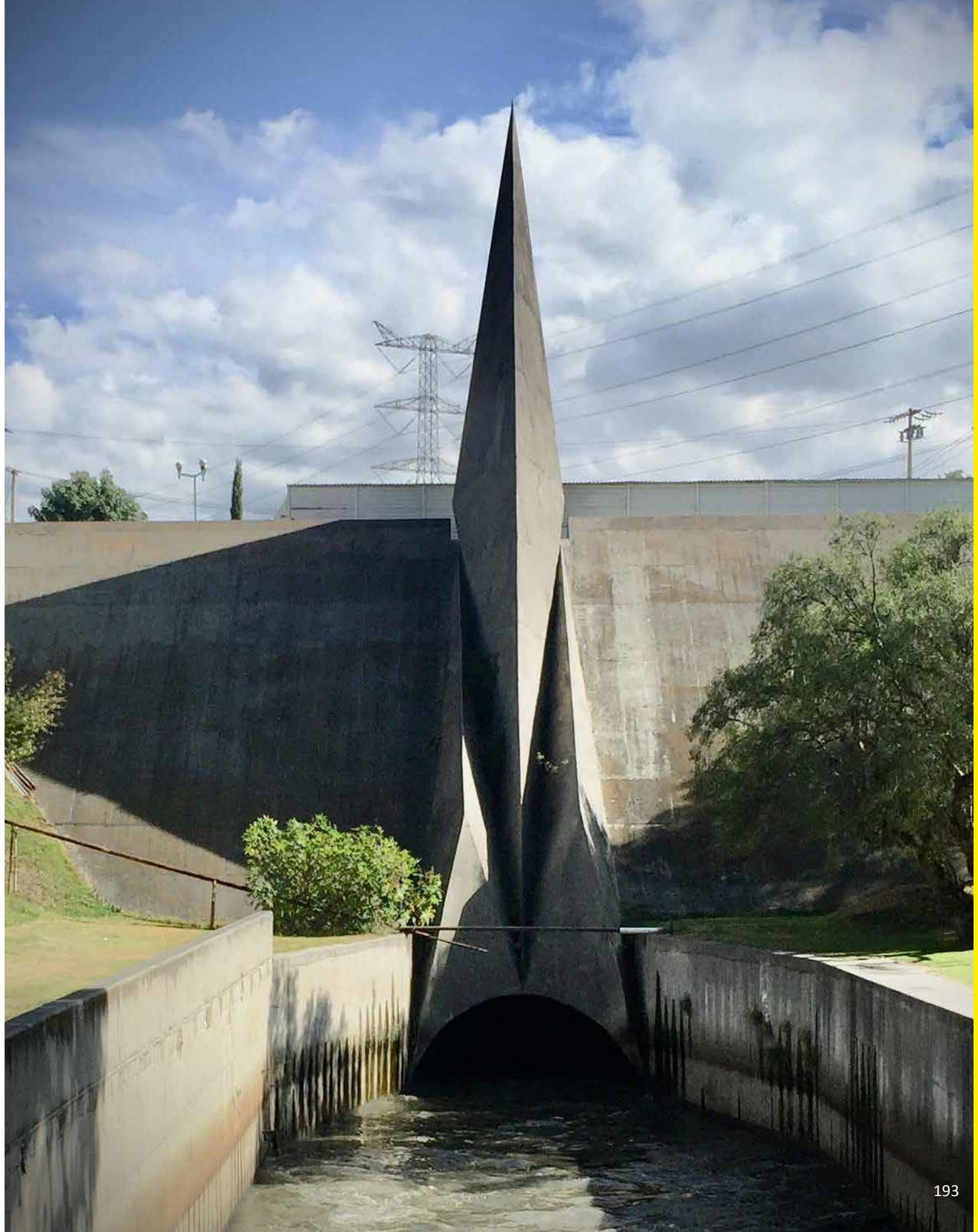
Olivia So. *Mezquital Valley Map*. Map. Research for The Right to Sewage course by Monteserrat Bonvehi Rosich and Seth Denizen at Harvard GSD. February 20, 2021.

Bonvehi-Rosich, Montserrat and Seth Denizen. *Mezquital Valley*, Photo. Courtesy of the authors.

any time you think about wastewater agriculture you have to also question the medical and health landscape of what people are getting sick of, and why they are taking the medications that they take.

[1:01:27] In the Mezquital valley, why are people getting diabetes? It has a lot to do with corn, high fructose corn syrup, and the North American free trade agreement. In fact, the soil's metformin is directly related to the crops you are growing and the food system you are participating in. So you are finding these connections, and these connections will be different in different places, but they are things that you always have to keep an eye on no matter where you are.

One thing that can also be helpful for the students is not to read this as a wastewater urbanism project. There's not [just] one single problem if you go to a site. The problem with the Mezquital is that there were thousands of issues no matter which component we were giving the students. In a place where the complexity is that level, you can only address a small part of it, which also tries to relate to other projects. That is because, as we said at the beginning, you will not fix the Mezquital. There is no way to do that. But what matters is how we move the Mezquital on and find ways to imagine futures that, step by step, overlap this project and that project and all these projects to create new economies.



Denizen, Seth, Photo, 2019. Image courtesy of the author.

Agri-Resiliency Through Land Management and Built Environment

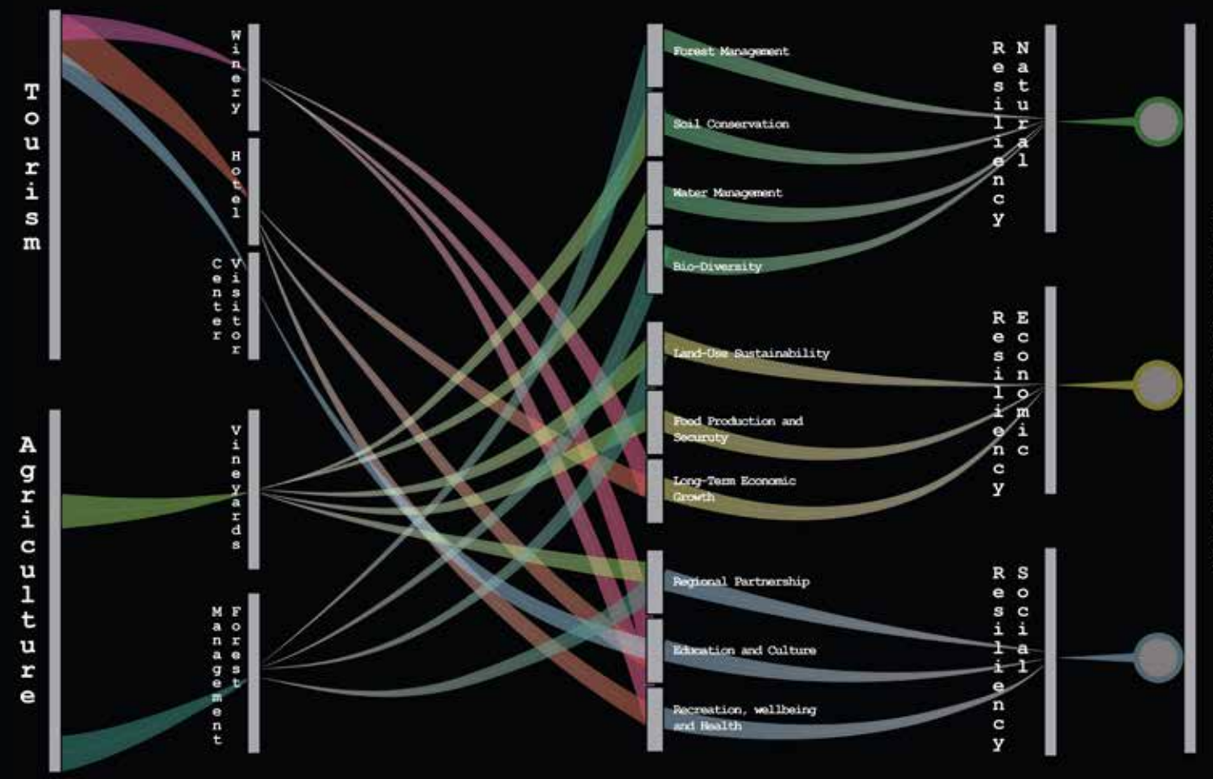
Austin Ng, Yiwei Qian

Fire City Research Studio
Instructor: Hitoshi Abe

How Agri-Tourism Help Increase Fire Resiliency

Fire Resiliency Depends On Regional Natural, Social and Economic Resiliency

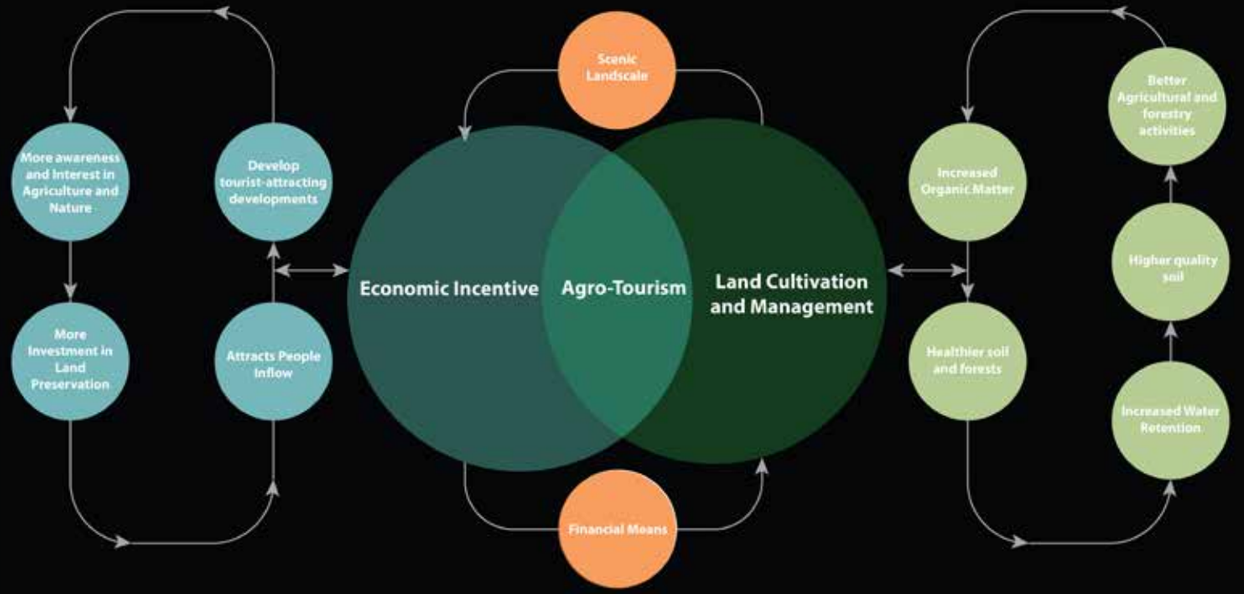
Components of Tourism and agriculture, for example, wineries, hotels, vineyards as well as forest management practices contribute to the general well-being of the region. Fire resiliency in turn can be achieved through achieving natural, social and economic resiliencies.

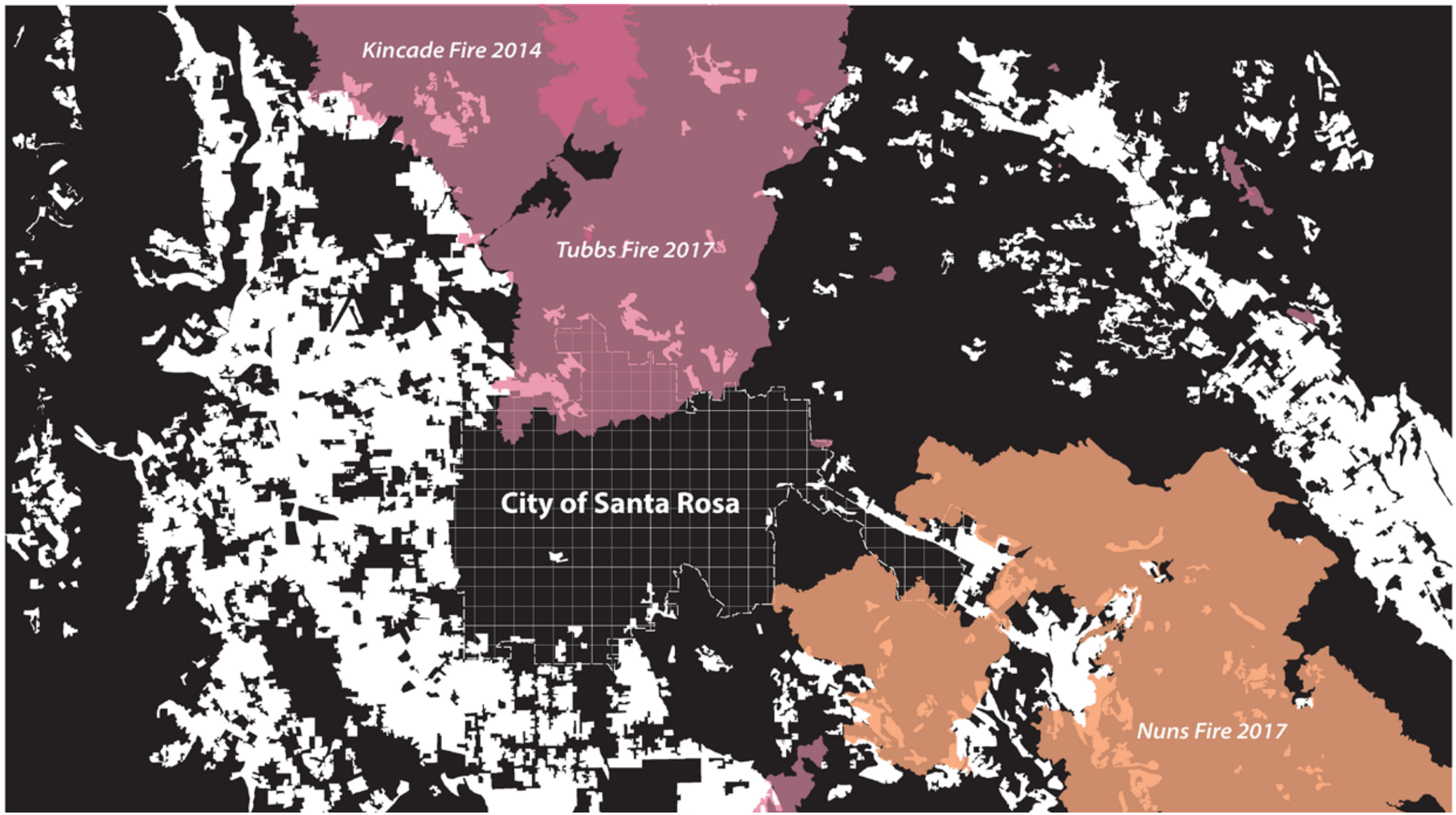


The Agri-Tourism Approach

Agriculture and Tourism combines land cultivation with economic benefits.

Benefits of land cultivation and management practices can only be achieved sustainably if they are also able to bring economic benefits to the community. Development of tourism-related facilities not only provides economic incentives, but also attracts inflow of visitors, heightening awareness in nature preservation.



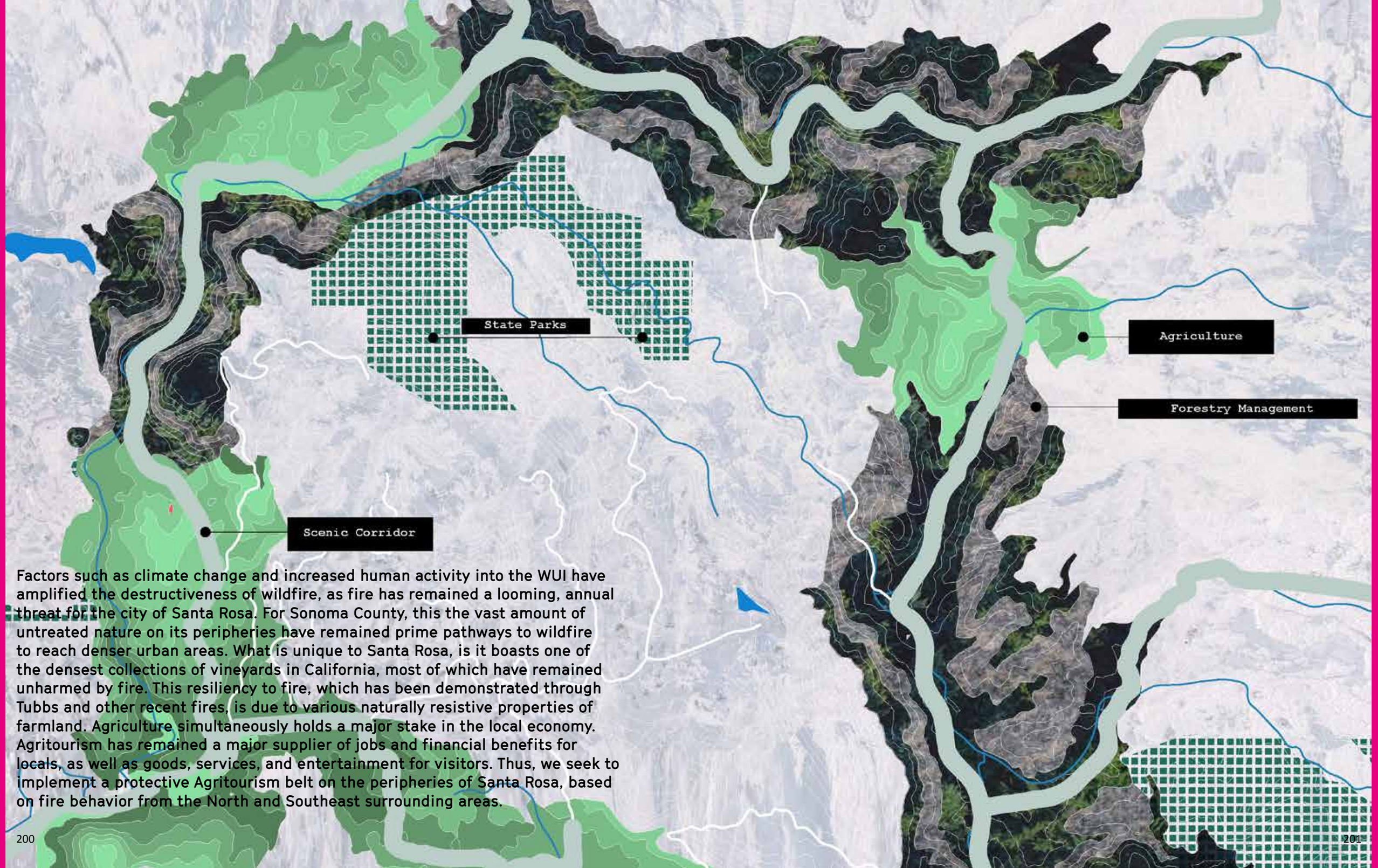


Uncontrolled Nature= Unmanageable Wild Fire

Cultivated Farmland = Fire Resiliency

Uncontrolled Nature

Agriculture



Factors such as climate change and increased human activity into the WUI have amplified the destructiveness of wildfire, as fire has remained a looming, annual threat for the city of Santa Rosa. For Sonoma County, this the vast amount of untreated nature on its peripheries have remained prime pathways to wildfire to reach denser urban areas. What is unique to Santa Rosa, is it boasts one of the densest collections of vineyards in California, most of which have remained unharmed by fire. This resiliency to fire, which has been demonstrated through Tubbs and other recent fires, is due to various naturally resistive properties of farmland. Agriculture simultaneously holds a major stake in the local economy. Agritourism has remained a major supplier of jobs and financial benefits for locals, as well as goods, services, and entertainment for visitors. Thus, we seek to implement a protective Agritourism belt on the peripheries of Santa Rosa, based on fire behavior from the North and Southeast surrounding areas.


Wine Tasting Node
50,000 sf Occupiable
Hotel Node
130,000 sf Occupiable
28,000 Parking
Wine Production Node
Hiking Trails and
Picnic Areas
Wine Production Node
Logistics
Visitor Center +
Farmer's Market
20,000 sf Occupiable
0
1000
3000 feet

01

Visitor Center

The visitor center introduces tourists to the nearby attractions. The visitor center contains a lecture and film area, a display area and an information desk.

02

Wine Production Node

03

Wine Tasting Node

04

Hotel Node

Mountain Lion Urbanism

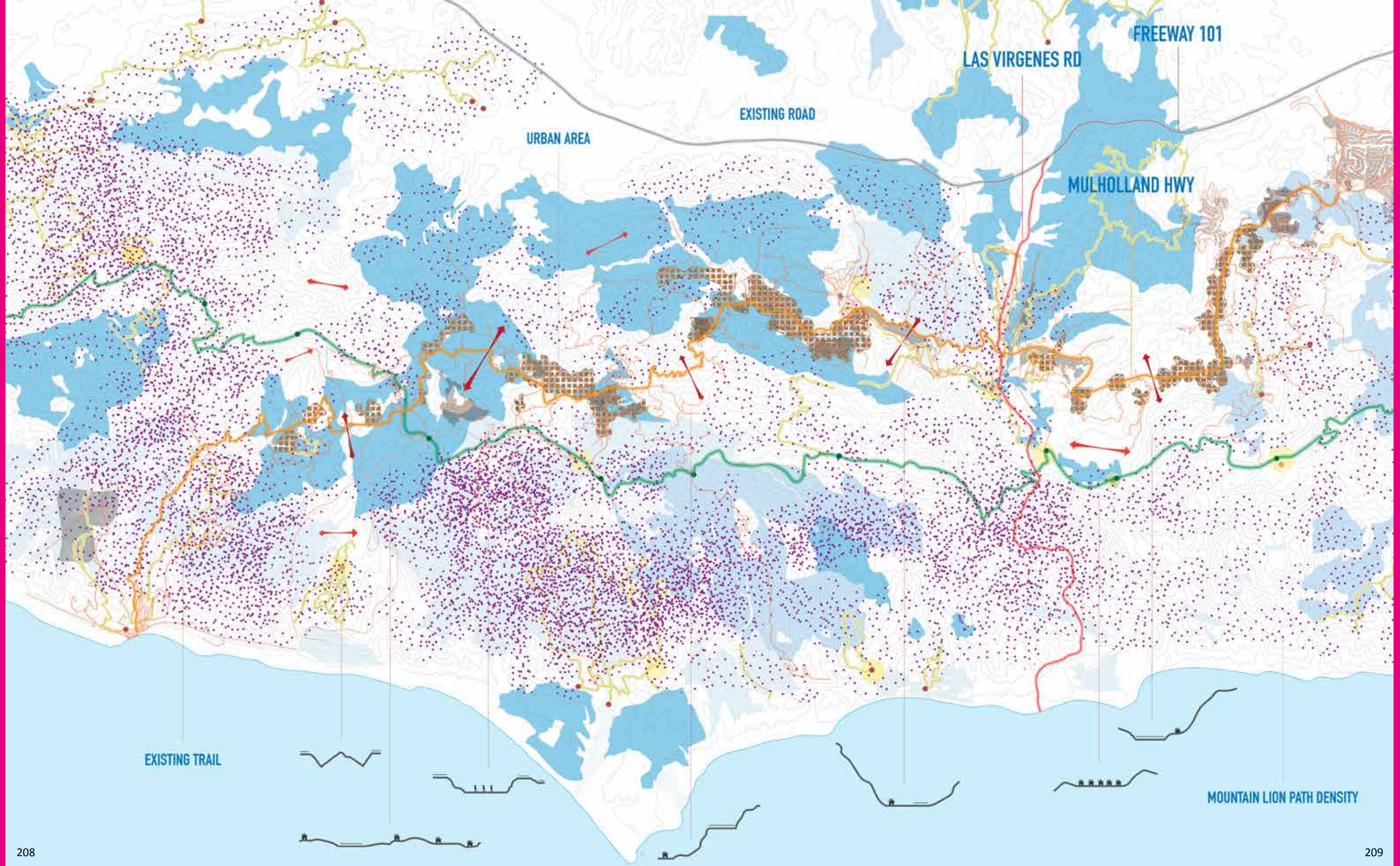
Daniel Lee, Hanxue Wu, Tianyang Xu

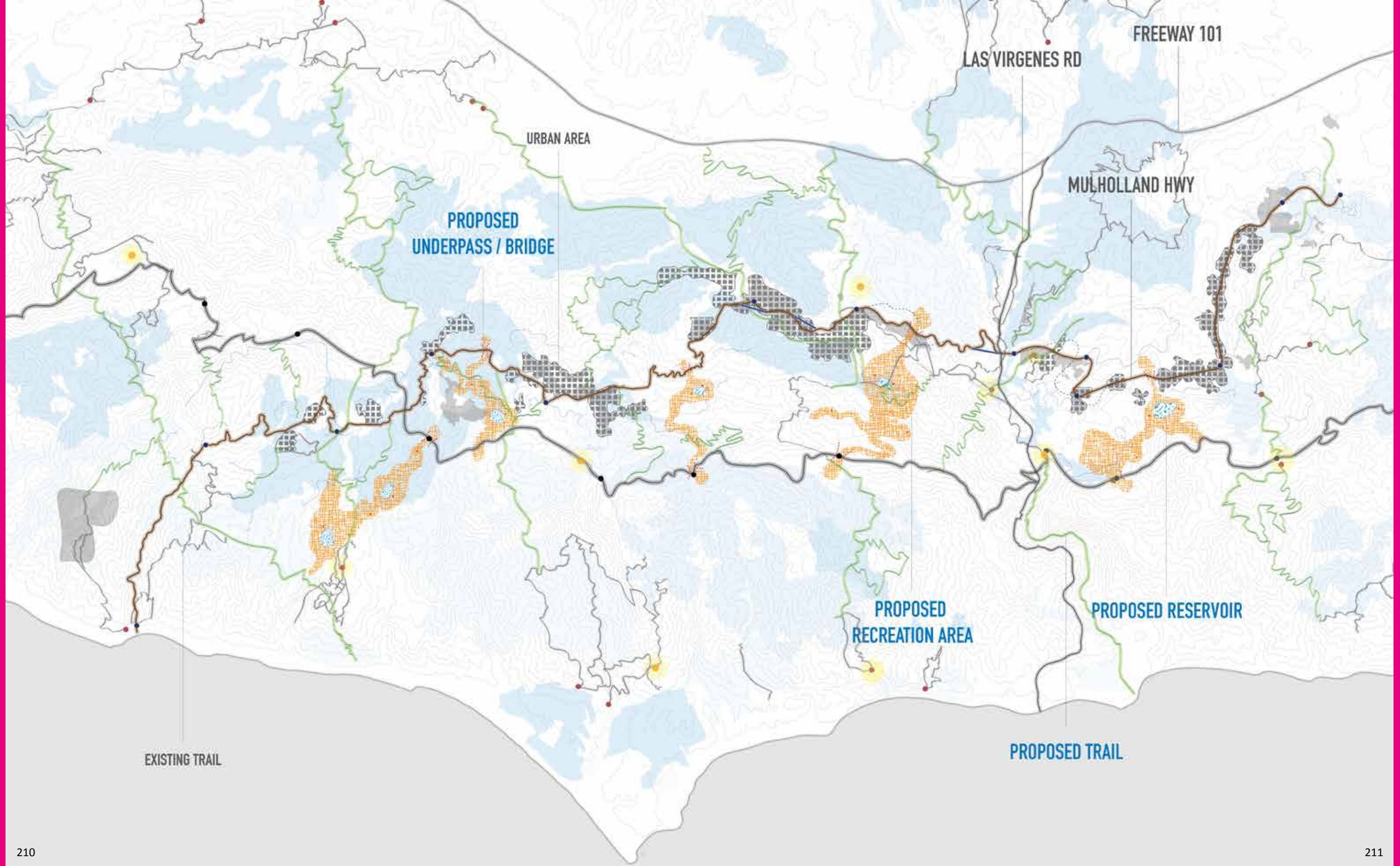
Fire Land Studio
Instructors: Jeffrey Inaba and David Jiménez Iniesta

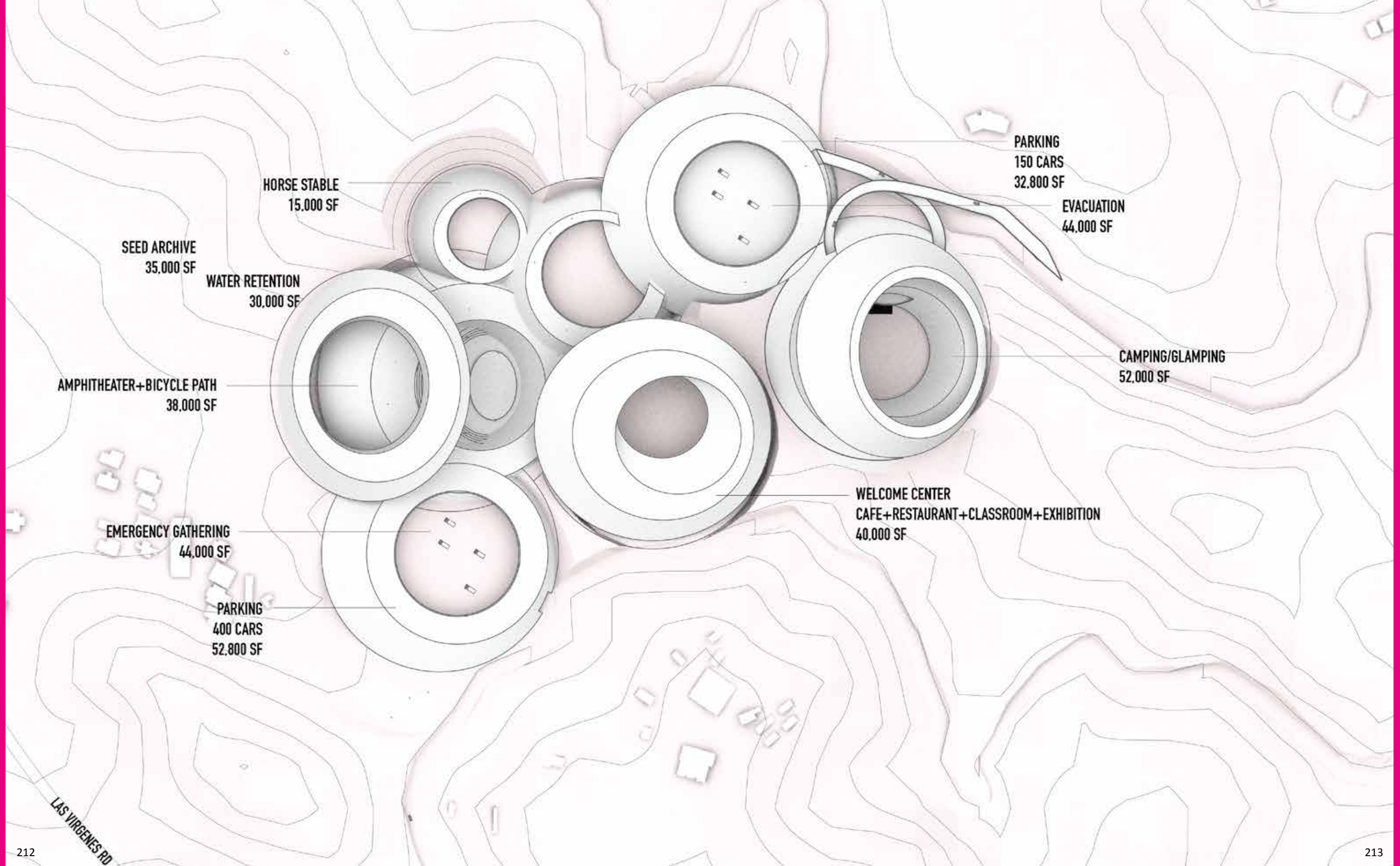
Adult female mountain lion was photographed with a motion sensor camera in the Verdugos Mountains in 2016. LA city lights in the background.

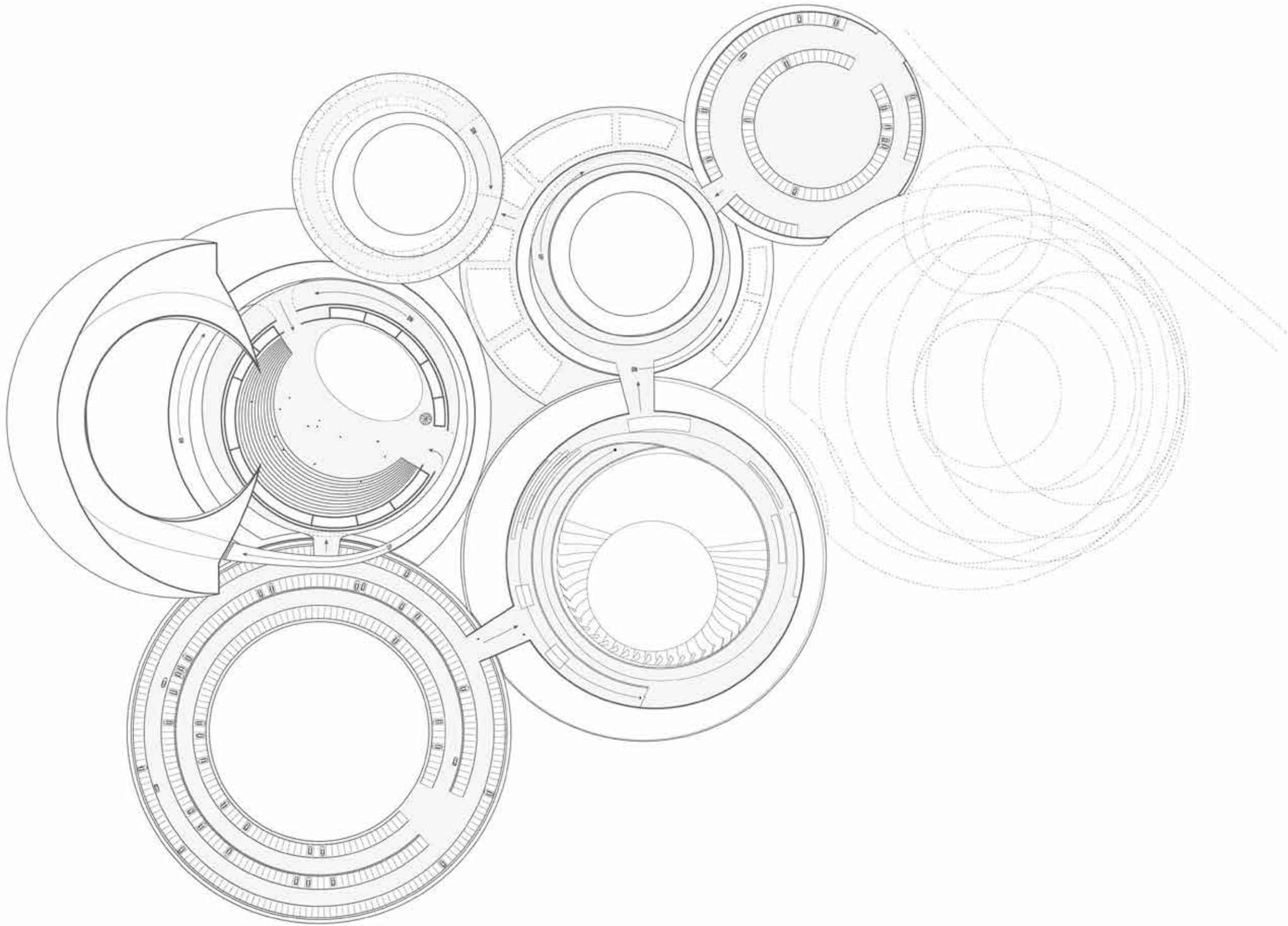
Female Mountain Lion in Verdugos, Photo, Santa Monica Mountains National Recreation Area, July 10, 2016. Public Domain.

Preserving the natural beauty of the Santa monica mountains, it has paradoxically enabled frequent and large wildfires to occur while limiting animal habitat. The project proposes a healthy ecosystem to in turn aid fire recovery. Wildlife plays an important role in building a healthy ecosystem. Therefore, we hope the project will not become an obstacle for wildlife's habitat, it should benefit the coexistence between human and wildlife.

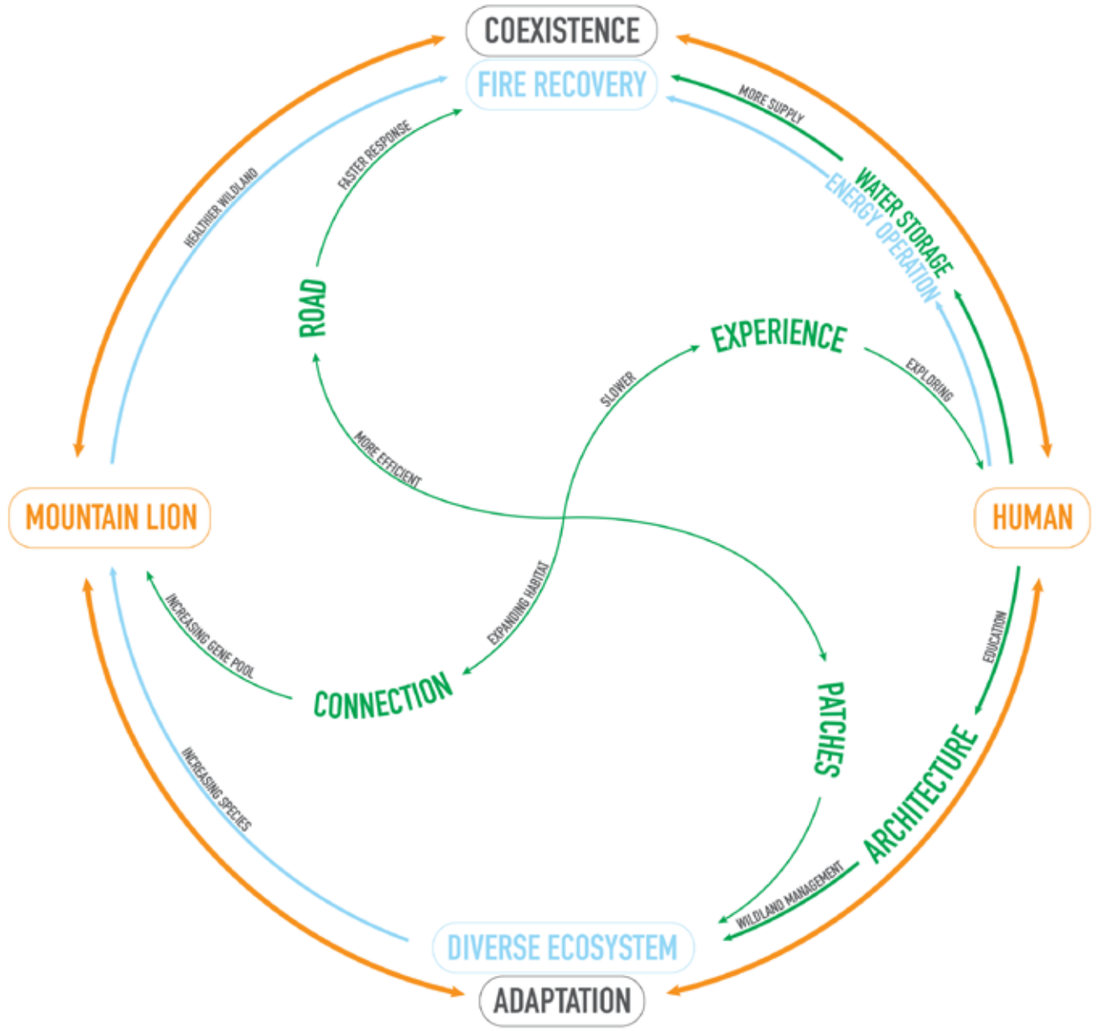

FREEWAY 101
LAS VIRGENES RD
EXISTING ROAD
URBAN AREA
MULHOLLAND HWY
EXISTING TRAIL
MOUNTAIN LION PATH DENSITY


FREEWAY 101
LAS VIRGENES RD
URBAN AREA
MULHOLLAND HWY
PROPOSED
UNDERPASS / BRIDGE
PROPOSED
RECREATION AREA
PROPOSED RESERVOIR
EXISTING TRAIL
PROPOSED TRAIL


PARKING
150 CARS
32,800 SF
EVACUATION
44,000 SF
HORSE STABLE
15,000 SF
SEED ARCHIVE
35,000 SF
WATER RETENTION
30,000 SF
CAMPING/GLAMPING
52,000 SF
AMPHITHEATER+BICYCLE PATH
38,000 SF
WELCOME CENTER
CAFE+RESTAURANT+CLASSROOM+EXHIBITION
40,000 SF
EMERGENCY GATHERING
44,000 SF
PARKING
400 CARS
52,800 SF
LAS VIRGENES RD



CAMPING/GLAMPING SECTION



Social Resiliency.
Community
engagement.

4

Miho Mazereeuw
Tei Carpenter
Aaron Gross
Amy Robles + Anabella Rosa
Tomasz Groza + Jenn Peterson Ruiz + Yiwen Song

Embedded Community-Scale Design

Miho Mazereeuw

Miho Mazereeuw and the Urban Risk Lab team approach design in a way that centers communities in emergency preparedness processes. Through fieldwork, communities and designers grow and learn from each other, leading to actionable projects. The example of the PREPHub project shows that it is fun to invent, experiment, and engage.

Brearley, Jonathon, Chu, Cyrus, Johnsen, Lenna, Gibson, Emily Lo, Matthai, Charlotte, McCoy, Sarabrent and Yaara Yacoby. *"Where there is smoke…"* A cooperative gave for Miho Mazereeuw's seminar. MIT Urban Design Studio. Image courtesy of the author.

[02:40] In 1995 there was a devastating earthquake in Kobe. My parents still live in Kobe, they were very fortunate to not be there during the actual earthquake, but my father's workplace was flattened when the floor above collapsed. Within the whole region over 6,000 people lost their lives. This was a turning point for me, but also a turning point for the profession. […]
Kobe is a very long and skinny city bounded by mountains on one side and ocean on the other. So when the earthquake damaged the lifeline infrastructure, debris blocked the narrow streets, and many emergency vehicles could not access parts of the city even when fires broke out. This was when I started researching, in 1995, how to understand the structure of the city, anticipating these events and embedding more aspects of preparedness into our cities. As I was mentioning, there are a lot of places that burned within Kobe because of the earthquake; then because of the structure of the city, fire trucks couldn't reach a lot of the densely built areas. This is when my interests grew from structural resilience of buildings to also understanding larger urban systems as well. At the same time a number of Japanese academics started writing about how earthquake preparedness has to really go beyond engineering and into human and social aspects.

[…]We all understand that the elderly, and the more vulnerable are often most greatly impacted by disaster, but there was a question of where this spike in this graph came from.

It turned out because there was a lot of lower cost housing with people who didn't know each other, in a neighborhood with high turnover, they were not part of the community yet. It is really about understanding your community and knowing who is there, and who you need to help when these events occur. That led to this phase of our work, where we are trying to think about how, as designers, we can design neighborhoods to make sure that communities are involved in emergency preparedness processes.

When I moved to MIT, I was able to start the Urban Risk Lab. We cover a broad spectrum, from objects and buildings to technology platforms, all the way to really understanding larger systemic issues. We have a variety of different partners globally. We develop both methods and prototypes to embed risk reduction and preparedness into cities with a multidisciplinary team from emergency managers, computer scientists, and ethnographers, to architects, landscape architects, urban designers and planners. One of the main fundamental pieces is education. Educating students like you all, but also community members. We do a number of workshops where we are both learning from communities and

This text is derived from a lecture recording, not intended to be published as an article.

giving back to them (with detailed information and data which wouldn't be easy for them to access otherwise). We call this process of learning, sharing, building, and reevaluating "action research." A term coined by Kurt Lewin, a professor at MIT, it is about the cyclical process of learning, acting, and then learning again, with a larger network of partners. Part of this too, is to make sure we test things that we develop in-house to get user feedback before they are scaled in the real world. So, this is also a kind of cyclical process. But most fundamental to our work is fieldwork: going to places, interviewing people, understanding what the main issues are throughout the process, and then finding ways to contribute back to their lives.

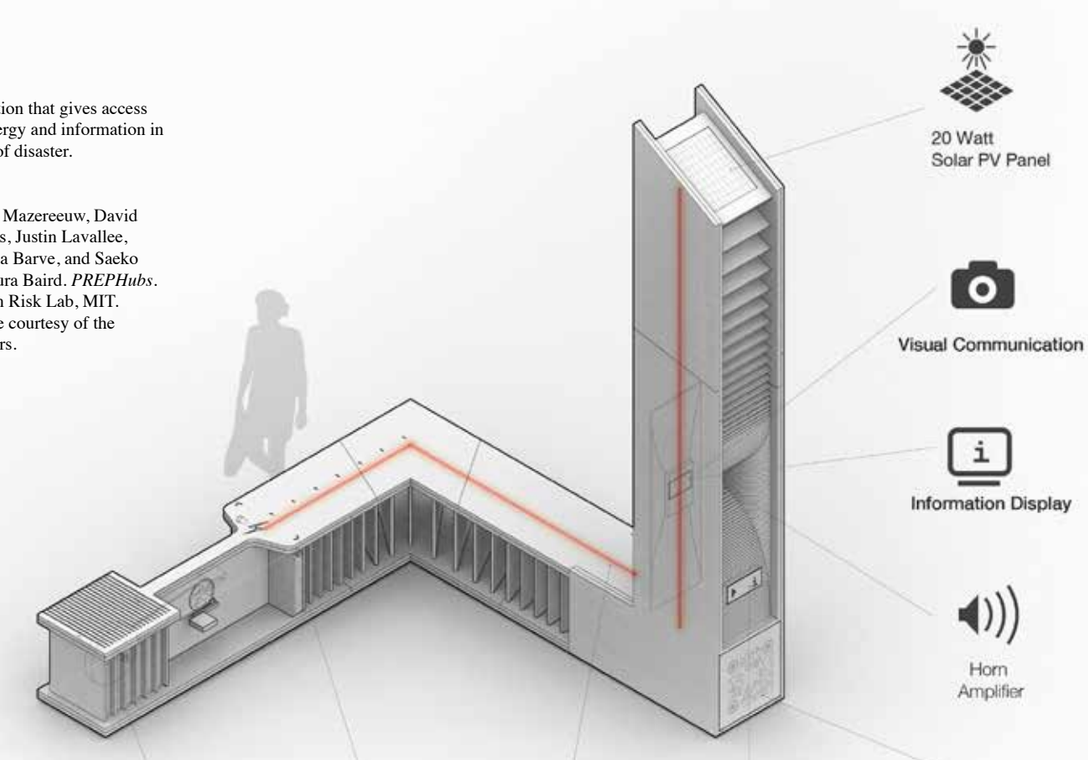
[23:48] I thought maybe it'd be fun to share the PREPHub project. I know you're focusing on fires, but this project focuses more on earthquakes. We've been researching the first 72 hours after an earthquake and what is important for people during that time. For example, information is really important to share in clear locations (rather than this image of critical information and alerts written on a white-board). Also, the notion that people really want to share (for instance, power to charge phones) after an event, but maybe there are ways to organize this be-forehand so it's not ad hoc. We've been designing and building different versions of this emergency preparedness hub, which we've shortened to call PREPHub.

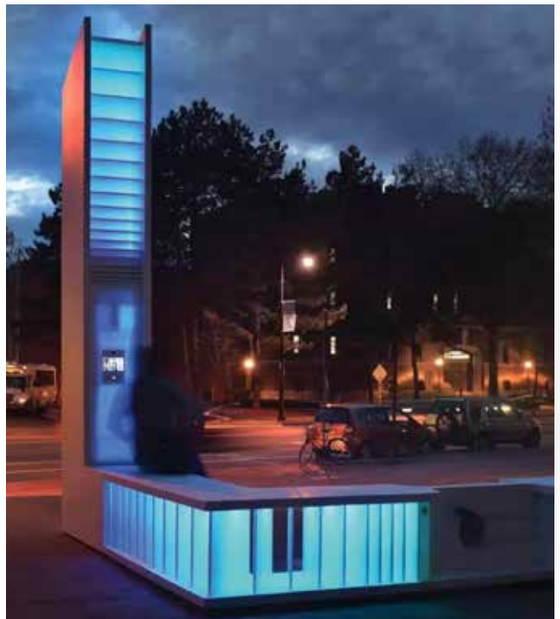
PREPHubs are conceived as a new kind of civic infrastruc-ture designed to embed community scale preparedness into cities. This particular one is outfitted with a PV panel, screen for education and information display, speaker sys-tem, power charger, and also emergency lighting.

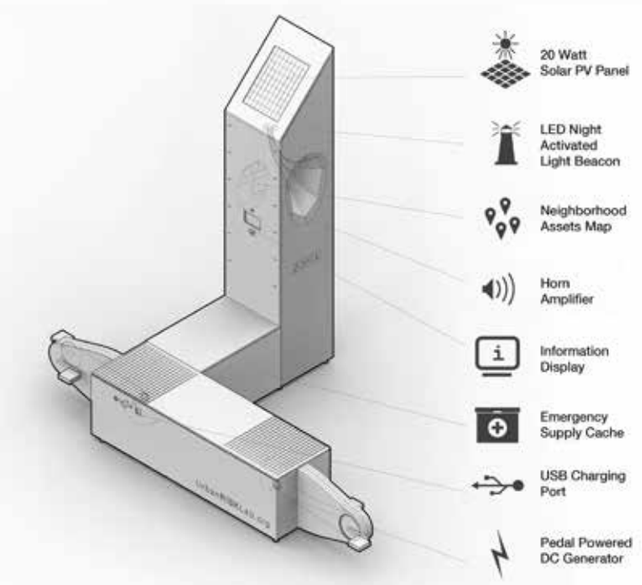
All of this could be packed into a small gray box, but we really wanted to en-gage the public so that they know where they are located. Also, the element of curiosity is important to us. We feel that once you gather around this as a family and you're encouraging your child to pedal faster to charge the phone, even years later, if a disaster occurs, you will still have this cognitive map of where these are located. In each part of the PREPHub we really tried to build on this notion of dual design. Each piece is designed to be really fun during the regular day, but then if something happens, there is also an emergency mode to it. For example, as you start pedaling, the blue lights turn on one by one, but once your cell phone has a 5% charge, you get this rainbow of lights. So, on the regu-lar day, kids are racing each other to try to get the rainbow and they're filling up this big battery. If there is an emergency and there is a long line to charge phones, then this rainbow would essentially show that person has a 5% charge on their phone, giving them enough to make emergency calls and allow the next person in line to come in. In each one of these, we've developed really different aspects to it. Fun and engaging pieces that all have secondary uses during an emergency. We fabricate pretty much all the components in-house, including sensors that collect that data, for example in this power module. This is the aca-demic, internal experimentation, innovation work that gets tested on the street for public feedback. We have been seeing this as a series of modules that can all come together, embedded with these functions.

A station that gives access to energy and information in case of disaster.

Miho Mazereeuw, David Moses, Justin Lavallee, Aditya Barve, and Saeko Nomura Baird. *PREPHubs*. Urban Risk Lab, MIT. Image courtesy of the authors.





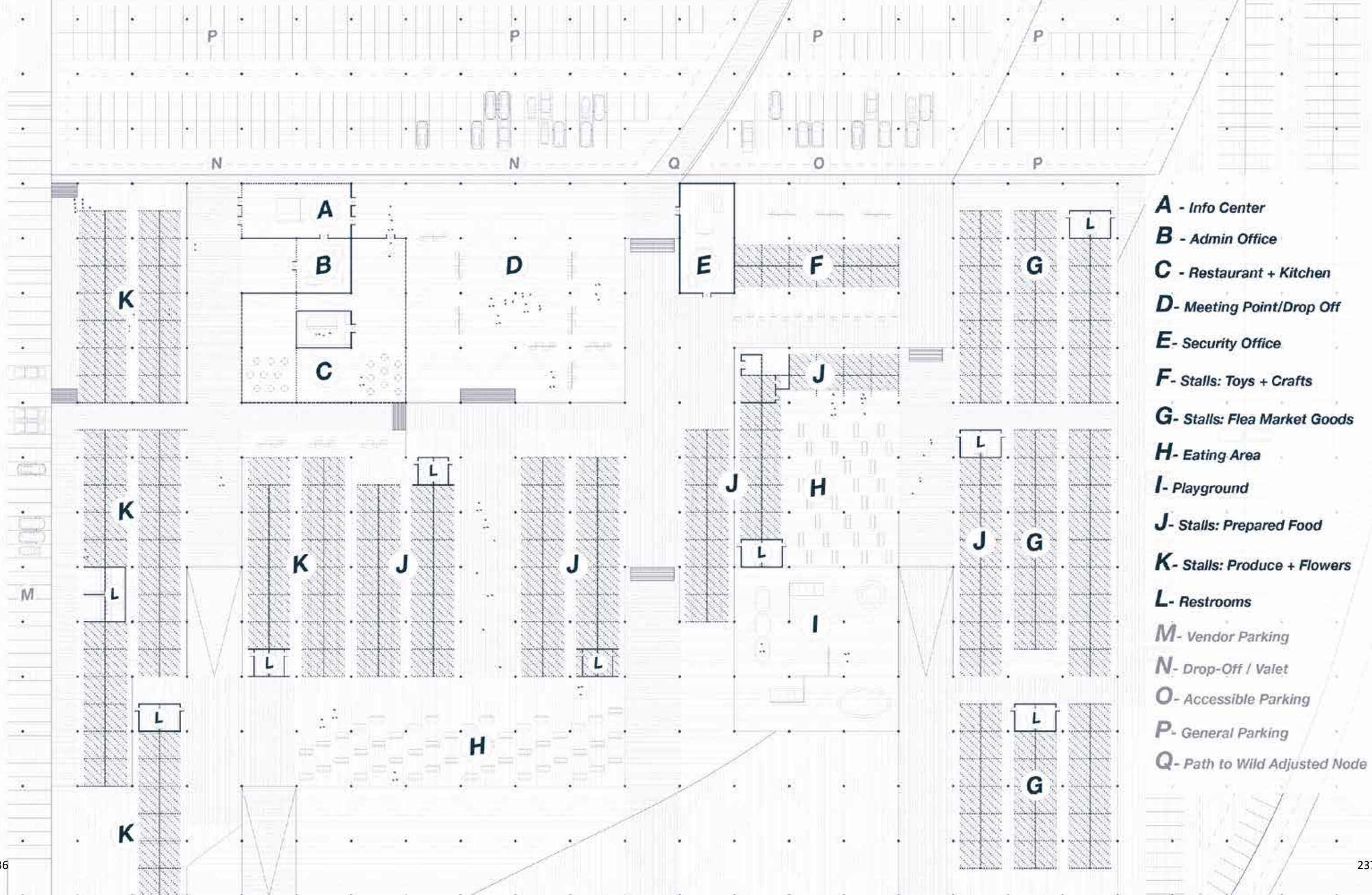


Resilient Node

Rosa Bella, Amy Robles

Fire City Research Studio
Instructor: Hitoshi Abe

The intention of the farmer's market is to demonstrate flexibility, not as a trope often associated with resilience, but as a community-specific strategy in both program and design. The site combines aspects of adaptability in both urban-scale design and small scale architectural detailing. In this way, the project facilitates a broader understanding of how human activity and natural ecologies can support and benefit each other.



A - *Info Center*

B - *Admin Office*

C - *Restaurant + Kitchen*

D- *Meeting Point/Drop Off*

E- *Security Office*

F- *Stalls: Toys + Crafts*

G- *Stalls: Flea Market Goods*

H- *Eating Area*

I- *Playground*

J- *Stalls: Prepared Food*

K- *Stalls: Produce + Flowers*

L- *Restrooms*

M- *Vendor Parking*

N- *Drop-Off / Valet*

O- *Accessible Parking*

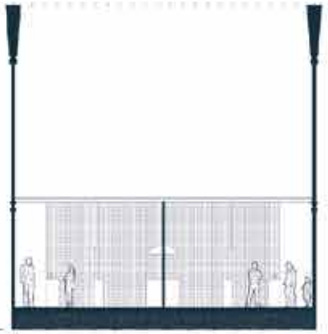
P- *General Parking*

Q- *Path to Wild Adjusted Node*

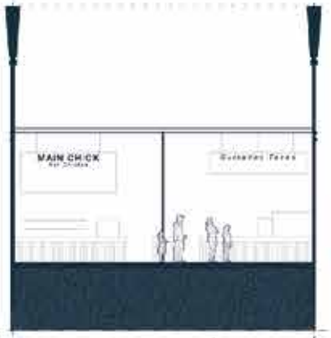
FARMER'S MARKET

Produce Stall

Prepared Food Stall



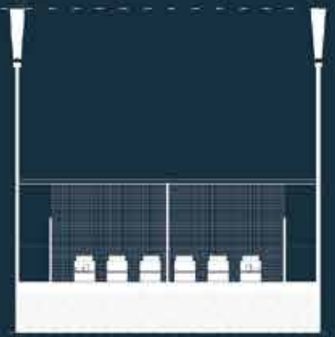
Prepared Food Stall



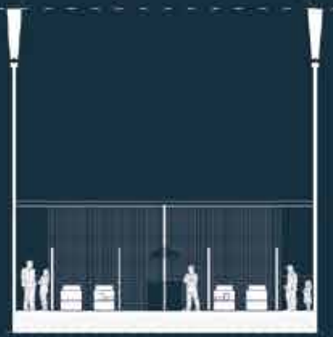
Flea Market Stall

TEMPORARY SHELTER

Short Duration Stay
Maximizing bed capacity

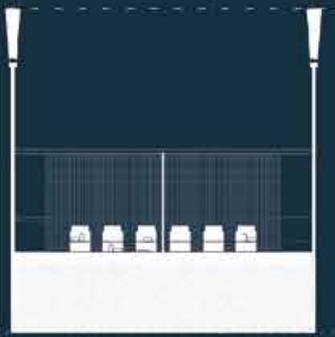


Medium Duration Stay
Maximizing utility and privacy

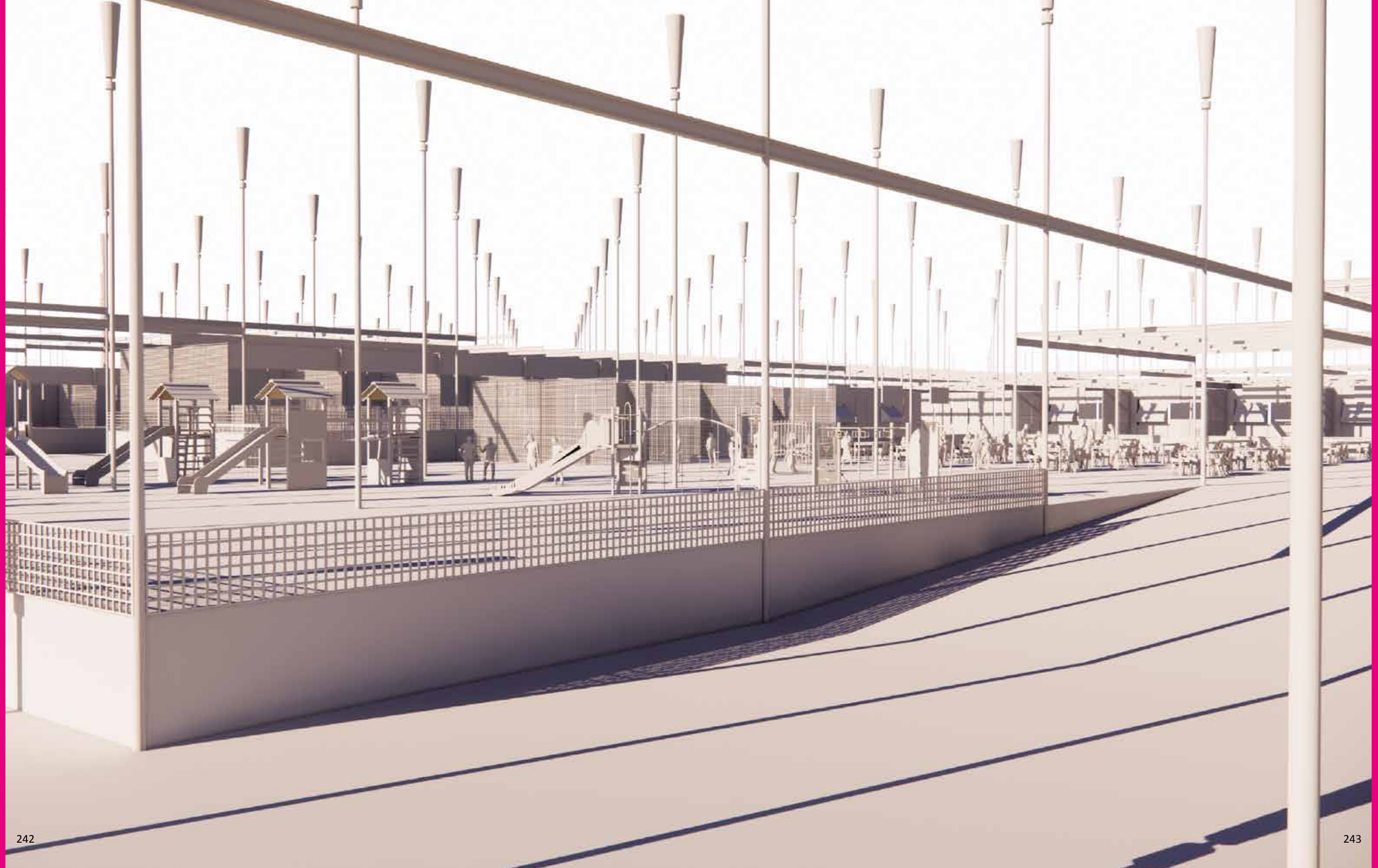


Medium Duration Stay
Prioritizing comfort

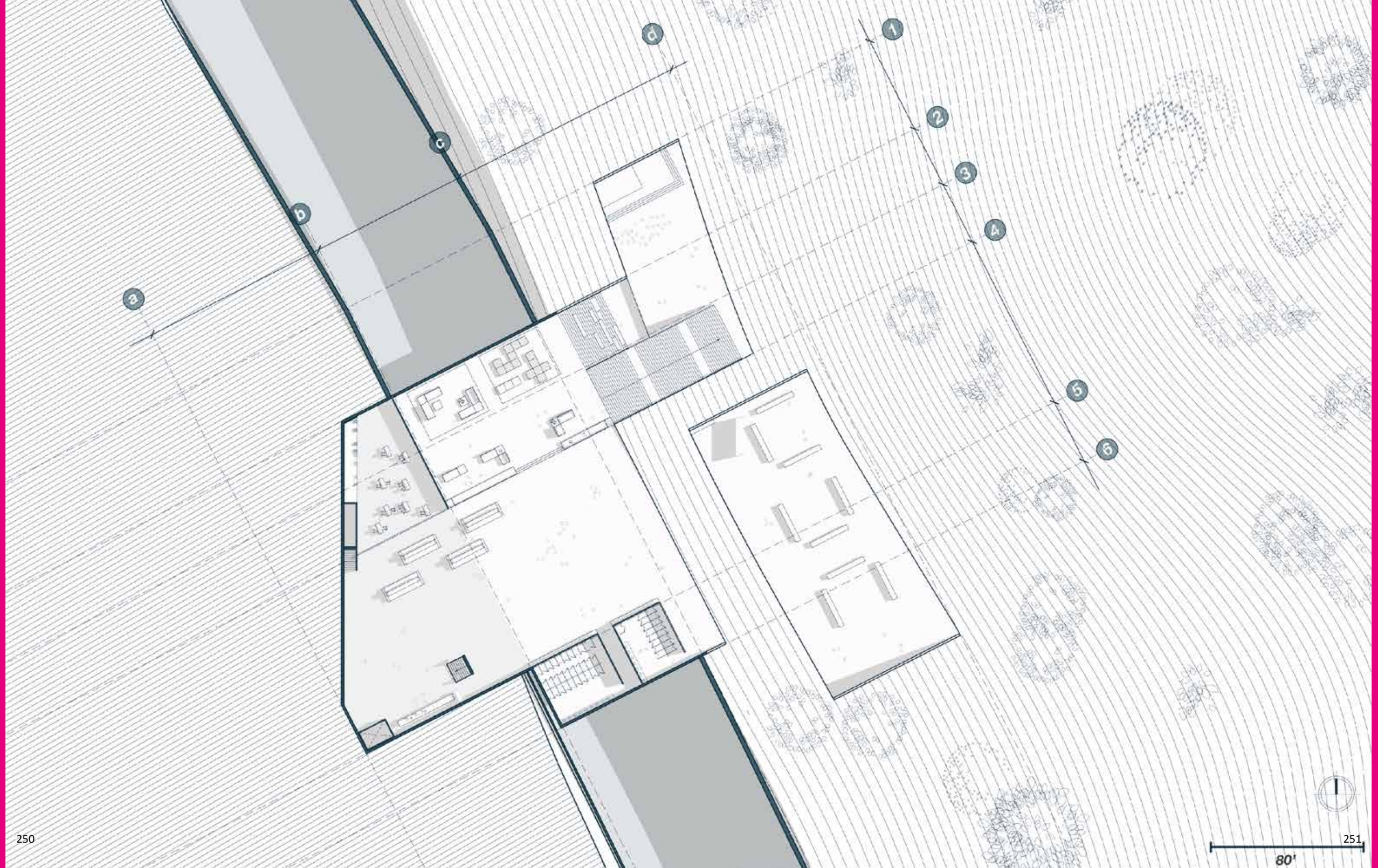
Open Space Flexibility
Storage or Bed Capacity




TULIP MART



The wildfire management hub and community outlook acts as a threshold structure: functioning as a main hub for a larger network of fire management officials and administrators by providing access into the wildlands. The hub also offers the broader community of Paradise a space to appreciate and learn from their natural surroundings, allowing them to reflect on their own existence and daily activities within the greater context of the larger ecosystem.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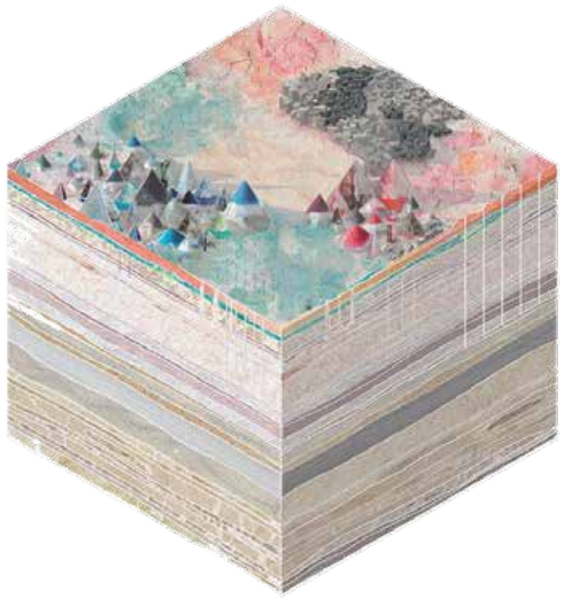
Co-Existence and the Everyday Collective

Tei Carpenter



Tei Carpenter explores two frameworks, co-existence and the everyday collective, and investigates how they can prompt designers to create more fruitful atmospheres. By embracing and appreciating what already exists in the world—both natural and built—we can develop designs that are utilized to their maximum capacity.

"Testbed, 5,000 Year Geologic Axonometric Projection." Rendering: Agency—Agency, 2017.

[04:03] For me,architecture is really about designing spaces and spatial systems that might benefit society and envision new ways to engage with and also inhabit the world. Architecture (and thinking architecturally) for me really occurs across many scales and formats, whether it's through the design of buildings, rooms, infrastructures, or environments. So what I thought I would do is to try to set up two frameworks that really describe some motivations and preoccupations of the practice [Agency—Agency], which run in parallel but also intertwine at times. Those frameworks I want to call "coexistence." Then, there is also an "everyday collective" that really ties into some questions of infrastructure.

[05:26] The first framework is coexistence. What I'd like to start talking about today is an idea about how architecture can be involved in an expanded idea of an environment, and of a nature that moves beyond the nature versus human binary in order to investigate an increasingly contemporary condition in which humans and nature can no longer be considered separate entities, but rather how the natural world and the human world are collapsing into one another. This is an image of a hermit crab that's living in a soap bottle cap, and for me it really highlights this tension between society and nature which suggests that they are not opposite, but rather increasingly intertwined and codependent. In my work I'm interested in the strange and also sometimes accidental ways in which natural processes have been hybridized, interrupted, changed, or accelerated by human impact.

[07:12] Within the context of the anthropocene, how might we as designers move beyond prevailing sustainability discourse that tends towards short-term efficient solutions, objective metrics, and also assumptions about controlling and maintaining a stable and pristine version of nature.

As designers we can start to focus on developing an architectural language that explores this condition of hybridization or entanglement between humans and nature. This approach is about critical sustainability that both mitigates human impact, but also admits to it through modes of material reuse, and also co-production with nature.

The practice I'm really interested in is how to work with concepts of coexistence and also co-production, which can be modes of collaboration, working with nature not against it, and designing both for and with multiple species.

This text is derived from a lecture recording, not intended to be published as an article.

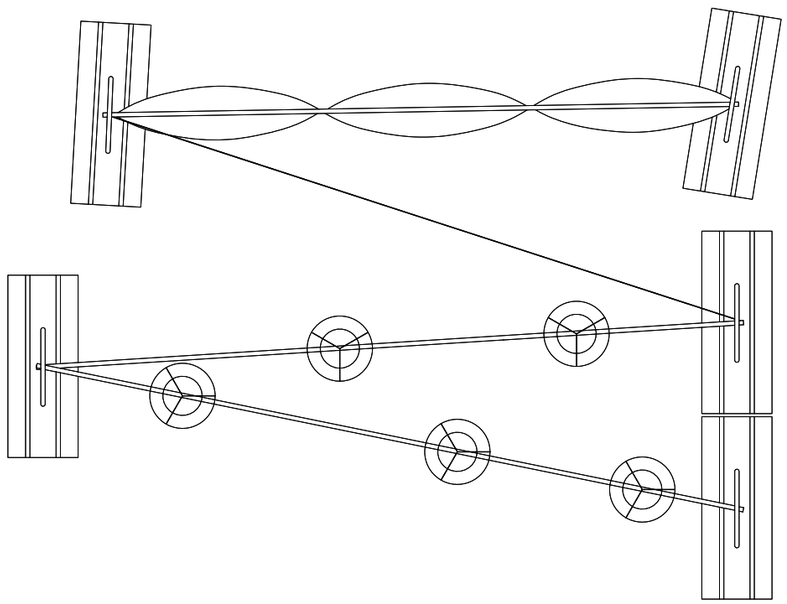
[08:56] The second framework I wanted to talk about is this notion of an “everyday collective” that’s strongly tied to infrastructure.

[10:06] Rather than relying on modernist attitudes of heroic problem solving and the kind of functional efficiency tied to many past approaches to infrastructural design, in the practice we look at examples such as here. This is the Kumbh Mela, which is an impermanent religious festival that’s supported by these amazing, surprisingly temporary mobile infrastructures. Here you can see the temporary bridges that begin to appear as a result of the number of people who are coming to this festival, and along this line of thought, I think this framework of the everyday collective tries to focus on infrastructure’s ability to produce unexpected forms of collectivity through shared resources.

[11:10] What I thought I would do is present two projects, one of which kind of fits into the framework of the coexistence and then one within the everyday collective.

[11:41] This first project is called Testbed, and it’s a winning design actually for a marker system for radioactive waste storage for the Department of Energy’s waste isolation pilot plant, which I’ll call the WIPP, located in Carlsbad, New Mexico. The brief for this marker system asked for a system that could communicate the dangers of nuclear waste buried below the surface of the earth, and to also deter human entry there for up to ten thousand years. This is a task that historian of science Peter Galison has pointed out – something that’s both impossible and necessary. Galison describes the importance of bringing the invisible into visibility, because unseeable abstractions like nuclear waste with a material half-life of 24,000 years vanish from national awareness once they’re externalized outside of perceptual range.

“Open Barriers: Play Stop”.
Drawing: Agency—Agency, 2021.



[15:47] Rather than starting as a tabula rasa, we are really thinking about how we start with contamination and compromised conditions. While historically the solutions that I showed you tend to use fear tactics to deter entry, instead what we did is proposed a gridded field of carbon dioxide capturing strategies that produce a kind of an active marker system that stores one form of energetic byproduct (which would be the carbon dioxide in the surface) above another which would be the nuclear waste below it.

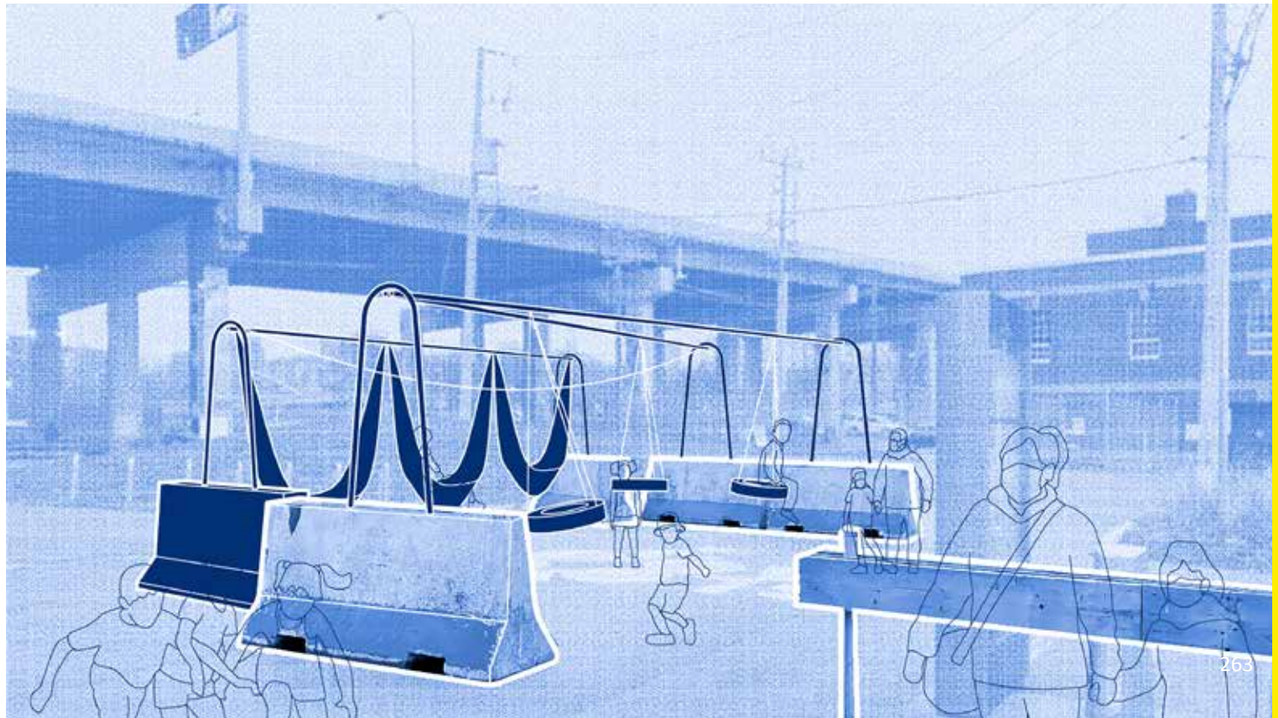
The idea is that it’s really designed as a process and a geologic earthwork that can transform over a very long time and with a combination of formations that are both natural and then also artificial.

Through this kind of continued growth and transformation, these new geologies mark the site as something that’s deeply strange and unfamiliar, deterring human and non-human entry and also communicating otherness by intervening into fundamental processes.

[19:22] The design for the island is cited in the north Pacific subtropical gyre which you may be familiar with as the Great Pacific Garbage Patch, which is essentially a swirling mass of invisible detritus that’s located in the pacific ocean, not so far away from Hawaii. It’s where the highest density of marine debris and microplastics collect due to the natural wind and current conditions to form a gyre that’s more or less the size of a small continent.

[20:01] The detritus is typically at a subsurface depth and the majority of it is composed of invisible microplastics that harm marine life by ingesting it, so you actually almost can’t see the gyre in many areas. There’s five gyres in the world, this is just one of them, and it’s an externality that exists in the world, but we’re not

“Open Barriers: Play Stop”.
Drawing: Agency—Agency, 2021.



confronted with its effects because it's so distant. But increasingly the consequences of over consumption and discard are creeping into our reality.

[25:09] This next project is pretty new, it happened during the pandemic and it's called "Open Barriers." It's a project that was commissioned by the Bentway in Toronto and if you're not familiar with it, the Bentway is an amazing public space project that opened in 2018.

[26:04] We were asked to be part of their safe and public space program which aimed to broaden the definition of public safety and to address the challenges of health protocols during covid and also on systemic inequities. In particular our prompt was to look at the design of safety infrastructures as it relates to both access and securitization.

We thought if infrastructure is typically designed with a singular functional purpose, instead we wanted to think about the capacity for infrastructure to act double duty.

We thought the Bentway pretty perfectly illustrates this concept of an infrastructure that's created for automobiles as the Gardner expressway, which now works double duty as a public space of gathering and events on its underside.

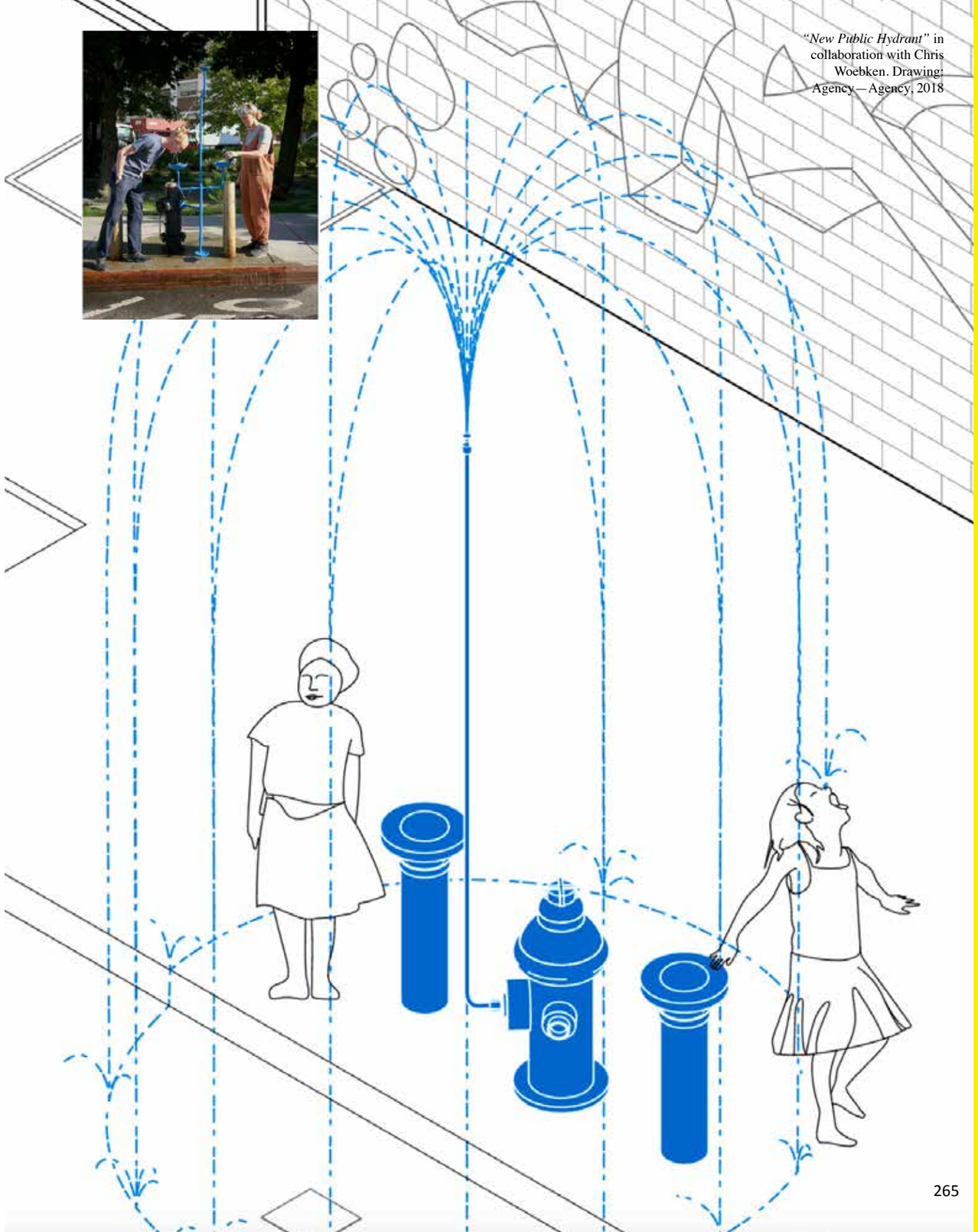
[27:55] For our project we were looking at safety infrastructures, mostly focusing on traffic because of the nature of the Bentway and this kind of automobile corridor.

[28:08] Traffic drums really tend to exist in the background of everyday experience, and typically these safety infrastructures are distributed as acts of control throughout cities with little consideration for bodies or experience.

We thought what if the underlying characteristics of these objects could maybe be reconsidered, and might there be alternative ways to engage them that could benefit the public? So we developed two prototypes that explore the affordances of the concrete barrier.

[29:09] The prototype is called Play Stop, and we studied this typical site condition where concrete barriers are basically sprawled around as a urban residue, as a means to protect the site. Instead, we thought that we might think about the jersey barrier, and think about the weight of the ballast to perhaps support flexible and also easily repeatable and expandable play structures using arches and horizontal members embedded into the barriers themselves. We are essentially trying to think about how to mark the interior of the barriers as something that might be occupiable, and could also afford any number of activities including tire swings, hammocks, monkey bars, or lights for gathering.

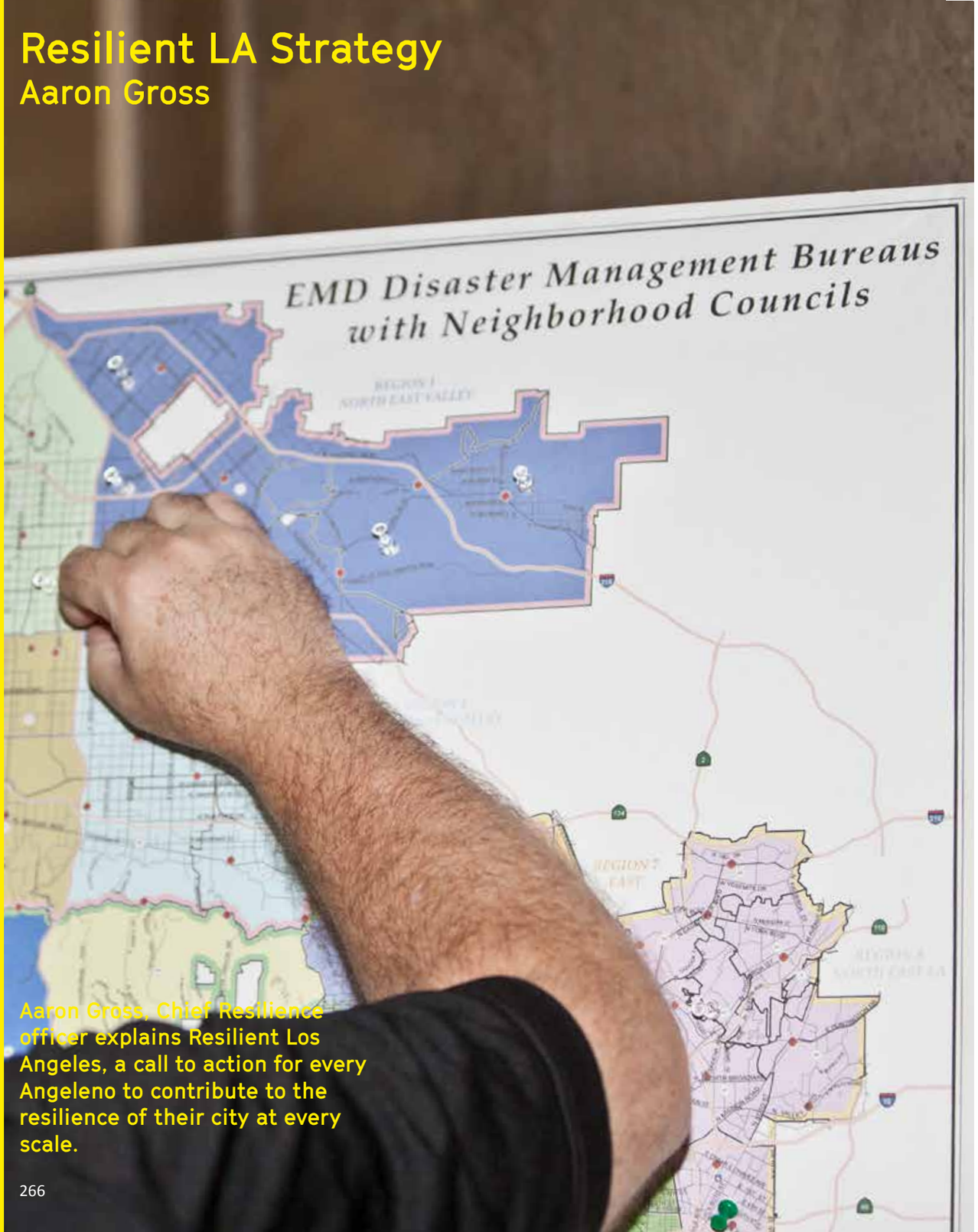
This is the after image of that, but the design shifts the reading of those barriers essentially as an edge condition instead to an occupied zone on the inside and at the same time the arches are delineated with color and they produce a kind of identifiable threshold condition. The system is really designed with a kind of very easily manipulated and accessible material, mostly based on the kind of scaffold joint joinery.



"New Public Hydrant" in collaboration with Chris Woebken. Drawing: Agency—Agency, 2018

Resilient LA Strategy

Aaron Gross



Aaron Gross, Chief Resilience officer explains Resilient Los Angeles, a call to action for every Angeleno to contribute to the resilience of their city at every scale.

Dusti Cunningham. *2017 Los Angeles Congress of Neighborhoods*. Photo. Flickr. September 9, 2017. Public Domain.

[04:03] The work of creating a resilient community or city is not all done by the "City." It takes partners and it takes everybody in a community to create a resilient community or resilient city, whether that be through academia, or partners, nonprofits, community groups, the private sector, or other parts of the public sector.

My current role in the City is really about implementing the Resilient LA strategy, which is a big book of strategies and goals for the city and region to fulfill to become more resilient. They range from very small things to very big things; from individual acts to policies – regional, statewide, national policies.

[06:48] Resilient LA is about creating a lens by which we see all of the work that the City does - a long range lens of resilience. We need to view everything, whether it is projects, or policy or relationship building, as a long-term view of a more resilient city. There are a number of lenses that we are all trying to implement. By "all of us" I mean not just the city, but you as well. There is the lens of resilience, there is the lens of equity, the lens of sustainability, the lens of efficiency – these are values that we need to use as we do our work.

Resilience generally is understood as a city's ability to prepare to deal with and then recover from any shock or stress that may present itself.

Those shocks can be acute (like an earthquake) or gradual (like sea level rise); they can be natural disasters (like fires) or they can be human made (like pollution or poverty). So there is a really wide range of what falls in the category of resilience, but it really is the capacity to survive, deal with, and recover from any shock or stress.

[08:37] What often happens with shocks or stresses is that they pile up on each other. For example the Earth's warming may pile up with more severe storms and more flooding. With COVID, we're seeing a pile up of not only a global pandemic, but now there are economic challenges that follow with that. There will be food, employment, and education issues that follow this global pandemic. And so that's part of the preparation and dealing with shocks and stresses – there are usually multiple that we have to deal with.

[10:53] The first really focused work by the city that lent itself to the Resilient LA strategy was a seismic risk research report and recommendations led by Dr. Lucy Jones, called Resilience by Design. [...] The report identified systems pillars that the city needed to address. And so not only did we address those issues on what the risks and challenges might be, but also what some solutions might be.

This text is derived from a lecture recording, not intended to be published as an article.

[14:06] The other big precursor and influential plan that lent itself to the Resilient LA strategy was the Mayor's Sustainable City Plan. It is now referred to as LA's Green New Deal, coined after the federal program that really focuses on a sustainable city. […] A sustainable city is more resilient and a resilient city is more more sustainable. The Sustainable City Plan lays out the city's sustainability actions and goals, with an additional focus on how they overlap with resilience. There is urban heat – the heat that comes into the city […] where there is so much concrete and many buildings. There is also the issue of how the city accesses and retains water – water conveyance is one issue, but also we want to protect and increase the water that we have locally.

[15:48] As we started to put together the resilience strategy, we brought experts from all realms together to advise us (from academia, experts in the community, and experts in various shocks and stresses). The guiding principles for creating a plan were these five issues: leadership and engagement; disaster preparedness and recovery; economic security; climate adaptation; and infrastructure modernization. These buckets helped us start designing specific goals and actions that the city or region should take. I want to underscore that

a resilient city, must focus and protect its most vulnerable people, places and systems. It is not only the just thing to do, but also, the most efficient way to make a stronger city. There is also an economic argument to be made to focus on neighborhoods and populations that are most vulnerable and underserved, historically and disproportionately suffer the most regardless of the shocks and stresses endured.

If we can prepare those communities beforehand, or have tools available to deal with and recover from a shock or stress in those communities, then hopefully the damage that is caused by shock or stress may be minimized and recovery will be easier.

In addition to the shocks and stresses I mentioned when I was talking about whether they are acute or gradual, our advisors presented other challenges that we needed to address in the plan. The primary resilience challenges you would think of that are natural shocks or stresses like an earthquake, fire or flood. But there are others that must be confronted […] including air quality issues, extreme heat, food disparities, and poverty. Homelessness, as an example, is a huge issue in Los Angeles – and represents our most vulnerable population that must be considered when attempting to create a resilient city. The digital divide was one of the things that we've seen with COVID, that really illustrates how shocks and stresses disproportionately affect more vulnerable communities. That further underscores the need for us to focus our efforts on older and more vulnerable populations in the city.

[26:14] My favorite project from this effort is called a Resilience Hub. The concept of a Resilience Hub is a grassroots-focused resilience effort in a community of higher risk. Typical strategies of emergency preparation, emergency response, and some of the long term planning for resilience tends to be the government telling communities what to do. In contrast, the Resilience Hub strategy involves working with a local nonprofit that is trusted and used in a community. They help the community in a way that the government will never be able to. If the City or government isn't trusted (for cultural reasons, bad experiences, etc.), we still want to find ways to help prepare communities. For instance we have identified a nonprofit in a low income, high density, high immigration, community of Boyle Heights. We are working with that nonprofit to create a hub that will be an asset in the community –a place where people can get more prepared, a place where people can go during an emergency, a place where people can go after an emergency to get information, services, and training.

Crystal Housman. California National Guard. Photo. Flickr. March 29, 2020. Creative Commons License (CC BY-NC 2.0).

Jeremy Oberstein. Los Angeles Fire Department LAFD Graduation 14-2. Photo. Flickr. August 20, 2015. Creative Commons License (CC BY-NC 2.0).

This nonprofit already does amazing work with the community, including job training for youth and an annual youth festival. But we want to add on some components that will help them serve the community even more. One is putting solar on the roof, so [...] they will still have independent power if the power goes out. We are also looking at having a water system so they are able to provide safe water if there is an earthquake and the water conveyance systems don't work. Another component is working with the American Red Cross, who will provide training programs for local youth. We have a number of different partners; there's a restaurant in front that has not only a gas fired oven, but a wood fired oven. So if the gas lines are cut, they can still provide warm food for people. There's a ballroom upstairs, and that'll be a place not only for training [30:03] opportunities, but also our emergency shelter, if necessary. I bring this all up because this is one of my favorite resilience projects, and is one that really relies on partners to help communities be more resilient.

My project partner at the USDN likes to refer to Resilience Hubs as snowflakes, in that every community is different.

Every community is going to have different things that they see as necessary to protect themselves. That is what makes the Resilience Hub strategy unique – it starts with community engagement, it starts with talking to the community, and hearing from the community about what they view as essential for making for a safer, more resilient, more prepared community.

[35:34] It is very interesting how a shock or stress cascades with other issues. When we talk about fires and wildfires, there are so many different components that go into the work of either mitigating or adapting to the new reality of fire risk. Not only is it potential damage to forests that damage our ecology and our environment, but also the damage to private property, loss of property, and loss of life. And there are other things that come along with that.

After a fire, we often see mudslides in that particular area. A lot of times in burnt areas there is infrastructure that gets damaged. The water conveyance systems and electricity grids, especially through the hills, have a lot of wires and towers that will sometimes cause the fire, but more often get damaged in a fire. Telecommunications are also a factor, and if there is a fire, what kind of damage that might create?

Some of the efforts we have seen in trying to mitigate risk include not only design of buildings and making them more fire safe, but also potentially policies that would restrict where people can build. If they happen to be areas where there's repetitive loss, it doesn't really make sense. Even though in California we very much respect and value our private property laws and rights. As a city official, it's hard for me to justify a homeowner rebuilding a house that then puts firefighters at risk every time the hillside goes up. So there are a lot of different components that go into dealing with wildfire in addition to just how we save homes and save community assets from burning down.

Office of Mayor Garcetti. *Resilient Los Angeles*. Figure. March 2018. Public Domain.

CHAPTER 1
SAFE AND THRIVING ANGELENOS will call attention to the role that individuals, families, businesses, and property owners can take to both prevent and prepare for future shocks and stresses.

- GOAL 1: Educate and engage Angelenos around risk reduction and preparedness so they can be self-sufficient for at least seven to 14 days after a major shock.
- GOAL 2: Develop additional pathways to employment and the delivery of financial literacy tools to support our most vulnerable Angelenos.
- GOAL 3: Cultivate leadership, stewardship, and equity with young Angelenos.

CHAPTER 2
STRONG AND CONNECTED NEIGHBORHOODS will focus on actions that support and strengthen community connectedness and collaboration.

- GOAL 4: Build social cohesion and increase preparedness through community collaboration.
- GOAL 5: Increase programs and partnerships that foster welcoming neighborhoods.
- GOAL 6: Prepare and protect those most vulnerable to increasing extreme heat.
- GOAL 7: Reduce health and wellness disparities across neighborhoods.

CHAPTER 3
PREPARED AND RESPONSIVE CITY will emphasize strategies the City and its partners will take to ensure that Los Angeles is equipped to address current and future challenges.

- GOAL 8: Integrate resilience principles into government to prioritize our most vulnerable people, places, and systems.
- GOAL 9: Equip government with technology and data to increase situational awareness and expedite post-disaster recovery.
- GOAL 10: Provide safe and affordable housing for all Angelenos.
- GOAL 11: Restore, rebuild, and modernize Los Angeles' infrastructure.

CHAPTER 4
PIONEERING AND COLLABORATIVE PARTNER will feature the multidisciplinary innovations and partnerships that will continue to propel Los Angeles forward as a leader among our global peers.

- GOAL 12: Use climate science to develop adaptation strategies consistent with the Paris Climate Agreement.
- GOAL 13: Foster a healthy and connected Los Angeles River system.
- GOAL 14: Strengthen regional systems and fortify critical infrastructure.
- GOAL 15: Grow public, private, and philanthropic partnerships that will increase resources dedicated to building resilience.

Fostering Community

Tomasz Groza, Jenn Peterson Ruiz, Yiwen Song

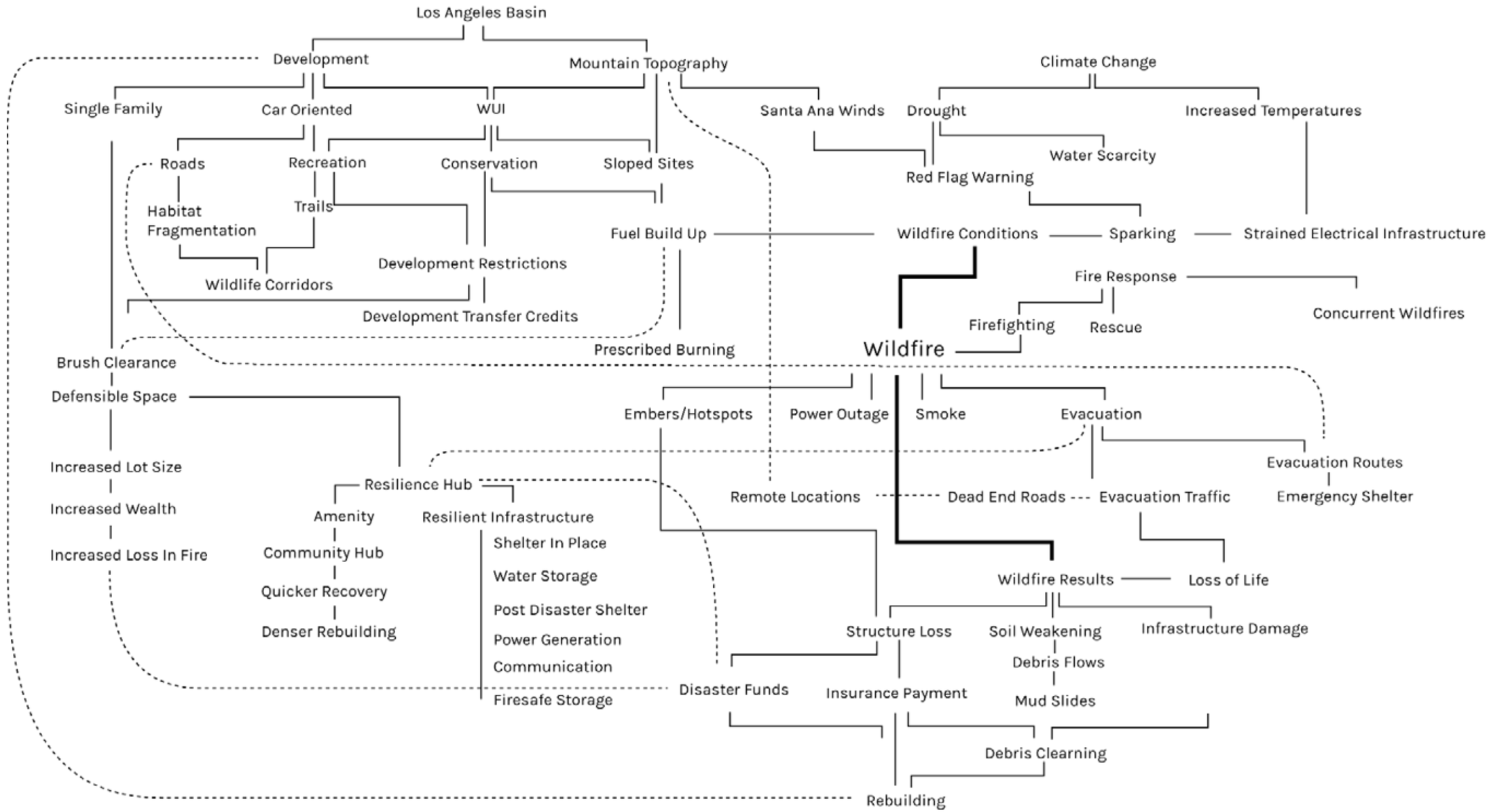
Fire City Research Studio
Instructor: Hitoshi Abe

As wildfire threats rise, and WUI grows,

What does fire-resilient development look like?

Our fire resilient strategy is to foster community cohesion through a transformational adaptive land use plan. Our project is designed to help build social cohesion and resilience to local fire. we propose to “fortify” community amenities to help and facilitate residents in wildfire disasters as well as attract those who choose to live in the WUI to live closer to these adaptive hubs.We propose an incentive based process for transforming the community into a denser more resilient and equitable forms of development. This 4 step transition plan is intended as a clear guide for developers and residents.The process begins by encouraging community responsive public oriented resilience projects in the center of the community that are aimed at increasing social cohesion and independence of the community. We focus on enhancing existing communities with resilient programs. The enhanced amenities are intended to attract residents to their proximity due to their fire readiness and general convenience.

WILDFIRE SCENARIO



RE-ZONING/ TRANSITION

DEVELOPMENT STRATEGY:
Incentives

We propose an incentive based process for transforming the community to a denser more resilient and equitable forms of development.

01

INCENTIVE DRIVEN INITIATIVE

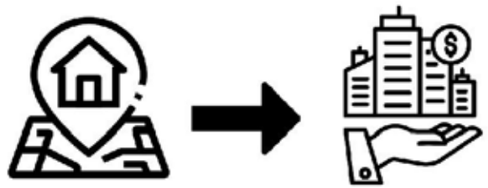
01 *Create incentive for denser development in WUI Areas*

With the encouragement of a community responsive and public oriented resilience project, we aim to provide insentives to increase denser development as well as keep social cohesion in mind.

02 *Wildfire Disaster: Burned Homes w/ Defensible Boundary Issues*

A lot of buildings built in WUI were built without proper consideration for long term effects of living in fire prone area. Those structures are a liability to a community as a whole and should be replaced or removed.

03 *Trasnferring Ownership*

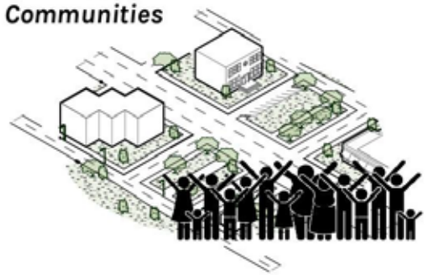


In our plan spaces in denser, fire safe parts of the community are reserved for homeowners at risk of losing their homes to fire to avoid having to leave the area.

04 *Potential Development Areas: Vacant Lots + New Amenities*

With the same incentive model used to enhance the hub amenities we propose redeveloping the land traded in. Since the burned areas tend to have highers with highly fire safe construction methods.

05 *Building Defensible Communities*



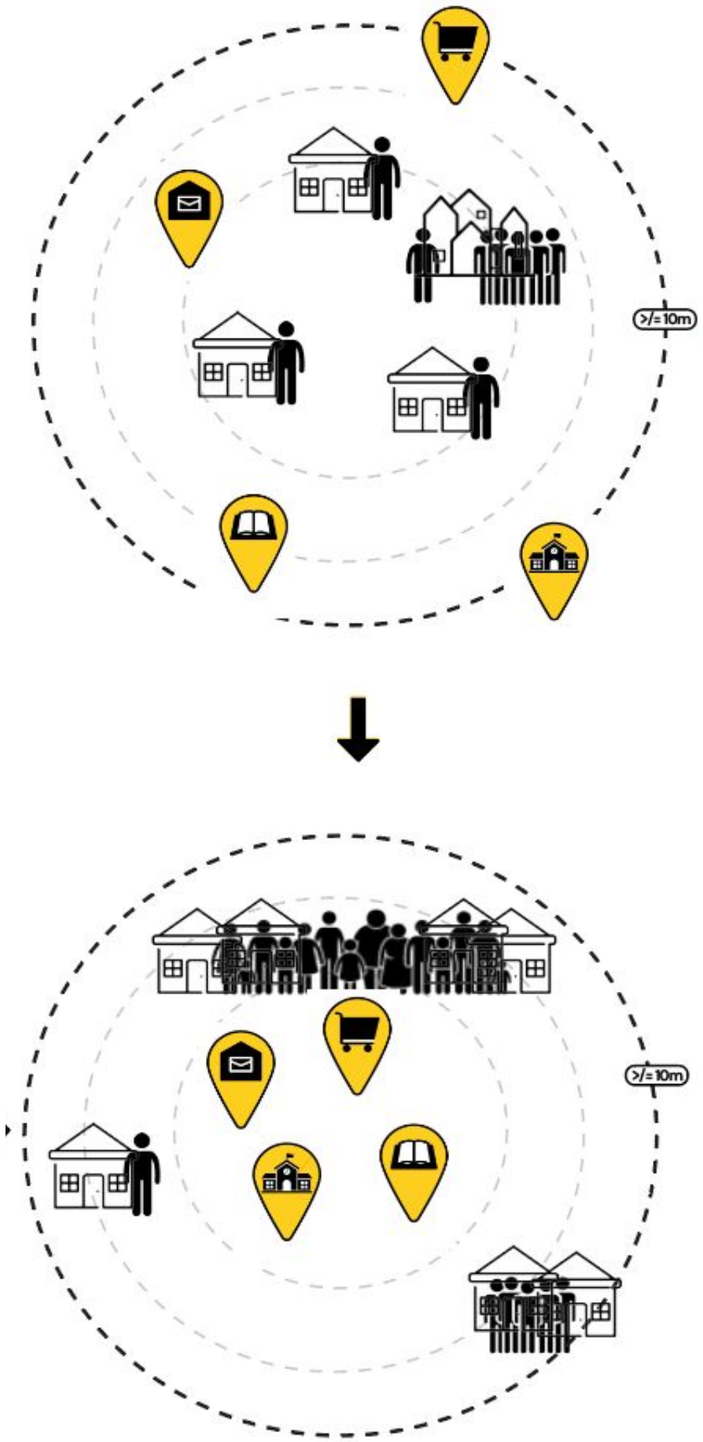
ADAPTED COMMUNITY AMENITIES

SOCIAL CONNECTOR:
Amenity Injection

Bringing service amenities into the community can limit residents' reliance on cars and encourage casual social encounters among neighbors while serving emergency functions in cases of wildfire disasters.

02

EXISTING V. PROPOSED



AMENITIES:
Typologies + Strategies

SOLAR ENERGY GENERATION
1 kW requires 150 sf
1 kW = 1300 kWh/year of energy production

WATER STORAGE TANKS
f > (r+a) and f < h

SHELTER-IN-PLACE
2,000 - 6,500 SF

MONITORING/ WARNING BEACON
100 - 500 SF

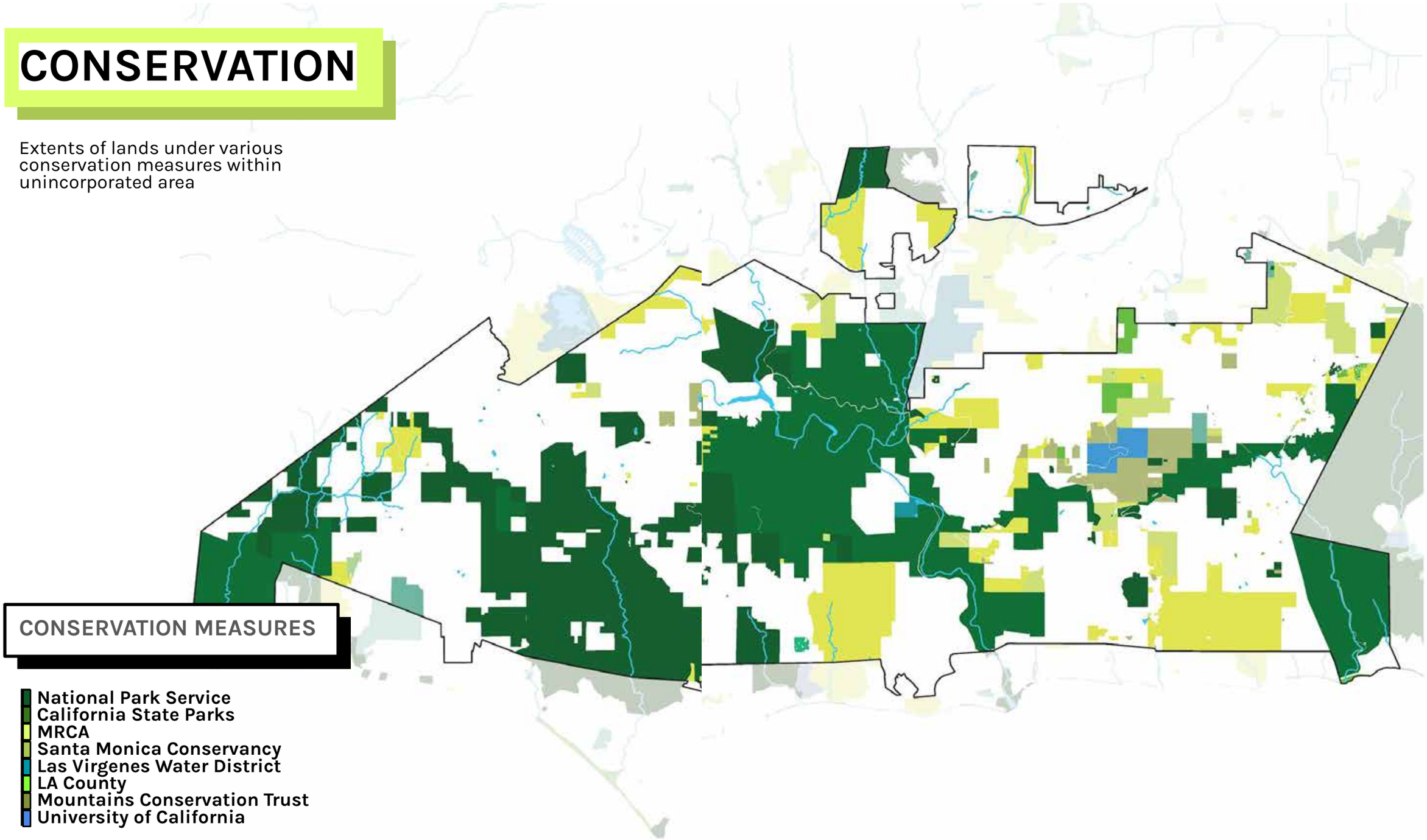
EVACUATION STATION
100 - 500 SF

PREPARDNESS KIT
100 - 500 SF

DISASTER TIMELINE	ANYTIME	PRE-DISASTER	DISASTER	POST-DISASTER
BUILDING TYPOLOGY				
SCHOOL *80,000 - 180,000 SF*	Classrooms, Offices, Staff Spaces, Library, Dining Area (Kitchen, Storage), Hall (Multipurpose Usage), Restrooms, Auditorium *as Workshop Space*, Computer Labs, Parking, Storage Facility, Outdoor Area *as Fire Drill A*	Parking ***as Evacuation Station***, Storage Facility, Playground/ Outdoor Area ***with Water Storage Tanks + Solar Energy Generation***	Dining Area(Canteen, Kitchen, Storage) ***as Emergency Supply Storage***, Hall (Multipurpose Usage), Auditorium ***as Shelter in Place Area***, Parking ***as Evacuation Station***	Auditorium *for Community meetings and Volunteering*, Playground/ Outdoor Area *as Fire Drill Area with Water Storage Tanks + Solar Energy Generation*
GROCERY STORE *12,000 - 40,000 SF*	Entry/Exit Vestibule, Produce Area, Produce Prep Area, Dry Grocery Stack Area, Frozen Area, Refridgerated Open Area, Checkout Area, Offices, Restrooms, Kitchen *as Food Lab/ Workshop Space*, Storage, Cafe, Loading Bay, Parking *as Fire Drill*	Offices ***w/ Preparedness Kit***, ***Cafe as Emergency Supply Storage***, Loading Bay, Parking ***as Evacuation Station + Warning Beacon***	Refridgerated Open Area ***as Temporary Shelter in Place Area***, Cafe ***as Emergency Supply Storage***, Loading Bay, Parking ***as Evacuation Station + Warning Beacon***	Kitchen *as Community meetings and Volunteering*, Storage, Cafe, Loading Bay, Parking *as Fire Drill Area w/ Water Storage Tanks + Solar Energy Generation*
COMMUNITY CENTER *20,000 - 180,000 sf*	Lobby, Multipurpose Spaces *as Workshop Space*, Offices, Conference Rooms, Gym, Locker Rooms, Dining Hall, Kitchen, Storage rooms, Restrooms, Playground/ Outdoor Areas, Parking *as Fire Drill Area*	Locker Rooms ***as Preparedness Kit***, Storage rooms ***as Emergency Supply Storage***, Playground/ Outdoor Areas ***as Evacuation Station + Warning Beacon***	Multipurpose Spaces ***as Shelter in Place Area***, Storage rooms ***as Emergency Supply Storage***, Playground/ Outdoor Areas ***as Evacuation Station + Warning Beacon***	Multipurpose Spaces *as Community meetings and Volunteering*, Playground/ Outdoor Areas, Parking *as Fire Drill Area with Water Storage Tanks + Solar Energy Generation*
LIBRARY *2,000 - 15,000 SF*	Entry/Exit Vestibule, Stack Area, Multipurpose Space, Restrooms, Storage, Office, Patio *as Workshop Space*, Mini Kitchen/Staff Area, Parking *as Fire Drill Area*	Storage, Mini Kitchen/Staff Area ***as Emergency Supply Storage***, Parking ***as Evacuation Station + Warning Beacon***	Multipurpose Space ***as Shelter in Place Area***, Storage rooms ***as Emergency Supply Storage***, Parking ***as Evacuation Station + Warning Beacon***	Multipurpose Space *as Community meetings and Volunteering*, Parking *as Fire Drill Area with Water Storage Tanks + Solar Energy Generation*
POST OFFICE *6,500 - 9,000 SF*	Entry/Exit Vestibule, Mailbox Area, Restrooms, Storage, Office, Service Lobby, Lock Box Area, Mini Kitchen/Staff Area, Parking *as Fire Drill Area*	Storage ***as Emergency Supply Storage***, Parking ***as Evacuation Station + Warning Beacon***	Storage ***as Emergency Supply Storage***, Parking ***as Evacuation Station + Warning Beacon***	Parking *as Fire Drill Area with Water Storage Tanks + Solar Energy Generation*

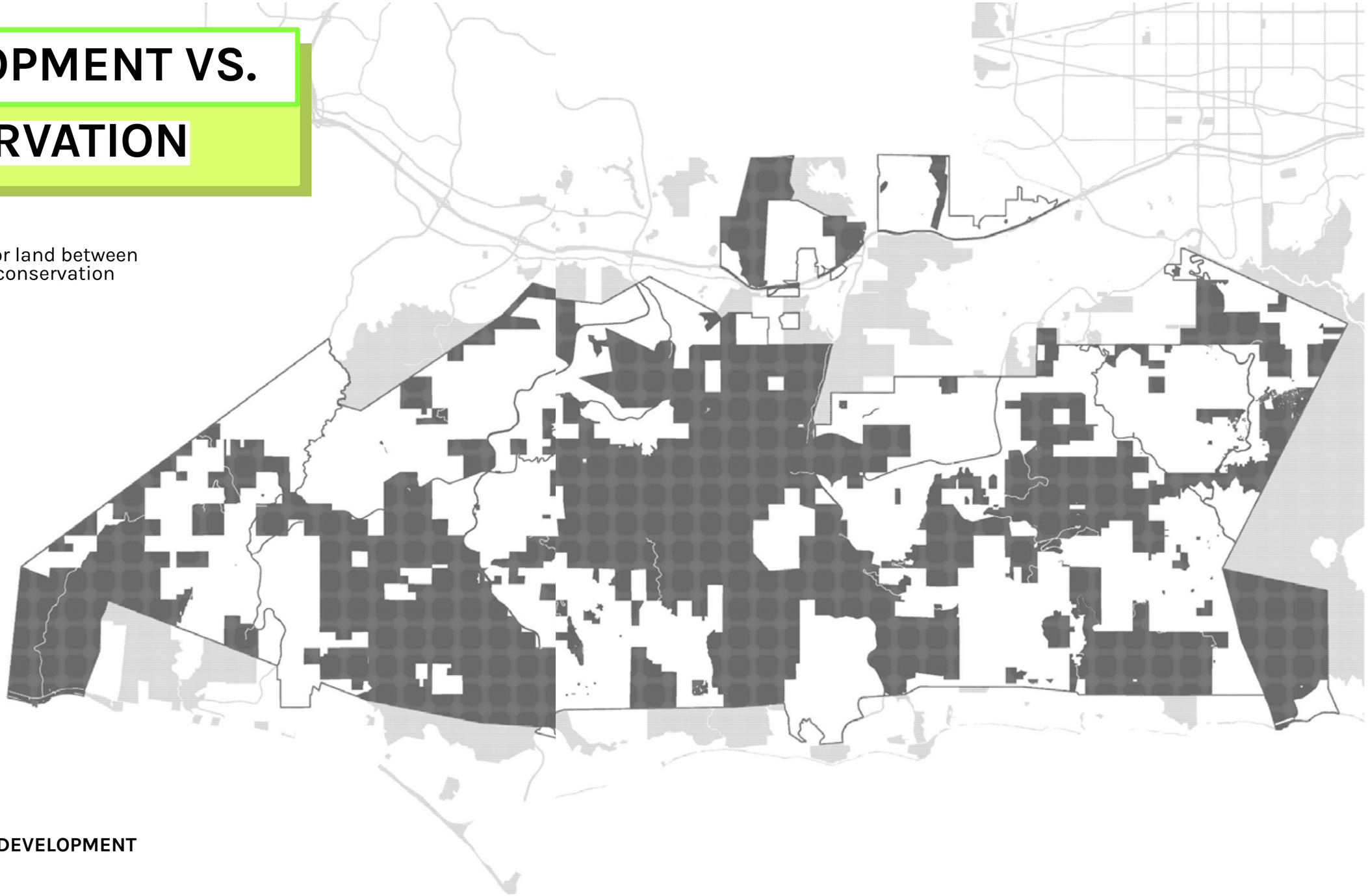
CONSERVATION

Extents of lands under various conservation measures within unincorporated area



DEVELOPMENT VS. CONSERVATION

The competition for land between development and conservation

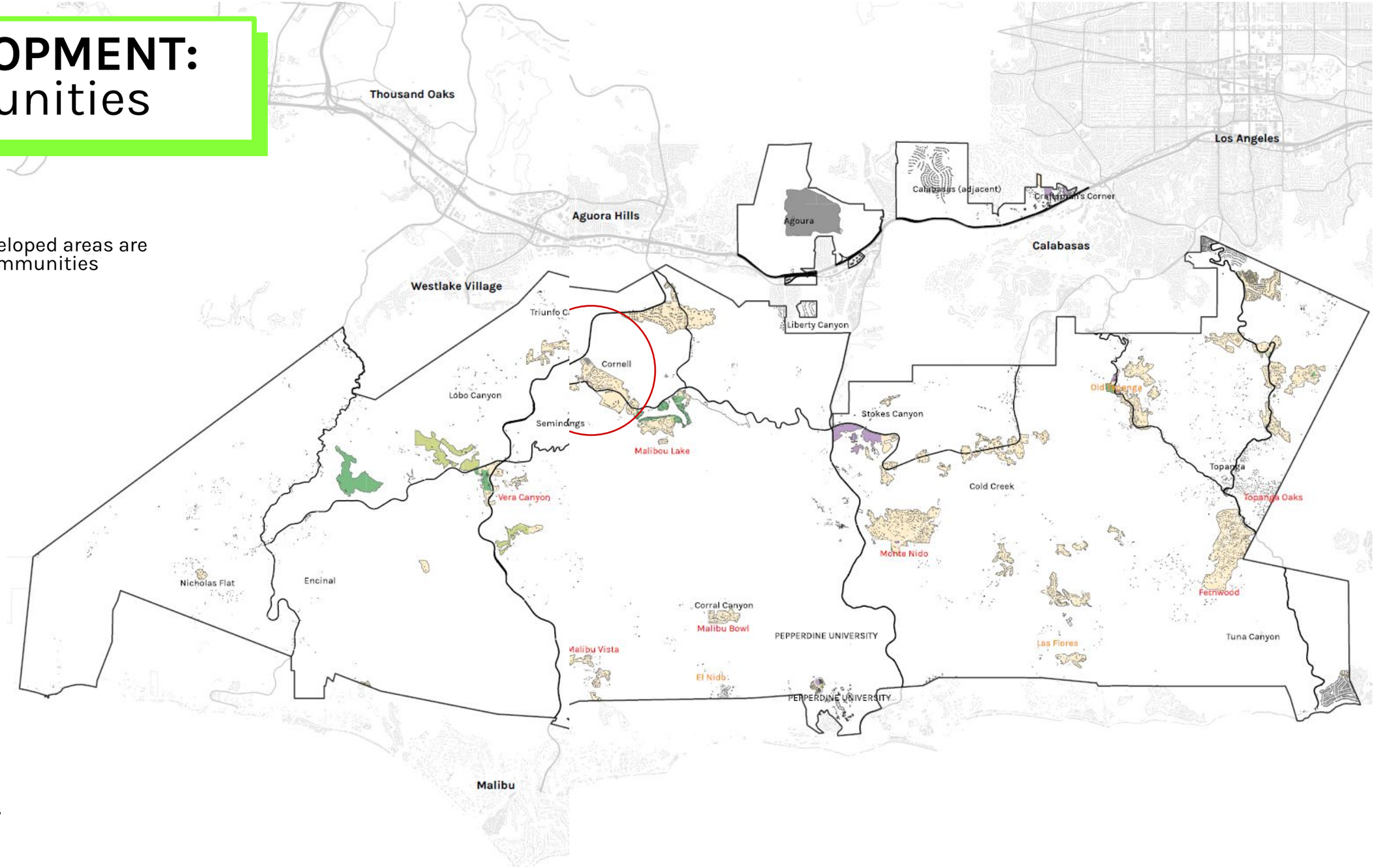


LEGEND:

CONSERVATION
AVAILABLE FOR DEVELOPMENT

DEVELOPMENT:
Communities

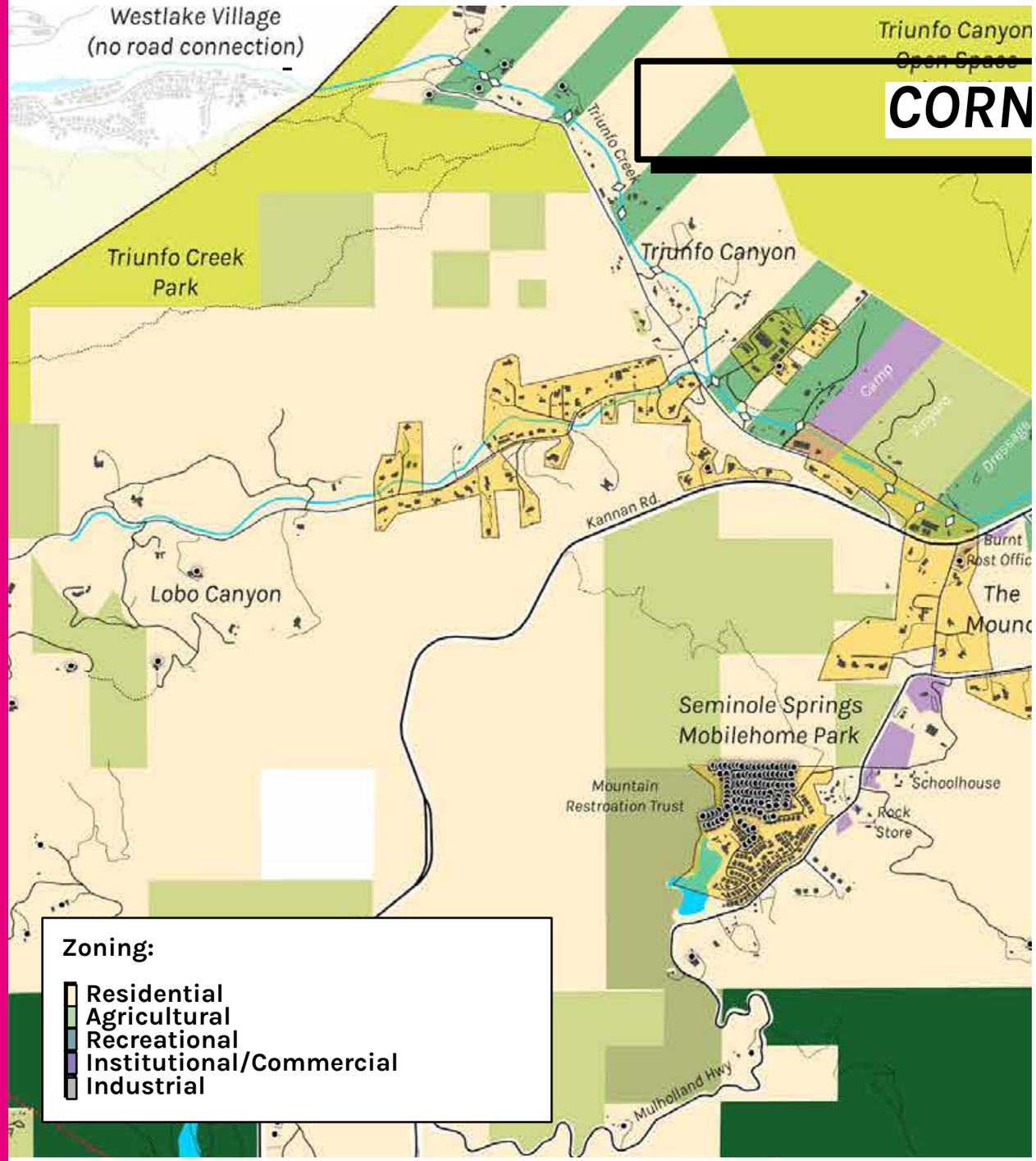
Significantly developed areas are recognized as communities

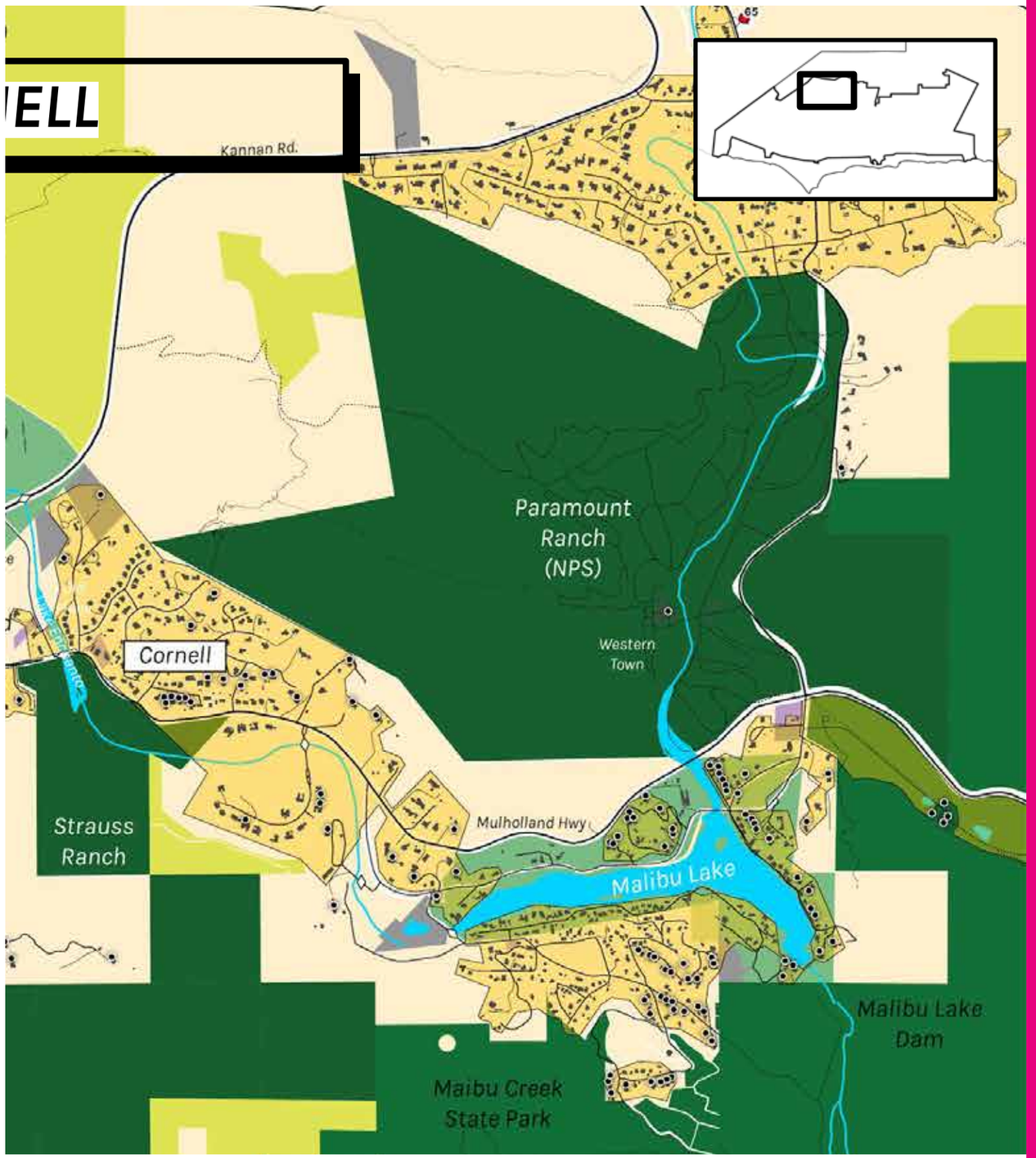


LEGEND:

[] DEVELOPMENT

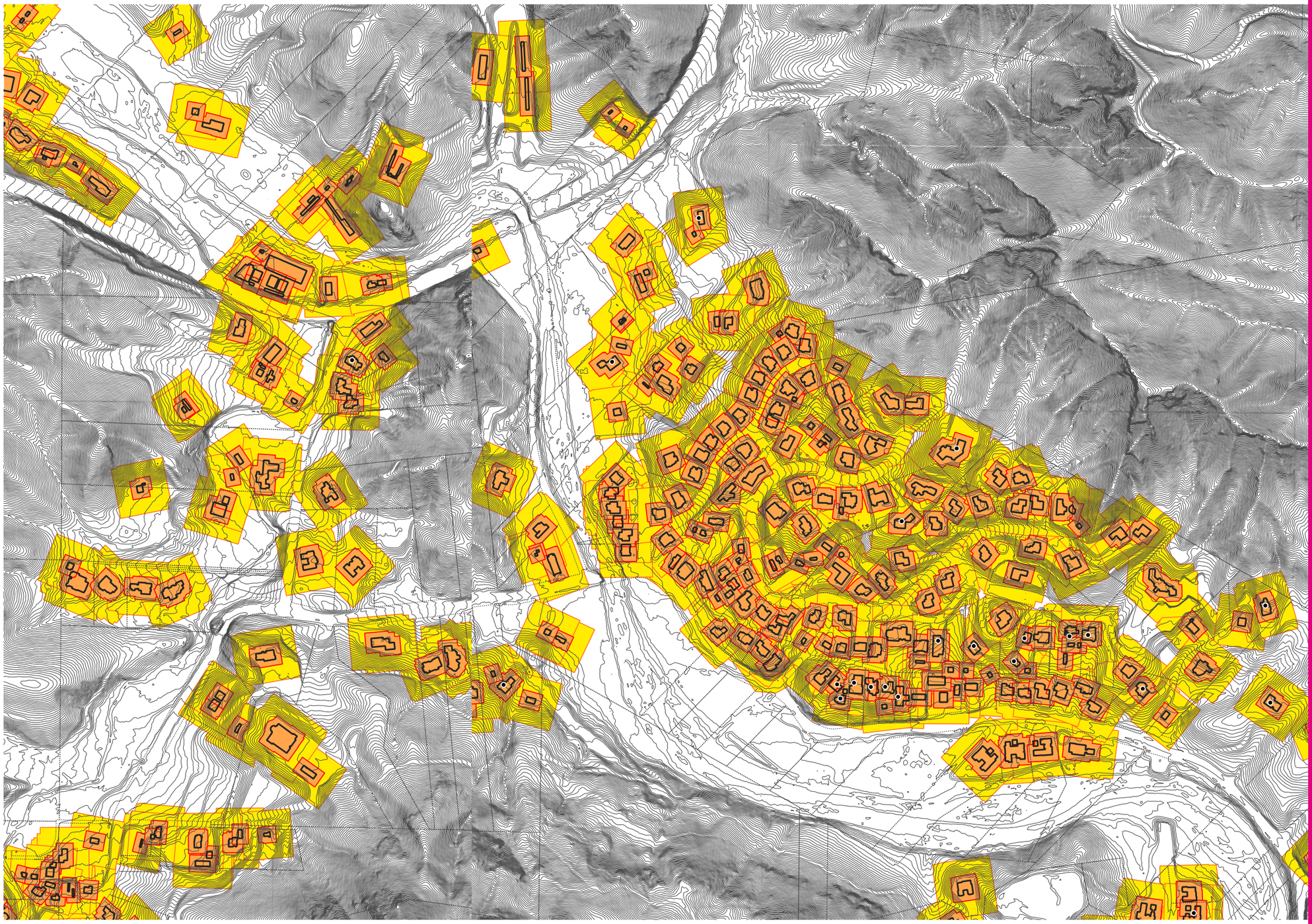
CORNELL


Westlake Village
(no road connection)
Triunfo Canyon
Open Space
Triunfo Creek
Triunfo Creek
Park
Triunfo Canyon
Camp
Kannan Rd.
Lobo Canyon
Seminole Springs
Mobilehome Park
Mountain
Restroation Trust
Schoolhouse
Rock
Store
Mulholland Hwy
Zoning:
Residential
Agricultural
Recreational
Institutional/Commercial
Industrial


Kannan Rd.
Paramount
Ranch
(NPS)
Western
Town
Cornell
Strauss
Ranch
Mulholland Hwy
Malibu Lake
Malibu Lake
Dam
Malibu Creek
State Park

LEGEND:

- BUILDING OUTLINE
- 30FT NO FUEL ZONE
- 100FT MAINTENANCE ZONE
- BURNED IN WOOLSEY FIRE



Antiquated Subdivision

1930's

minimal

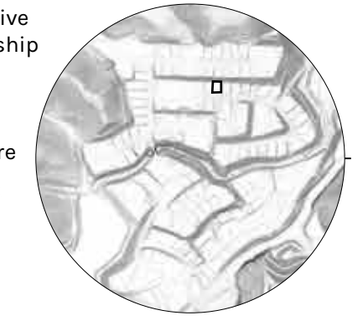
<$100k

Collective Ownership

1970's

1/16 acre

<$100k



Tract

1990's

1/4 acre

$300k

Luxury

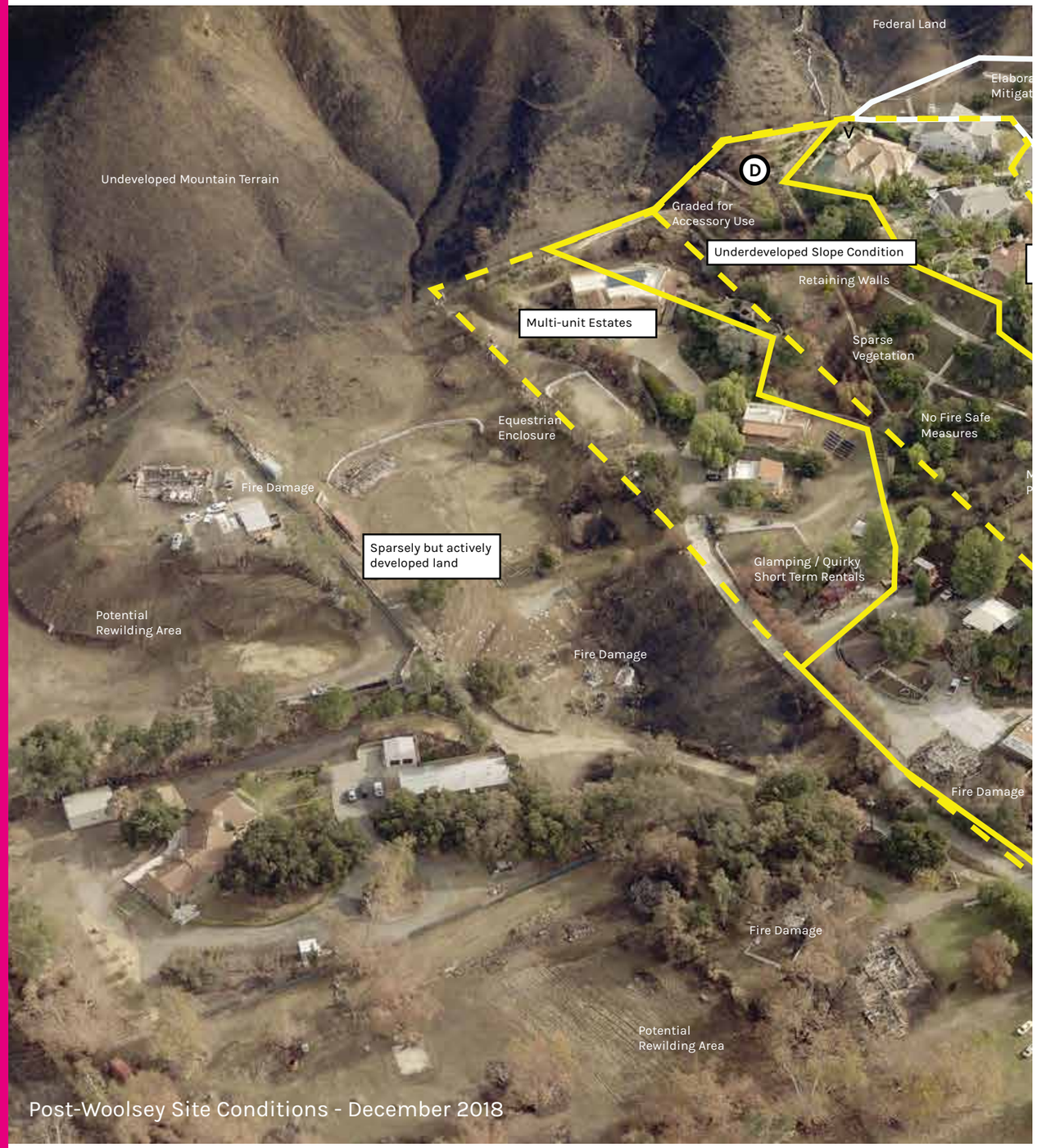
2000's

1/2 acre

$600k

Residential Lot Grading

Cornell, CA - Slope Map
Transformation of hillside topography according to development patterns



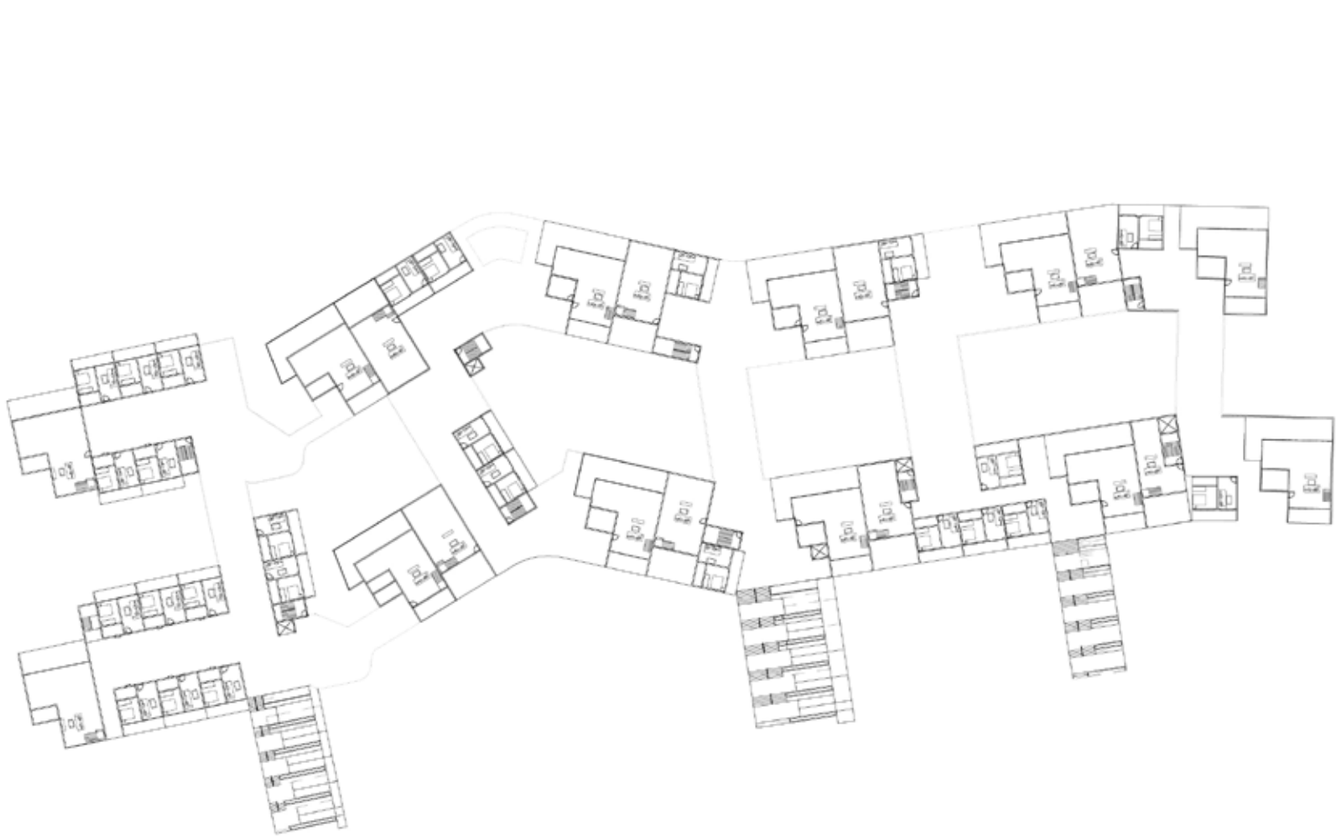
Post-Woolsey Site Conditions - December 2018

Disaster Relief Greenbelt Community

Yiwen Song

Fire City Research Studio
Instructor: Hitoshi Abe

By noticing that a lot of buildings built in WUI were built without proper consideration for long term effects of living in a fire prone area. Houses that are not properly maintained or built too close to an unmitigated fire hazard will burn in a wildfire. Those structures are a liability to a community as a whole and should be replaced or removed. In addition, social cohesion is a strong determinant of community resilience. because during disaster scenarios people are predominantly rescued by neighbors, friends and families and not emergency response crews. However, unincorporated area lies entirely in the Santa Monica Mountains National Recreation Area which is considered a significant ecological Area and communities are scattered on the site and lack of social cohesion. Hence choosing a proper site and enhancing communities cohesion is emphasis for this project. By analysis the site near the Truinfo Creek, shrink and increase the density of community near the riverside to protect those communities from fire. Connecting the scatter communities by adding new amenity enhance the connection, communication and information transferring between those communities to enhance the resiliency of those communities during fire disaster and after fire disaster.

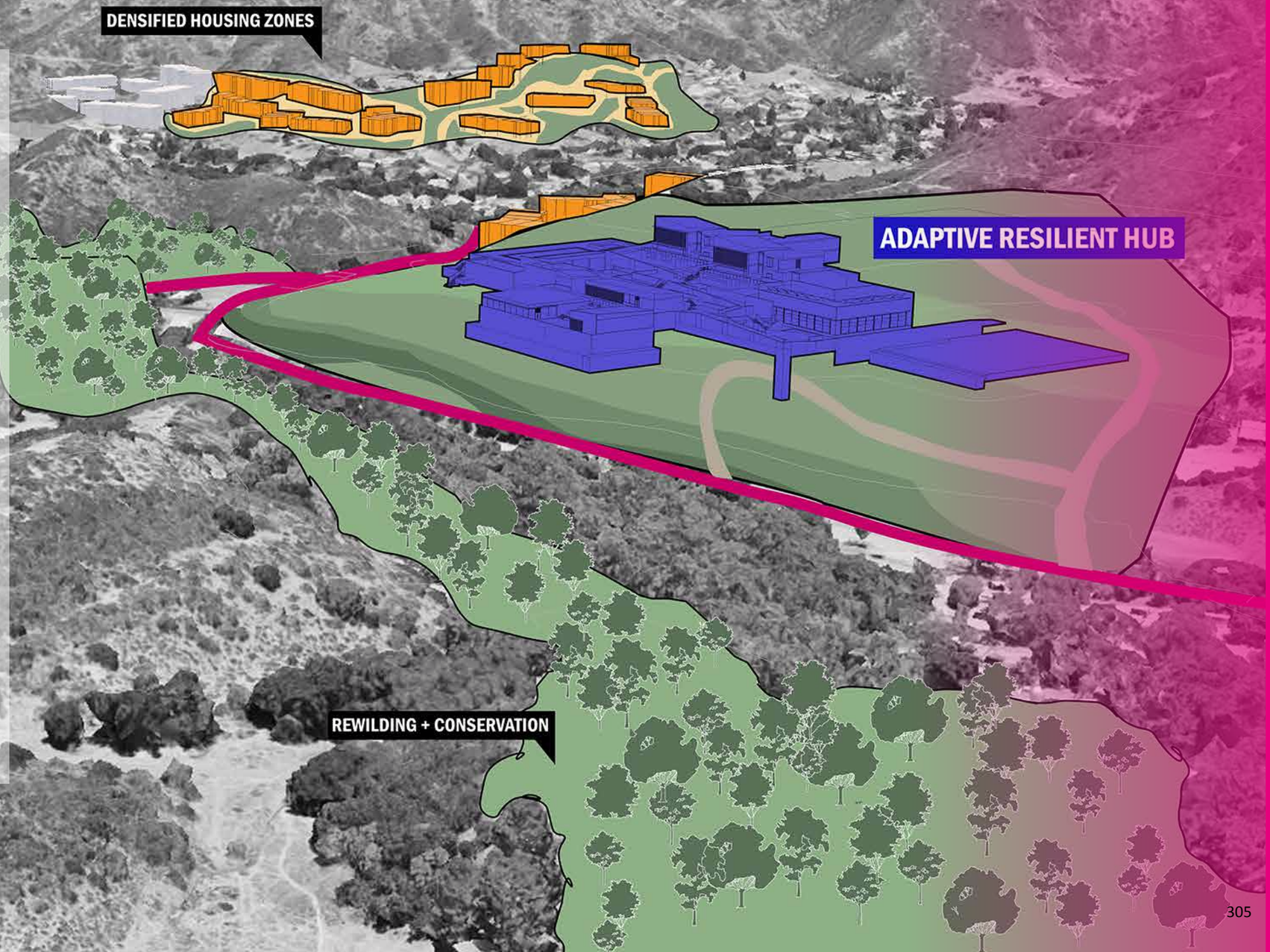


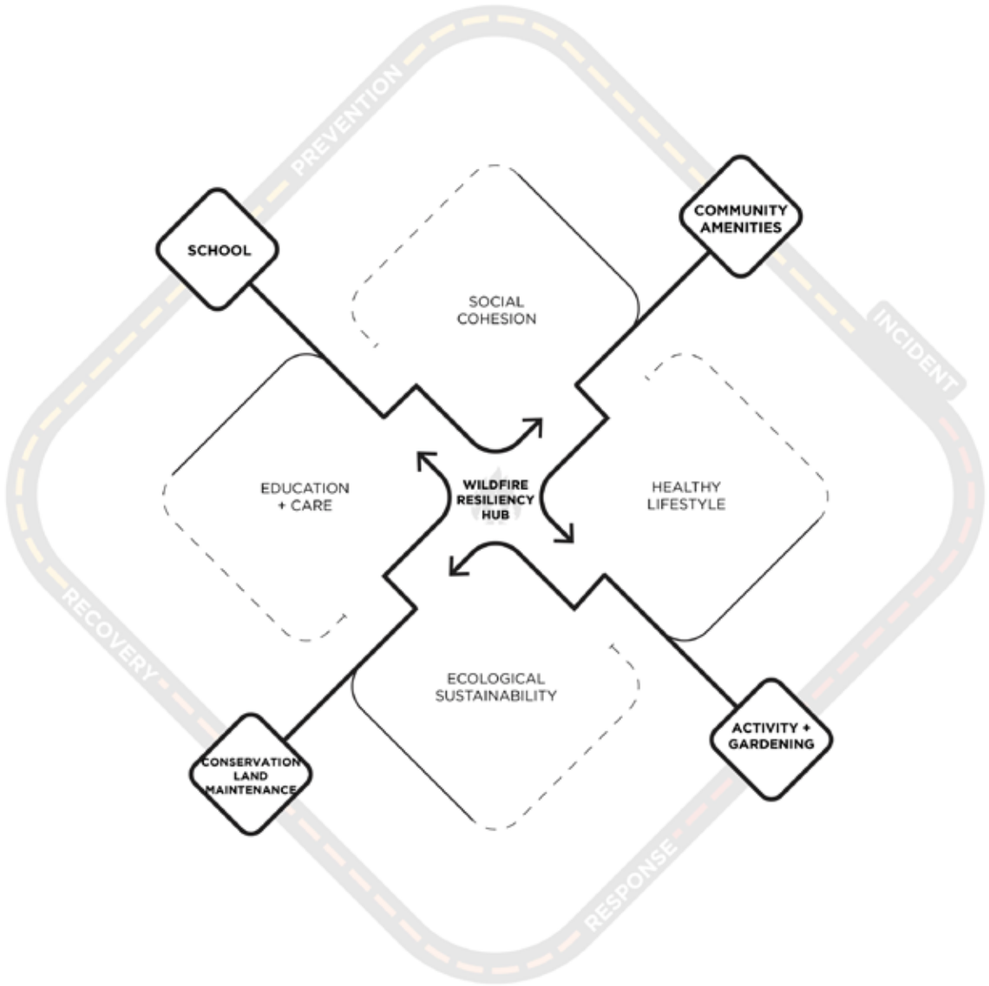
Community-Specific Fire Adaptive Amenities

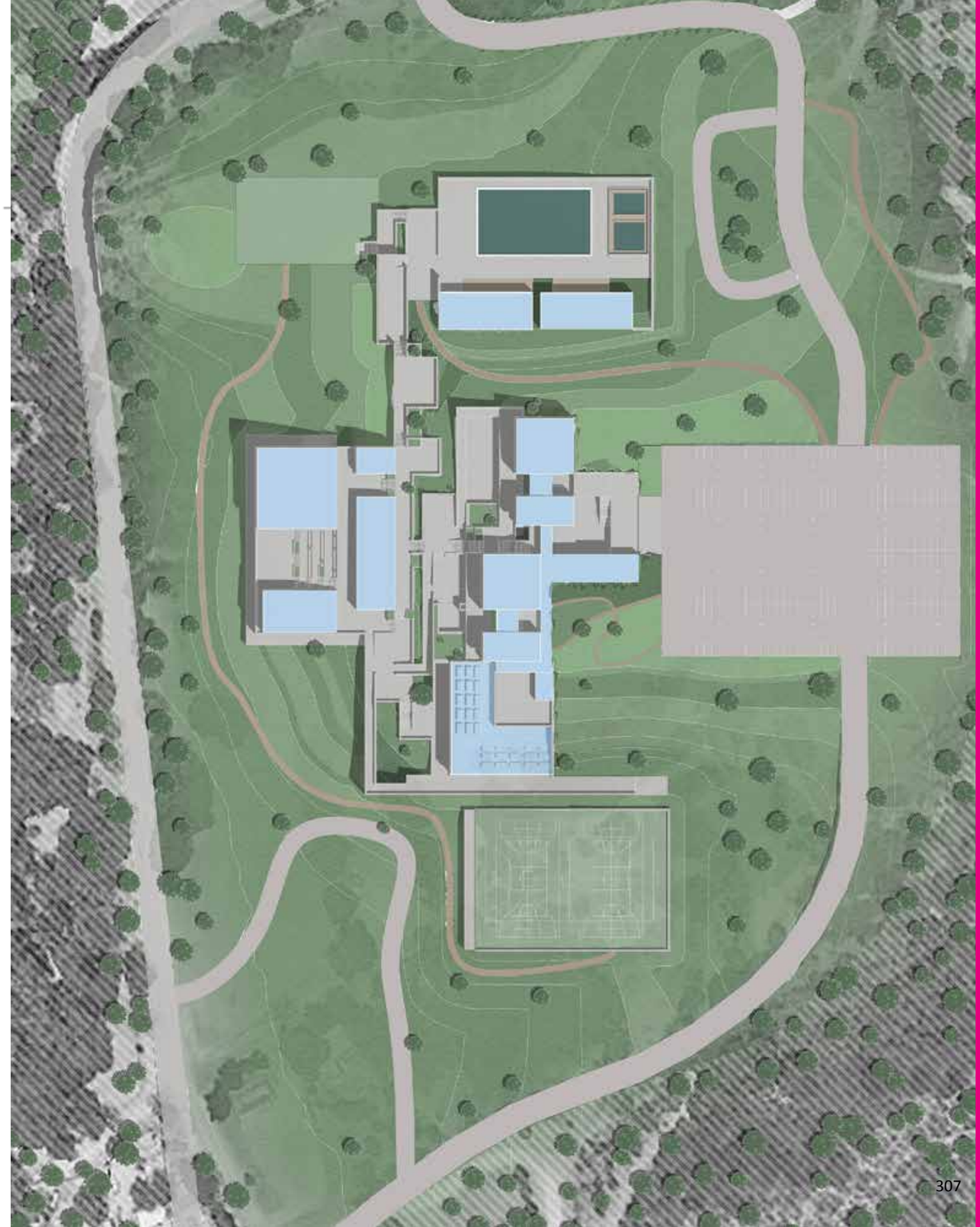
Jenn Peterson Ruiz

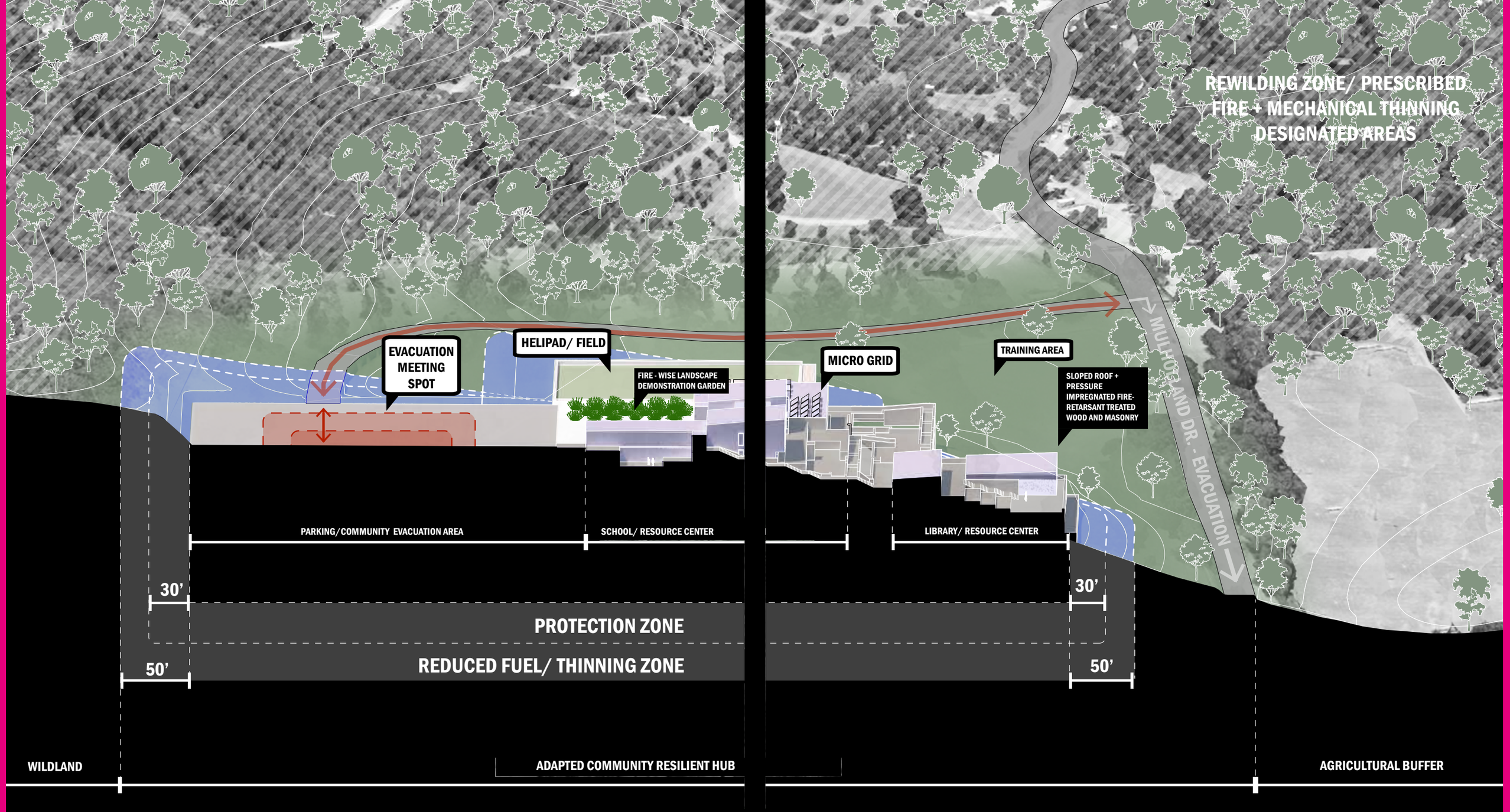
Fire City Research Studio
Instructor: Hitoshi Abe

This project looks at interjecting within the current community structure and development patterns of Cornell, CA. It includes introducing/fortifying community amenities (social cohesion/safe space), rezoning and incentivizing for denser development (healthier strategies for development in the WUI), reclaiming land for conservation and an ambition for periodical prescribed fires in surrounding areas to fortify the land (resilience through mitigation). The project also seeks to serve as a model for future fire resilient communities by treating the Woolsey fire as an opportunity for Cornell to rebuild stronger and gain resilience through the design and implementation of these resilience strategies.




PREVENTION
INCIDENT
RECOVERY
RESPONSE
SCHOOL
COMMUNITY AMENITIES
SOCIAL COHESION
EDUCATION + CARE
WILDFIRE RESILIENCY HUB
HEALTHY LIFESTYLE
ECOLOGICAL SUSTAINABILITY
CONSERVATION LAND MAINTENANCE
ACTIVITY + GARDENING




EVACUATION MEETING SPOT
HELIPAD/ FIELD
FIRE - WISE LANDSCAPE DEMONSTRATION GARDEN
MICRO GRID
TRAINING AREA
SLOPED ROOF + PRESSURE IMPREGNATED FIRE-RETARSANT TREATED WOOD AND MASONRY
REWILDING ZONE/ PRESCRIBED FIRE + MECHANICAL THINNING DESIGNATED AREAS
MULHOLLAND DR. - EVACUATION
PARKING/COMMUNITY EVACUATION AREA
SCHOOL/ RESOURCE CENTER
LIBRARY/ RESOURCE CENTER
30'
30'
PROTECTION ZONE
50'
REDUCED FUEL/ THINNING ZONE
50'
WILDLAND
ADAPTED COMMUNITY RESILIENT HUB
AGRICULTURAL BUFFER

Contributors Bios

Hitoshi Abe is a professor and former Chair in the Department of Architecture and Urban Design at UCLA and the Director of the UCLA Paul I. and Hisako Terasaki Center for Japanese Studies. He also holds the Terasaki Chair for Contemporary Japanese Study. Since 1992, when Dr. Abe won first prize in the Miyagi Stadium Competition and established Atelier Hitoshi Abe, he has maintained an active international design practice based in Sendai, Japan. As a successful designer and educator who continuously lectures and publishes throughout his career, Hitoshi Abe has earned a position among the leaders in the field of architecture and urban design for his ability to initiate productive interdisciplinary collaborations and establish professional partnerships with various constituencies.

Known for architecture that is spatially complex and structurally innovative, the work of Atelier Hitoshi Abe has been published internationally and received numerous awards in Japan and worldwide, including the 2011 Japan Society for Finishing Technology Award for the F-town building; 2009 Contract world Award for Aoba-tei; 2009 Architectural Institute of Japan Award for the K-Museum; 2009 Architectural Institute of Japan Education Award; 2008 SIA-Getz Prize for Emergent Architecture in Asia; 2007 World Architecture Award for M/Kanno Museum; 2005 Good Design Award for Sasaki Office Factory for Prosthetics; 2003 Architectural Institute of Japan Award for Reihoku Community Hall; 2003 BusinessWeek and Architectural Record Award for Sekii Ladies Clinic; 2001 Building Contractors Society Award for Miyagi Stadium; and 1999 Yoshioka Award for Yomiuri Media Miyagi Guest House. With growing geography in its portfolio, Atelier Hitoshi Abe opened its second office in Los Angeles in 2008. Its most recent works include a departmental building on the New Campus of the Vienna University of Economics and Business (WU), and the 3M Headquarters building in St. Paul, Minnesota, Hotlinks, for Brad Pitts' Make It Right Foundation in the Lower Ninth Ward in New Orleans, and Terasaki Research Institute in Westwood, Los Angeles.

In 2011, together with a group of Japanese Architects, Hitoshi Abe initiated the Arch-Aid network – a voluntary network of architects established to help reconstruct the damaged community by the 2011 East Japan Great Earthquake and Tsunami. In 2017, he opened the xLAB Research Center at UCLA, which serves as an international think tank that examines architecture's elastic boundaries through interdisciplinary collaboration.

Jeffrey Inaba is the co-founder of Inaba Williams Architects. He's interested in the knowledge that's gained from the profession–especially ideas about urbanism, typology, and building technologies. His firm is based in Los Angeles and Brooklyn and its clients include Red Bull Music Academy, YouTube, Whitney Museum of American Art, BMW/MINI, New Museum, Van Alen Institute, and Public Art Norway. He is an Adjunct Professor at UCLA Architecture and Urban Design where he teaches urbanism courses.

Jeffrey enjoys writing and editing. He's the author of *Adaptation: Architecture, Technology and the City* (2012), and *World of Giving* (Lars Müller Publishers, 2010). For ten years he served as the Features Editor of Volume magazine and he's edited numerous publications about design, cities, and technology.

Mohamed Sharif, AIA, is an Assistant Adjunct Professor in the UCLA Department of Architecture and Urban Design and has served on the faculty since 2011. He teaches in the undergraduate design and technology seminar and studio series and the graduate design studio series, including the comprehensive integrative design sequence. Mohamed is currently the Director of the Undergraduate Program and was the Director of the Summer Programs from 2017-19. Mohamed has been a key member of Professor Hitoshi Abe's Arc DR3 initiative since its founding in the summer of 2019. A co-author of the overarching syllabus for the participating universities focused on architectural and urban design for disaster risk and resilience, Mohamed has helped to develop the thematic focus of Regenerative Urbanism. A host for the symposia associated with this global platform and chief editor of a forthcoming publication on its research outcomes, Mohamed worked closely with Professor Abe and his team of Yelena Pozdnyakova and Carlo Sturken on the texts framing the exhibition.

With over twenty-five years of professional experience, Mohamed has completed numerous award-winning projects in many sectors with Sharif, Lynch: Architecture, and previously with internationally recognized architecture practices. An active critic, Mohamed's essays and reviews have appeared in journals and periodicals, including 306090, a+u, arq, Constructs, JAE, and Log. A recent essay on the artist Soo Kim's work features in a catalog for a 2018 exhibition at the Getty Center, and another on the New York-based design practice SO-IL was published in the Japanese journal a+u in 2021. He served on the editorial board of arq (Cambridge University Press) from 2006 to 2016; and on the advisory board of the Los Angeles Forum for Architecture and Urban Design, serving as President from 2007 to 2009.

David Jiménez Iniesta is a Spanish architect and researcher. David was trained as an architect at ETSA Universidad de Alicante, Universidade Técnica de Lisboa, and Universidad de Alcalá de Henares and specialized in architecture communication after completing MaCA (Master in Architectural Communication) at ETSAM Universidad Politénica de Madrid.

Jimenez Iniesta's thesis A Lobotomy's Tale (with M.Angeles Peñalver) has been recognized in several architectural exhibitions and competitions such as ISARCH Awards, Archiprix, and the 16th International Architecture Exhibition La Biennale di Architettura di Venezia. Jimenez Iniesta combines his professional activity with teaching and academic research. David has taught at the Master's program of Architectural Communication at Escuela Técnica Superior de Arquitectura de Madrid and UCLA Architecture and Urban Design. As a curator and designer, Jimenez Iniesta has participated in Becoming, the Spanish Pavilion at the Venice Biennale of Architecture 2018, CO. and COCA'17 congress among others.

Kian Goh is an Associate Professor of Urban Planning at the University of California, Los Angeles, and Associate Faculty Director of the UCLA Luskin Institute on Inequality and Democracy. She researches urban ecological design, spatial politics, and social mobilization in the context of climate change and global urbanization. Dr. Goh's current research investigates the spatial politics of urban climate change responses, with fieldwork sites in cities in North America, Southeast Asia, and Europe. More broadly, her research interests include urban >

theory, urban design, environmental planning, and urban political ecology. As a professional architect, she co-founded design firm SUPER-INTERESTING! and has practiced with Weiss/Manfredi and MVRDV. She received a PhD in Urban and Environmental Planning from MIT, and a Master of Architecture from Yale University. Dr. Goh is the author of the book "*Form and Flow: The Spatial Politics of Urban Resilience and Climate Justice*" (MIT Press 2021).

Ali Mosleh is a Distinguished University Professor and Evelyn Knight Chair in Engineering at UCLA, where he is also the director of The B. John Garrick Institute for the Risk Sciences. Previously he was the Nicole J. Kim Eminent Professor of Engineering and Director of the Center for Risk and Reliability at the University of Maryland. He was elected to the US National Academy of Engineering in 2010 and is a Fellow of the Society for Risk Analysis, and the American Nuclear Society, recipient of several scientific achievement awards, and technical advisor to numerous national and international organizations. He conducts research on methods for risk and reliability analysis of complex systems and has made contributions in diverse fields of theory and application. He holds several patents and has authored over 600 publications.

Saeed Nozhati is currently a research scientist in Chubb and he was cooperating with the Institute as a Postdoctoral Research Scholar. He earned his Ph.D. in Civil Engineering from Colorado State University. He has an M.S. degree in Computational Sciences from Marquette University, Wisconsin and an M.S. in Civil Engineering from Sharif University of Technology, Iran. During his Ph.D., Dr. Nozhati developed a decision-making framework based on Approximate Dynamic Programming techniques to support policymakers to manage community recovery under disasters. He specializes in resilience/risk and loss analysis, dynamic optimization, natural hazards, and machine/reinforcement learning.

Miho Mazereeuw is an assistant professor of architecture and urbanism at MIT and is the founder of the Urban Risk Lab. Working on a large, territorial scale with an interest in public spaces and the urban experience, Mazereeuw is known for her work in disaster resilience.

Urban Risk Lab is a cross-disciplinary organization of researchers, designers, and decision-makers affiliated with MIT – operating at the intersection of risk and disaster, storms and earthquakes, floods and fires, ecology and infrastructure, research and action, addressing the most challenging aspects of contemporary urbanization. The Lab is a place to research and innovate on technologies, techniques, materials, processes, and systems to reduce risk. We develop methods to embed risk reduction and preparedness into the design of the regions, cities and everyday urban spaces to increase the resilience of local communities.

Henk Ovink was appointed in 2015 by the Dutch Cabinet as the first Special Envoy for International Water Affairs. As the Ambassador for Water, he is responsible for advocating water awareness around the world, building institutional capacity and coalitions amongst governments, multilateral organizations, private sector and NGO's, and initiating innovative approaches to address the world's stressing needs on water. "Worldwide, water is the number one global risk, the connecting challenge across the 2030 Agenda for Sustainable Development and our best opportunity for inclusive and comprehensive action!" Ovink is also Sherpa to the UN / World Bank High Level Panel on Water. Henk Ovink served on President Obama's Hurricane Sandy Rebuilding Task Force where he led the long term innovation, resilience and rebuilding efforts. He developed and led the 'Rebuild by Design' competition and initiated the National Disaster Resilience Competition. Before joining the Task Force Ovink was both Acting Director General of Spatial Planning and Water Affairs and Director National Spatial Planning for the Netherlands. Henk teaches at Harvard GSD, the London School of Economics and the University of Groningen. His book - written together with Jelte Boeijenga - "*Too Big. Rebuild by Design: A Transformative Approach to Climate Change*" explores his climate and water work for the Obama Administration. In January 2018 Henk Ovink was awarded for his 'transformative global water work' an honorary membership from the Royal Instítute of Engineers of the Netherlands. At the World Urban Forum in February 2020 Henk was awarded the IHS Urban Professional Award 2020.

Jeremy Alain Siegel has been working with Bjarke Ingels and BIG since the establishment of its New York office in 2010, and brings a focus on issues of urbanism, landscape, infrastructure, and climate change adaptation. Jeremy led the BIG team in its winning Big U proposal for the federal Rebuild by Design competition, and has led urban design of the subsequent East Side Coastal Resiliency project, BQ-Park proposal, and other complex infrastructure and planning efforts for a variety of clients. Jeremy is a Forefront Fellow with the Urban Design Forum, a 2017 Fellow with New Museum's IdeasCity, and lectures frequently on issues of resilient and sustainable design and planning. He has taught at Cornell University, the University of Pennsylvania, Parsons School of Constructed Environments, and the Pratt Institute.

Jeff Schlegelmilch is the Director for the National Center for Disaster Preparedness at Columbia University's Earth Institute. In this role he oversees the operations and strategic planning for the center. He also oversees projects related to the practice and policy of disaster preparedness. His areas of expertise includes public health preparedness, community resilience and the integration of private and public sector capabilities. Prior his role at Columbia, he was the Manager for the International and Non-Healthcare Business Sector for the Yale New Haven Health System Center for Emergency Preparedness and Disaster Response. He was also previously an epidemiologist and emergency planner for the Boston Pub Health Commission. >

Mr. Schlegelmilch has overseen numerous initiatives integrating emergency preparedness and response across government and non-government sectors. This includes leading a study to determine the requirements for a national operational epidemiological modelling process, developing and delivering a national training program focused on evacuation and sheltering of people with medical dependencies, and developing new models for community resilience with a focus on children. He is also a FEMA certified Master Exercise Practitioner and has been in a leadership role on numerous discussion and operations-based exercises, including one of the largest municipal bioterrorism response exercises ever conducted. He has advised leaders on preparedness systems and policy at various levels of government. He has published peer reviewed articles on topics ranging from the national funding streams for public health and medical preparedness, the integration of the private sector into disaster response, and improving the integration of complex analytical information into disaster operations. He has also been published as an Opinion Contributor by The Hill and Fortune and has been used as a subject matter expert for numerous media outlets.

Greg Kochanowski is a licensed architect, landscape architect, urbanist, and educator in the State of California, and is a Partner and Design Principal at GGA+ in Pasadena, and Founder of The Wild, a 501(c)(3) non-profit research lab focusing on the impacts of the climate crisis in urban environments. He has been practicing and teaching for over 25 years with projects spanning a wide array of scales, typologies, complexities, and disciplinary orientations. His work and research seek to holistically combine the techniques and strategies of architecture, landscape architecture, and urbanism to create unique, sustainable, forward thinking, equitable environments that build upon and enhance the specific qualities of a place. His research explores new initiatives and thinking around transdisciplinary design, with current work focusing on resilient environments that create synergies between natural systems, culture, infrastructure, and development.

Greg's work has been recognized and published nationally and internationally within all three disciplines – architecture, landscape, and urban design, exhibited in both the Venice and Rotterdam Biennales, as well as other venues, and has received recognition from prominent organizations including the Young Architects Forum Award from the Architectural League of New York, AIA, ASLA, and AIACC. He continues to lecture locally, nationally, and internationally on design and has led education sessions at both the ASLA and AIA National Conventions focusing on the Wildland Urban Interface, and the fire, flood, debris flow weather cycles experienced in Southern California on a recurring basis. This research seeks to engage these unique challenges of climate change within the West & Southwest United States, Australia, Central and South America, and globally. Most recently, he has published a book on the subject entitled "*The Wild*", which examines the physical, political, economic, and environmental impacts of climate change in Los Angeles. A new publication entitled "Wildlands in the Expanded Field" will be released by Routledge Press in 2023.

Aaron Gross is Los Angeles' Chief Resilience Officer and is charged with implementing Resilient LA, the City's robust resilience strategy. Most recently, Aaron served as Deputy Chief Sustainability Officer at the LA Department of Water and Power aiming to make LA a more efficient and sustainable City. Prior to that, he served as an International Trade Specialist and Port Liaison to Mayor Garcetti and has worked for three City Councilmembers, LA's City Attorney, and the Port of LA in various capacities from field work, to policy, to land use planning. Aaron earned degrees in Political Science, Social Work and Non-Profit Management.

Jack Cohen is a retired U.S. Forest Service Research fire scientist who has spent years determining how structures ignite during extreme wildfires. Jack served as Research Physical Scientist for the Missoula Fire Sciences Laboratory. He has been involved in wildland fire research since the early 1970s and has served at the U.S. Forest Service fire laboratories in Missoula, MT, Riverside, CA, and Macon, GA. He was a co-developer of the U.S. National Fire Danger Rating System and has contributed to the development of U.S. fire behavior prediction systems. At the Riverside Forest Fire Laboratory, he conducted research on live fuel fire behavior in southern California shrublands (chaparral) and also served operationally as a prescribed fire ignition supervisor and fire behavior analyst. For most of two decades, Jack focused his research on how wildland-urban fire disasters occur and how homes ignite during extreme wildfires. He was one of the principal scientists involved in the International Crown Fire Modeling Experiment, Northwest Territories, where he investigated the thermal characteristics of crown fires related to structure ignitions and fire spread. Jack currently focuses his research on the fire dynamics related to live shrub and tree canopy fire behavior (active crown fires) and continues a portion of his time revealing opportunities for preventing wildland-urban fire disasters.

Jeff Brown retired from his position as Director of the UC Berkeley - Central Sierra Field Research Stations where he was resident at the Sagehen Creek Field Station for 20 years. Sagehen, like the other sites, are research and teaching facilities of UC Berkeley and part of the broader UC-wide network of research and education sites, the UC Natural Reserve System. Sagehen was established in 1951 with the signing of a long-term special permit from the Tahoe National Forest within the 9,000-acre basin for research and teaching.Research activities are multi-disciplinary and onsite facilities are occupied year-round. Flora, fauna, and insects of the area have been well-studied, and there is substantial climate and hydrological data collected since the '50s. Jeff is an Experienced Director with a demonstrated history of working in the higher education industry. Strong professional skilled in Nonprofit Organizations, Environmental Awareness, Fundraising, Strategic Planning, and Research. Currently focused on addressing issues related to holistic approaches to managing the ecosystem function of Sierra Forests. He continues toVolunteer his time at Sagehen as Co-Director of the Sagehen Art Program.

Fumihiko Imamura finished his PhD study at Tohoku University, Japan in 1989. He was promoted to a full professor of Tohoku University in 2000 and now is a director of the International Research Institute of Disaster Science (IRIDeS) at Tohoku University since April 2014, and also is a professor of Tsunami Engineering. He is an expert on tsunami modeling for warning, mitigation planning and education/awareness. He has conducted several field surveys as leader for earthquakes and tsunamis damage investigation since the 1992 Nicaragua and Indonesia. And he is a secretary, international TIME-project (Tsunami Inundation Modeling Exchange) supported by IOC and IUGG Tsunami commission. He is a member of Science Council of Japan, Science member of the Central Disaster Management Council in Japan, and was the president of Japan Society for Natural Disaster Science in 2008-2011. After the 2011 Tohoku earthquake, He was a member of study group of the reconstruction design council in response to the 2011 Tohoku earthquake at cabinet office, and the committee for technical investigation on Countermeasures for Earthquakes and Tsunamis of the Central Disaster Management Council.

Osamu Murao is a professor at the International Research Institute of Disaster Science (IRIDeS) at Tohoku University, which was established in order to disseminate learning from the 2011 East Japan Earthquake and Tsunami Disaster, and the founder of the International Strategy for Disaster Mitigation Laboratory (ISDM). Together with collaborating organizations from many countries and with broad areas of specializations, the IRIDeS conducts world-leading research on natural disaster science and disaster mitigation. In order to be in charge of ISDM in Disaster Humanities and Social Science Division, Dr. Murao was transferred to IRIDeS from Faculty of Engineering, Information and Systems at the University of Tsukuba in April 2013. His current researches focus on post-disaster recovery process and urban design, and the relationship between physical environment (architecture and urban design) and disaster. To date, with research grants by Ministry of Education, Culture, Sports, Science and Technology of Japan, and other organizations, he has investigated the post-disaster recovery process for damaged areas in Taiwan, Turkey, Sri Lanka, Thailand, Indonesia, Peru, Philippines, and World Trade Center in New York, as well as the 2011 Great East Japan Earthquake. Particularly he kept tracking the recovery process of Chi-Chi Township since the 1999 Chi-Chi earthquake in Taiwan as a visiting researcher of National Taiwan University in 2005. Dr. Murao has been involved in some research projects about post-disaster urban recovery and disaster risk reduction in the world.

Elizabeth Maly is an Associate Professor at the International Research Institute of Disaster Science, Tohoku University, in Sendai Japan. With the theme of people-centered housing recovery, her research interests are community-based housing recovery and temporary, transitional and permanent housing provision within reconstruction–including policy, process and housing form–that support successful life recovery for disaster-affected people. Past and current research focuses on the experiences of people affected by disaster, and the roles of government and NGOs in the processes of housing reconstruction and resettlement after disasters in the U.S.A, Indonesia, Philippines, and Japan.

Yasuaki Onoda would be the most noted architectural planner in recent Japan. He became recognized in the field after his contribution to a masterpiece of contemporary architecture, Sendai Mediatheque by Toyo Ito in 2001. In 2003, he received AIJ(Architectural Institution of Japan) prize, which is a prestigious prize in the field of architecture in Japan, for Reihoku Community Hall Project with Hitoshi Abe. Since the Great East Japan Earthquake and Tsunami in 2011, he has been playing an important role as an organizer for reconstruction projects in disaster affected areas and contributed to realize some good architecture in a severe front line of reconstruction from the disaster, being part of Archiaid and received some important design awards. In Oct. 2018, Chinese version of his AIJ award book, "*Pre-Design Thinking of Architecture*" published by Wu-Nan Book Inc., Taipei. As chairman of the Architectural Planning Committee of the Architectural Institute of Japan, he is working to improve the architect selection in Japan and to promote pre-design as a bridge between architectural planning research and practice.

Renato D'Alençon is an Architect, graduated from the School of Architecture of the P. Universidad Católica de Chile, and M. Arch. graduated from Cornell University. He was awarded a Fulbright Grant from 2002 to 2004 to pursue his Master's, and a Deutscher Akademischer Austausch Dienst Grant to pursue a PhD Degree in the Technische Universität Berlin. He has taught Design Studios and Building Technology at Pontificia Universidad Católica de Chile in the areas of architectural design and building technology. He has been Guest Faculty at the University of Chile, Politecnico di Milano and Technische Universität Berlin. He currently works at Universidad Católica de Chile in research, teaching and as Academic Deputy Director.

His field of scholarly work includes environmental design and performance of buildings, area where he published the book "*Acondicionamientos*" (Ediciones ARQ, Santiago 2008) and several articles; the recovery and development of heritage building systems, an area which has published the book "*Eingewanderte Baumeister*" (DOM Publishers, Berlin 2014) and other publications product of his research in catastrophes management and heritage recovery (Reclaiming Heritage www.reclaimingheritage.org); and in the area of Circular Economy in Architecture, in which he leads the research group "RRR: Economía Circular en Arquitectura"

Roberto Moris is an architect of the Pontifical Catholic University of Chile, Master in City Design and Social Sciences of the London School of Economics, and Ph.D. student in Civil Engineering from the University of Granada. He is an expert on integrated planning, carrying capacity models, sustainability, and resilience. He has worked with the UNDP, World Bank, and IADB. He was Technical Secretary of the Cities and Territory Ministers Committee and National Director of Urban Projects at the Chilean Ministry of Housing and Urban Development. He was responsible for the creation of the first Urban Planning academic program in Chile and the founder of the Chilean Planners Network. He is a professor at the School of Architecture and the Institute of Urban and Territorial Studies. He was Principal Investigator of the National Research Center for Integrated Risk Management, Director of Cities Observatory UC, and the Plans and Urban Projects Program UC.

Montserrat Bonvehi-Rosich is a licensed Spanish architect and urban designer with an interest in living systems, climate, and soils in urban environments. Her ongoing project “The Landscape We Eat” seeks to unfold geomorphological, climatic, and infrastructural relationships in food systems. The work was launched as a performance in CA2M Contemporary Art museum in Madrid, exhibited in Milan’s EXPO 2015, and included different publications such as Food Atlas. She is currently teaching in the Department of Landscape Architecture at the Harvard University Graduate School of Design, where she was named 2017–2018 Daniel Urban Kiley Fellow. Previously she has taught both architecture and landscape architecture at the University of Virginia, as well as architecture and industrial design at Iowa State University and urban design at ETSAB-UPC Barcelona. Her designs, built and unbuilt, have received several awards and have been published in Detail, Plataforma Arquitectura, and Quaderns among others.

Seth Denizen is a writer, researcher, and design practitioner trained in landscape architecture and human geography. In 2019 Denizen completed a PhD at the University of California Berkeley in Geography, where his research investigated the vertical geopolitics of urban soil in Mexico City. In addition to his geographical work he has published widely on art and design with the Asia Art Archive, LEAP International Art Magazine of Contemporary China, Volume, and Fulcrum, among others. He is currently a member of the editorial board of *Scapegoat* Journal: Architecture/Landscape/Political Economy. Collaborations include scientific research on Hong Kong’s urban microbiome, as well as art exhibitions in the Blackwood Gallery (Toronto), The Kunsthal (Netherlands), and Para/Site Art Space (Hong Kong). He currently teaches landscape architecture at the Harvard University Graduate School of Design.

Christy Cheng is an Associate at the Office of Metropolitan Architecture in New York, where she is leading a number of cultural, institutional, and infrastructural projects including the recently completed Sotheby’s Headquarters galleries in New York; the recently awarded UIC Center for the Arts, the awarded Discovery Partners Institute Chicago Center for Education & Research in Chicago; and the Rebuild by Design Hoboken Implementation in New Jersey. Christy has worked with the artist Ai Weiwei’s architectural design firm, Fake Design, in Beijing. Christy has taught graduate-level architectural studios at Columbia University, Cornell University, Harvard University, and CCNY. In addition, Christy is a New York-based architect, writer, and editor. She received a Masters Degree from Harvard University GSD and a Bachelors Degree in English and Communications from the University of Pennsylvania.

Tei Carpenter is an architectural designer, educator and founder of Agency—Agency, an award-winning New York City-based architecture and design studio. Agency—Agency has been honored as a winner of the 2021 League Prize by the Architectural League of New York, the 2018 New Practices New York by the American Institute of Architects, featured as a Next Progressives by Architect Magazine, and included in Domus Magazine’s 2019 list of the Best 100 Architecture Firms. She has taught design studios and seminars at Columbia GSAPP, the University of Toronto, Rice University and Brown University.

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11 Universities around the Pacific Rim

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Facio, Ricardo. *Layalton Fire California 2020.* Photo. Flickr. August 15, 2020. https://www.flickr.com/photos/165415395@N07/50622941702. Public Domain.

ESTUDIO BRAVA, *LAnd Poster.* Courtesy of the Author.

Dass, Bob. *Wildfire in Redwood Valley, California.* Photo. Flickr. July 16, 2017. https://www.flickr.com/photos/54144402@N03/35993039635. Creative Commons License (CC BY 2.0), https://creativecommons.org/licenses/by/2.0/legalcode.

Buschmann, Peter. *The Woolsey Fire seen from Topanga, California.* Photo. Flickr. November 9, 2018. https://www.flickr.com/photos/140082569@N07/45923178512. Public Domain.

Stevens, Joshua. *August Complex.* Photo. NASA Earth Observatory. September 1, 2020. https://earthobservatory.nasa.gov/images/147215/california-continues-to-burn. Public Domain.

Andrade, Pamela. *Hurricane Sandy Aftermath - Howard Beach - 10/30/2012.* Photo. Flickr. October 31, 2012. https://www.flickr.com/photos/89158243@N02/8145585491. Creative Commons License (CC BY 2.0), https://creativecommons.org/licenses/by/2.0/legalcode.

Queensland State Archives. *Brisbane River with water hyacinth washed down in flood waters from the Bremer River.* Photo. Flickr. March 17, 1937. https://www.flickr.com/photos/60455048@N02/8743680778. Public Domain.

Stevens, Joshua. *Woolsey Fire Burn Scar Seen from Space. Photo. Nasa Earth Observatory.* November 25, 2018. https://www.flickr.com/photos/24662369@N07/45985801372. Creative Commons License (CC BY 2.0), https://creativecommons.org/licenses/by/2.0/legalcode.

Schlegelmilch, Jeff. *Getty Fire Burn Site.* Photo. Courtesy of the author. December 2019.

Mosleh, Ali. *ArcDR3 Guest Lecture: Why and How We Do Probabilistic Risk Assessment, xLab*, Youtube video screen capture, 30:39. October 16, 2020, https://www.youtube.com/watch?v=a_FDNdMrPWk&t=196s.

Lee, Ashley. *The Bay Bridge, taken on the day the skies were orange all day in San Francisco due to nearby fires.* Photo. Wikimedia Commons. September 9, 2020. https://commons.wikimedia.org/w/index.php?curid=95587707. Creative Commons License (CC BY SA-4.0), https://creativecommons.org/licenses/by-sa/4.0/legalcode.

Groza, Tomasz and Yiwen Song. *Debris Flow and Fire Cartography in Malibu.* 289 Tech Seminar “The Map is not the territory.” AUD UCLA.

Yang, Kaiwen and Guannan Wang. *Fire Cartographies.* The Map is not the territory. 289 Tech Seminar “The Map is not the territory.” AUD UCLA.

Gaba, Eric. *World map in English showing the tectonic plates boundaries with their movement vectors and selected hotspots.* Map. GSHHG Database. June 15, 2017. http://www.soest.hawaii.edu/pwessel/gshhg/index.html. Public Domain.

Hokusai, Katsushika. *The Great Wave off Kanagawa.* Painting, Wikimedia Commons. Metropolitan Museum of Art, online database: entry 45434. March 17, 2015. https://commons.wikimedia.org/wiki/File:Tsunami_by_hokusai_19th_century.jpg. Public Domain.

McCord, Dylan. *A Japanese home is seen adrift in the Pacific Ocean.* Photo. U.S. Navy. March 12, 2011. https://www.flickr.com/photos/47572167@N07/5530178976. Creative Commons License (CC BY 2.0), https://creativecommons.org/licenses/by/2.0/legalcode.

Mooney, Walter. *Collapsed Building.* Photo. U.S. Geological Survey. https://www.usgs.gov/media/images/collapsed-building-12. Public Domain.

Allen, Jesse and Robert Simmon. *Wildfire Scars Valparaíso, Chile.* Photo, Nasa Earth Observatory. May 4, 2014. https://earthobservatory.nasa.gov/images/83620/wildfire-scars-valparaiso-chile. Public Domain.

Government of Chile. *One of the affected hills of Valparaíso.* Photo. Wikimedia Commons. April 13, 2014. https://commons.wikimedia.org/wiki/File:Cerro_incendiado_en_Valpara%C3%ADso,_abril_de_2014.jpg. Creative Commons License (CC BY 3.0 CL), https://creativecommons.org/licenses/by/3.0/cl/legalcode.

Mooney, Walter. *100-Year Old Adobe Building Destroyed.* Photo. U.S. Geological Survey. March 14, 2010. https://www.flickr.com/photos/27784370@N05/4479274376. Public Domain.

Baan, Iwan. Photo. Copyright Iwan Baan.

Los Angeles Times. *Griffith Observatory near completion, bird’s-eye view facing south,* Los Angeles, 1935. Photo. University of California, Los Angeles Library, Department of Special Collections. https://digital.library.ucla.edu/catalog/ark:/21198/zz002cw6x5. Creative Commons License (CC BY 4.0), https://creativecommons.org/licenses/by/4.0/legalcode.

Baan, Iwan. Photo. Copyright Iwan Baan.

Iaba, Jeffrey. *Olmsted Bartholomew’s Plan for Greater Los Angeles (1930).* Map. Copyright Inaba Williams Architects, 2022.

Baan, Iwan. Photo. Copyright Iwan Baan.

Stevens, Joshua. *Hill and Woolsey Fires.* November 9, 2018. Photo. NASA Earth Observatory, https://earthobservatory.nasa.gov/images/144225/camp-fire-rages-in-california. Public Domain.
Wallace Idaho 1910 fire. Published 1915. U.S. Library of Congress Prints & Photographs Online Cataloghttps://commons.wikimedia.org/wiki/File:Wallace_Idaho_1910_fire.jpg.

U.S. Library of Congress Prints & Photographs Online. *Wallace Idaho 1910 fire.* Photo. Wikimedia Commons. 1915. https://commons.wikimedia.org/wiki/File:Wallace_Idaho_1910_fire.jpg. Public Domain.

Kochanowski, Greg. *ArcDR3 Guest Lecture by Greg Kochanowski, Middle Fork of the Kaweah River, Sequoia & Kings Canyon National Park.* xLab. Youtube video screen capture, 21:06. November 3, 2020. https://www.youtube.com/watch?v=s-JpyaRjMMY&t=4s.

Kochanowski, Greg. *‘Debris-Sheds,’* The Wild, 2020. Copyright Greg Kochanowski.

Thibideau, Mark. *Firefighter with drip torch on Algoma Prescribed Fire.* Photo. Pacific Southwest Forest Service. USDA. October 22, 2018. https://www.flickr.com/photos/39108150@N05/44847475864/. Creative Commons License (CC BY 2.0), https://creativecommons.org/licenses/by/2.0/legalcode.

Felix, Faerthen. *Washington DC visit.* Photo. Sagehen Forest Project. July 30, 2015. http://sagehenforest.blogspot.com/search?updated-max=2016-07-10T10:14:00-07:00&max-results=13&reverse-paginate=true.

Siguenza, Eddie. *California National Guard.* Photo. Flickr. July 13, 2017. https://www.flickr.com/photos/33252741@N08/35171663513. Creative Commons License (CC BY 2.0), https://creativecommons.org/licenses/by/2.0/legalcode.

Google Maps. 69 Bravo LaCoF Helipad. Map. March 10, 2022.

Felix, Faerthen. *Washington DC visit.* Photo. Sagehen Forest Project. July 30, 2015. Courtesy of the author.

Sturm, Tom. *Map of Pettaquamscutt Cove.* Photo. USFWS. July 2, 2014. https://www.flickr.com/photos/usfwsnortheast/14629242955/in/album-72157645675428243/. Public Domain.

Scheme sourced from the Rebuild by Design Book, p. 26-27. Published under a Creative Commons Attribution-NonCommercial license (CC BY-NC). https://rebuildbydesign.org/wp-content/uploads/2021/12/499.pdf.

Haga, Yuichiro. *IMG_1477.* Photo. Flickr. November 12, 2011. https://www.flickr.com/photos/77324941@N00/6362390601. Creative Commons License (CC BY 2.0), https://creativecommons.org/licenses/by/2.0/legalcode.

Schmaltz, Jeff. *NASA Satellite View of Northeastern Japan on March 13, 2011.* Photo, Flickr, March 13, 2011, https://www.flickr.com/photos/24662369@N07/5523171908. Creative Commons License (CC BY 2.0), https://creativecommons.org/licenses/by/2.0/legalcode.

Maly, Elizabeth. *Massive manipulation of the landscape for the recovery plan of Rikuzentakata.* Photo. July 2016. Courtesy of the Author.

Tokyo University Library. *Shin Yoshiwara ōnamazu yurai or "The cause of the great catfish at Shin Yoshiwara,"* namazu-e ni miru Edo Meiji no saigai joho - Ishimoto collection kara. Edo - 1855, https://en.wikipedia.org/wiki/Namazu#/media/File:Namazu-e.jpg. Public Domain.

THE BIG U. Image sourced from the Rebuild by Design Book, p.74. Image courtesy of BIG. http://www.rebuildbydesign.org/resources/book.

Bisker, Josh, Amy Chester, and Tara Eisenberg, eds. Photo, Rebuild By Design, June 2015, https://rebuildbydesign.org/wp-content/uploads/2021/12/499.pdf. Creative Commons License (CC BY-NC 2.0). https://creativecommons.org/licenses/by-nc/2.0/legalcode.

The BIG U. *Mapping of New York's Urban Core.* Image courtesy of BIG. https://rebuildbydesign.org/wp-content/uploads/2021/12/499.pdf In Bisker, Josh, Amy Chester, and Tara Eisenberg, eds. Photo, Rebuild By Design. American Printing Co, 2015, https://rebuildbydesign.org/wp-content/uploads/2021/12/499.pdf. Creative Commons License (CC BY-NC 2.0). https://creativecommons.org/licenses/by-nc/2.0/legalcode.

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Bisker, Josh, Amy Chester, and Tara Eisenberg, eds. Photo, Rebuild By Design, June 2015, https://rebuildbydesign.org/wp-content/uploads/2021/12/499.pdf. Creative Commons License (CC BY-NC 2.0). https://creativecommons.org/licenses/by-nc/2.0/legalcode.

HUD Rebuild by Design. Competition Axonometric. OMA. 2013 https://www.oma.com/projects/hud-rebuild-by-design.

Coffey, Ed. *Sonoma County.* Photo. U.S. Army Corps of Engineers. November 7, 2017. https://www.flickr.com/photos/30539067@N04/50186383847. Creative Commons License (CC BY-NC 2.0). https://creativecommons.org/licenses/by-nc/2.0/legalcode.

Google Maps. *Santa Rosa.* Map, February 15, 2021.

The Right to Sewage: Agriculture, climate change, and the growing need for cities to embrace wastewater reuse. Course by Montserrat Bonvehi Rosich and Seth Denizen at GSD Harvard. September 2020. https://www.gsd.harvard.edu/2020/09/the-right-to-sewage-agriculture-climate-change-and-the-growing-need-for-cities-to-embrace-wastewater-reuse/.

So, Olivia. *Mezquital Valley Map.* Map. Research for The Right to Sewage course by Monteserrat Bonvehi Rosich and Seth Denizen at Harvard GSD. February 20, 2021. https://research.gsd.harvard.edu/mci/gsd-professors-and-students-propose-new-visions-for-wastewater-equity-in-the-mezquital-valley/.

Bonvehi-Rosich, Montserrat and Seth Denizen. *Mezquital Valley.* Photo.

Denizen, Seth. Photo, 2019.

Female Mountain Lion in Verdugos. Photo, Santa Monica Mountains National Recreation Area, July 10, 2016, https://www.flickr.com/photos/santamonicamtns/29991903353/. Public Domain.

Brearley, Jonathon, Chu, Cyrus, Johnsen, Lenna, Gibson, Emily Lo, Matthai, Charlotte, McCoy, Sarabrent and Yaara Yacoby. *"Where there is smoke..."* A cooperative gave for Miho Mazereeuw's seminar. MIT Urban Design Studio. Image courtesy of the author.

Mazereeuw, Miho, David Moses, Justin Lavallee, Aditya Barve, and Saeko Nomura Baird. *PREPHubs.* Urban Risk Lab, MIT. https://urbanrisklab.org/work#/prephub/. Image courtesy of the author.

Carpenter, Tei, Arianna Deane and Ashley Kuo (Agency—Agency). *7017: 5,000-Year Geologic Axonometric Projection.* Rendering. Testbed. 2017. https://www.archoutloud.com/testbed.html. Copyright Agency—Agency.

Parking Lot reimagined. Drawing. Agency—Agency. Image courtesy of the author.

Parking Lot reimagined. Rendering. Agency—Agency. Image courtesy of the author.

Carpenter, Tei, Chris Woebken, Arianna Deane, Ashley Kuo and Zeynep Ugur. *New public hydrant in collaboration with Chris Woebken.* Rendering. 2018. Image courtesy of the author.

Cunningham, Dusti. *2017 Los Angeles Congress of Neighborhoods.* Photo. Flickr. September 9, 2017. https://www.flickr.com/photos/152329926@N03/37333388742. Public Domain.

Housman, Crystal. *California National Guard.* Photo. Flickr. March 29, 2020. https://www.flickr.com/photos/33252741@N08/49717449243. Creative Commons License (CC BY-NC 2.0). https://creativecommons.org/licenses/by-nc/2.0/legalcode.

Oberstein, Jeremy. *Los Angeles Fire Department LAFD Graduation 14-2.* Photo. Flickr. August 20, 2015. https://www.flickr.com/photos/90807129@N00/20123595594. Creative Commons License (CC BY-NC 2.0). https://creativecommons.org/licenses/by-nc/2.0/legalcode.

Office of Mayor Garcetti. *Resilient Los Angeles.* Figure. March 2018. https://www.lamayor.org/Resilience. Public Domain.


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