Climate Change: The Rise and Ramifications of Mass Migration

(Image Sources: NC State University & KPBS)

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INTRODUCTION

The Anthropocene is being experienced around the world through an increase in hazardous climate change events such as coastal flooding, erosion, and wildfires. With these great events individuals, businesses, and communities are being displaced and left to independently seek out migration to a new community. For those that cannot afford to move from their homes, their only option is to rebuild and plan resilience for future hazardous events, which is also a costly endeavor.

Today, nearly 40 percent of the American population lives in counties along the coast and are at-risk for erosion and flooding (Nation Oceanic and Atmospheric Administration [NOAA], 2018). In 2010, it was estimated that one third of the United States population was living in an area at risk for wildfires, putting their homes, properties, and lives in peril (Martinuzzi et al. 2015). While these are natural processes that have always existed on our planet, these processes have intensified due to human activity and behavior contributing to climate change. Communities, people, and properties will not only face mitigation issues and possible relocation, but socioeconomic concerns as well, creating greater inequalities in the nation's population.

Climate migration is a response to climate change, displacing homes and entire communities. With climate migration there is an expectation that there will be an increase in climate gentrification. The Environmental Law Institute describes climate gentrification as, “the process of wealthier, often whiter populations moving to areas less exposed to the effects of climate change that were previously occupied by lower-income residents and communities of color, thus exacerbating displacement and disparities.” In order to be resilient in remediating climate gentrification the subject must be understood. It's estimated that Americans earning more than $100,000 annually will financially have the ability to mitigate their homes or migrate from them due to climate change in coastal areas (Martel, 2017). Mitigation and resilience planning will be an option for low-risk communities where updates on foundations will be required for residential and commercial buildings. High risk areas will face more impactful planning such as migration and moving entire communities.

The fear that low-income and at-risk communities have of climate change is that if one cannot afford to buy their way into safety, they will remain living in an at-risk area, furthering the degree of inequality (Walsh, 2019). The list of stakeholders could run on, but the most prominent ones are at-risk communities, environmental justice advocates and groups, and city planning agencies. Planning has proven to be difficult because the measure and magnitude of climate change does not have a definite forecast as to the rate and degree and varies from coast to coast, and city to city. What is becoming apparent is that communities need to be assessed for resilience and a plan needs to be put in place for possible devastation of land, homes, and businesses.

Sea Level Rise & Erosion

Throughout human history, settlements and cities have been set up along bodies of water to allow access to ports which are necessary for the shipping and receiving of goods. The efficiency of living in a city along a coast quickly became apparent. Today, many large cities within the United States can be found along a body of water, including the world's 17th largest container port in Los Angeles, CA (World Shipping Council, 2020). Ports satisfy the needs of transportation, job creation, and trade needed in order to sustain a large population. Additionally, living in a coastal area has diverse tourism attractions, recreational opportunities, and industrial opportunities such as offshore energy and aquaculture. Today, nearly 40 percent of the American population lives in counties along the coast (NOAA, 2018). The population varies from working class to high-earning individuals and families, settling for individual reasons and purposes. There are 160 million people in the US living near the coast that are, or will be, affected by sea level rise (National Aeronautics and Space Administration [NASA], 2020) and 91 cities are facing 26 times more tidal flooding per year (Union of Concerned Scientists United States America [UCSUSA], 2017). People and properties are directly affected and will not only face mitigation issues, possible relocation, but socioeconomic concerns as well. Mitigation practices include but are not limited to building seawalls and enhancing foundations of structures.

Sea level rise is caused by the warming of Earth by greenhouse gases and emissions. The oceans absorb the energy in the form of heat. Sea levels then rise due to glaciers and ice sheets melting into the ocean, whereas they were located on land before. Water will also rise due to thermal expansion (NASA, 2020). It's currently estimated that sea levels are rising an average of 3.3 millimeters per year, or in other terms, 42 trillion cubic feet of water a year (NASA, 2020). While sea levels are rising, the rate at which they are rising is not at a logarithmic rate but exponentially, meaning very rapidly.

A problem closely related to sea level rise is high tide flooding. High tide flooding is an extremely high tide turned hazardous, often seen during king tides, a higher-than-normal high tide that happens around four times a year. These especially high tides affect public and residential areas by extending beyond the average threshold of the tides. High tide flooding is predicted to be intensified by sea level rise over the century, becoming more noticeable, more frequent, and with an increase in severity (NOAA, 2018). The effects that high tide flooding has on the human population varies. Communities see submerged roads with forced closure, swamped infrastructure that demands businesses close, and flooded homes inundating residents with clean up. Due to the issues that high tide flooding causes, this event is also referred to as nuisance flooding (NOAA, 2018).

Coastal erosion is part of the natural system but due to climate change, coastal erosion is increasing in degree. Storms and tides are breaking down sediment along the coasts at a rapid rate. With the rising sea level and tides, an increase in intensity of storms and flooding, the sediments and structures along the coasts are breaking down at an alarming rate. In the winter of 2009-2010, Ocean Beach in San Francisco experienced 55 meters of erosion along their shoreline during an El Nino winter (United States Geological Survey [USGS], N.D.). Coastal erosion is due mostly to the impacts of waves and is seen more heavily during El Nino years versus La Nina years. Sea level rise leads to high-energy waves which are what cause sand movement, coastal erosion, and water to extend further onto the beach (Sweet, et al. 2018). Communities make short-term attempts at remediating erosion with seawalls, groins, jetties, etc. but this causes issues further down the road leading cities budgets to be drained with constant repair and upkeep of these human engineered systems.

Wildfires

Wildfire prone areas, sometimes referred to as wildland-urban interface, are home to about 99 million people (Martinuzzi et al. 2015). California WUI's are home to the highest population, with Texas and Florida following. Western and southeastern states are the highest wild-fire risk areas (Martinuzzi et al. 2015). Below, Figure 1 labels each of the contiguous United States with the number (in millions) of homes located in WUI areas with the seasonal homes noted in parenthesis. The darker states reflect a higher percentage of the population located in WUIs (Alvarez, N.D.).

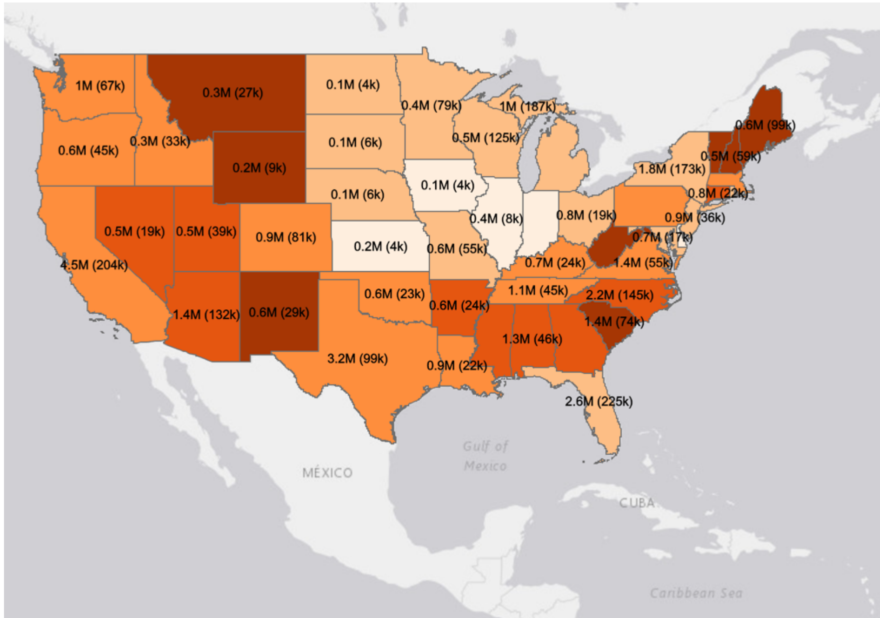

FIGURE 1: Homes and seasonal homes located in wildland-urban interfaces putting them at risk for wildfires (Martinuzzi et al. 2015)

The number of wildfires has increased over time from human-induced climate change. The numbers have been perplexing to experts who reported that more than five million acres have burned from January 2020 to September 2020 (National Geographic, 2020). The factors creating greater risk, and expanding the risk areas, are poor land management policies, increase in human population in rural areas, and uninformed forest management practices.

POLICY CONTEXT

Climate change has been a debated topic in Congress for nearly 30 years. In 1992, then President George H.W. Bush signed the United Nations Framework Convention on Climate Change with the hopes of America becoming a trailblazer in defending the world's environmental health (Center for Climate and Energy Solutions [C2ES], 2020). Without this initial action the following bills and policies aimed to remediate and assist during the unforeseen challenges of climate change would not exist. The three current policies being reviewed are SB 901 which directly cites wildfire remediation, California Coastal Act, and a case study on Marina, CA's Local Coastal Program.

SB 901

Senate Bill 901 was introduced in the Senate January 2018 and passed September 2018 (source). An attempt to mitigate the effects of wildfires, this bill has laid groundwork for financial responsibilities in the event of a wildfire. Here, landowner's freedom to practice controlled burns is increased, and even incentivized to remove dead trees and any other possible burning fuel. PG&E monetary support was re-negotiated given them the support to pass along cost of wildfire cause to customers, and insisted insurers provide coverage for related mud and landslides (KQED).

California Coastal Act

The California Coastal Act was instated in 1976 and revisions have been proposed for 2019. This policy outlines coastal development. In Chapter 3, article 6 it is defined that no structural changes be made to the natural geology of the coast when developing (California Coastal Commission, N.D.). What is does not clarify is the future need for seawall and retention wall building due to rising sea levels and the erosion they cause. While this policy is an attempt to mitigate coastal issues related to climate change, it is a policy that needs to be updated to cover increased concerns.

Marina, CA: Policy Case Study on the Local Coastal Program

Marina, CA has attempted to keep their coastline as natural as possible, sandwiched between Moss Landing to the north that is home to a coastal power plant, and to the south is Monterey where cruise ships can be seen docking along the bay. The city of Marina is experiencing some of the highest rates of erosion in California. Marina's mayor prides himself on the very natural elements of the sand dunes and the uninterrupted views. In Marina, they have local policies and requirements for "managed retreat." The city is working with the local private resort in order to aid in moving it from its current oceanfront property, aiding in moving other infrastructures away from the coast, and require real estate disclosures for sea level rise. About twenty years ago the community supported a petition to create an "urban growth boundary" (Xia, 2020). The city of Marina is doing this with a grant awarded to them by the California Coastal Commission, a California Natural Resource Agency that oversees land use and public access of the California coast (Xia, 2020). The city released an Existing Conditions and Sea Level Rise Issues Report in September 2019. This is a detailed 101-page paper laying out vulnerabilities, sea level rise expectations, and various planning scenarios.

STAKEHOLDERS

Climate change will affect every person on the planet, albeit some more than others. With all of us being affected, the major stakeholders are at-risk communities, environmental justice groups, and city planning agencies. At-risk communities include communities directly affected by sea-level rise and wildfires along with communities that will be migrated to, environmental justice groups concerned for the at-risk communities and the disparity that climate change may cause, and city planning agencies as they seek to build and plan their communities accordingly. In Figure 2, the stakeholder groups are listed with their defined values, concerns, and contributions.

Stakeholder Group	Representative Examples	Stakeholder Value Typology	What does the stakeholder value or contribute?	What are the concerns of the stakeholder?
At-Risk Communities facing disaster, and communities that will be relocated to	• Miami • San Francisco • Los Angeles	• Humanistic • Moralistic	• Their homes, communities, and businesses	• Loss of their community • Gentrification
Environmental Justice Advocates & Groups	• Arc Ecology	• Humanistic • Moralistic	• Protection of low-income communities being "gentrified" • Ensuring community member's voices are heard in resilience planning and development	• Cleaning up environmental issues within a community typically pushed out the low-income, long-term families and community members
City Planning Agencies	• City of Marina, CA	• Humanistic • Moralistic • Utilitarian	• Long-term community health • Community investment	• Climate change; sea level rise, erosion, and wildfires

FIGURE 2: Stakeholder table

At-Risk Communities

There are close to 160 million Americans that live along the coastline (NOAA, 2018), that are expected to be affected by sea-level rise, coastal flooding, and coastal erosion. Communities along the coast are all stakeholders in climate change and sea-level rise and erosion. Along with 99 million people that are living in areas prone to wildfires (Martinuzzi et al. 2015). These communities' members are at risk of losing their homes, their communities, and their land. The populations along the coast will eventually be forced to move more inland as property is damaged and consumed by the seas. Wildfire victims will move to adjacent communities, further away from the threat. There are few options against these dangers, including a costly updating of infrastructures to withstand erosion and flooding. If one can afford to move away from their home there are concerns for the established, neighboring communities.

A case study for close-by communities that will be affected by local migration can be seen in Los Angeles. According to Zillow, home values in the East L.A. neighborhood have risen 10.7% in the last year and are expected to rise another 8.5% in another year. Los Angeles has a rich history, a source of wondrous natural resources that indigenous tribes and people cultivated that were eventually demanded by European settlers. In the early 1900s much of the non-white population was pushed to the east side of the river while the city saw rapid growth (Benitez, 2004). East L.A. was home to many working-class individuals as the area was merely a place to pass through. The location of East L.A. has made it a place for migration from west side residents interested in investing in properties that will not see sea-rise damage and hazards.

Environmental Justice Groups

Nonprofit groups are actively fighting for the rights of communities experiencing gentrification working towards preserving the culture of the communities, fighting against displacement, and supporting the health of the community. According to the Proceedings of the National Academy of Sciences of the United States of America (2019), low-income communities, people of color, and migrant communities are the groups most likely to experience residential and social displacement. There are many non-profit groups, Cities for People, for example that are anti-gentrification and are “cities for people, not for profit” in hopes that their work will help from exploiting land and communities. The environmental justice groups hold moralistic and humanistic values.

City Planning Agencies

Many studies agree that “greening” a city, and the smart growth movement is expensive, considerably upscale, and drives residents out (Waldholz, 2011). City development plans often have goals requiring a set amount of affordable housing, job training, and even community involvement in the planning process. Whatever the case, growth and development within a community often moves the long-term and low-income residents out. With communities along the coast moving inland and away from climate change induced hazards, low income communities are expected to experience population growth and an increase in community development. A current example of this happening in real time can be found in Florida’s Little Haiti neighborhood that sits higher and further from the coastline in Miami. City planning agencies will play a prominent role in the actions taken to preserve their cities whether it be through resilience planning, or growth and development.

POLICY OPTIONS

A few highlighted policy options have been chosen and summarized in Table 1. The policies are covered more in depth in the following sections, with a conclusory recommendation. The policies fall within specific criteria: alleviating impacts on threatened communities, preventing displacement of low-income members in the communities being migrated to, ensuring that there is not an increase in economic disparities, and preventing sea-level rise and wildfires.

Policy 1: A Green New Deal & President Elect Biden Harris Administration

The Green New Deal encompasses all aspects of living on a habitable planet including poverty and inequality. According to The New York Times and the Green New Deal's political supporters, this plan is "the way to avoid planetary destruction." (Friedman, 2019) In an attempt to address climate change, this plan, not law binding if passed, would work to sequester greenhouse gas emissions and fix racial and economic injustices. This would translate to communities that are seeing an increase in population from climate migration. This resolution, H.RES.109 immediately addresses concern over sea level rise and an increase in wildfires. This resolution will support net-zero emissions by 2050 and repair and update United States infrastructure. A possible addition to this plan comes from President-elect Joe Biden who would budget 40 percent of climate funds to go towards supporting disadvantaged communities with a community-driven approach that will guide low-income communities and communities of color experiencing unequitable amounts of environmental injustices.

Policy 2: H. RES 112

H. RES 112, introduced by Representative Francis Rooney of Florida, is specific to Florida and signals the urgency of actions towards sea level rise and flooding mitigation. The resolution is fully known as Expressing the sense of the House of Representatives that sea level rise and flooding are of urgent concern impacting Florida that require proactive measures for community planning and the State's tourism-based economy to adapt. Florida already has a great deal of research supporting sea level rise and the increased expenses of repairs after king tides and storm surges. The resolution lists sensitive areas within Florida that are already in jeopardy or soon will be. This resolution is currently the most closely identifiable attempt to alleviate the possible social and economic effects of climate change on low-income communities.

Policy 3: H.R. 5552

On April 18, 2018 the 115th congress introduced the bill "Climate Change is Real Act" which would require the Environmental Protection Agency to reinstate the climate change information and data that was removed from the EPA's website beginning January 20, 2017 (H.R. 5552, 2018). This bill has only been introduced and no other action has yet been taken. It would also require the EPA website to continuously update information on climate change, specifically:

1. Information acknowledging the impact of human activities on climate and the planet
2. Link to materials that assist local governments in preparing for rising temperatures and more severe storms and weather conditions

3. Detailed information and descriptions of climate change risks

Approach: Human-Centered Design

A management and consulting agency based in Canada, known as William Sale Partnership (WSP), is providing for the built and natural environments (Power & Tyrpenou, 2020). Their vision on community and environmental design is the basis for the proposed third policy outline, "Human-centered design approach to recovery and ongoing risk reduction is inclusive, accessible, and participatory" (Power & Tyrpenou, 2020). This would be a movement to include the community voices in relationship with community builders. It is up to WSP to develop according to local, state, and federal policies while innovating in radically sustainable and community driven ways. Social Strategist and Designer for WSP recommends starting "with people and place, not the infrastructure itself, in order to drive social outcomes." In the event that communities are forced to migrate out, it's estimated that the neighboring and adjacent areas will see a population increase and possible gentrification in the process of increased development. This plan would not address climate-change specific areas but would take into consideration sustainability, green infrastructure and spaces, which would lead to healthy environments and ecosystems.

RECOMMENDATION

There are few policies that aid in remediating impacts from environmental hazards where homes are being lost due to coastal erosion and wildfires. All the proposed policies were required to meet the criteria listed in Figure 3 below, alleviate impacts on threatened communities, prevent displacement of low-income communities and communities of color, eliminate an increase in economic disparities, prevent sea level rise, erosion, and wildfires. In Figure 1, the three policies and proposed approach are given a – for weakness, and + for strength in addresses each criterion. The approach option was added as an emphasis to that policies to underline the fact that it will take ethical, moral, and innovative planning in order to guarantee strong committees. The policies will set the groundwork, but the approach will be how to caringly carry out the policies.

After reviewing the three policies, and keeping the WSP approach in mind, my recommendation is Policy Option 3 to begin alleviating the issues and concerns discussed above. The reason that Policy 3, H.R. 5552 is the best option is because this policy admits that there is a problem. With the support from the Environmental Protection Agency, a branch of the federal government, more states, businesses, and individuals will begin to accept climate change as fact. Once climate change is is accepted as a national, and global issue, recommendations can begin which will help to alleviate the rising sea levels and increased wildfires.

Criteria	Policy Option 1: Green New Deal	Policy Option 2: H. Res. 112	Policy Option 3: H.R. 5552	Approach: WSP Human Centered Design
Alleviate impact on the threatened communities	---	+++	+/-	+++
Prevent displacement of low-income communities, and communities of color	+/-	+++	+/-	+++
Eliminate increase in economic disparities	+/-	+++	+/-	+++
Prevent sea level rise, erosion, wildfires	+++	---	+/-	---

FIGURE 3: Policy criteria

CONCLUSION

With climate change increasing at an exponential rate, and countries like the United States removing themselves from worldwide agreements such as the Paris Agreement which seeks to mitigate climate change, we can only expect to see worsening hazards induced by humans. Climate change will create a new world and reality, where individuals and entire communities are forced from their homes, relocating their residence to considerably safer areas. For those with the opportunity to migrate away from hazardous areas experiencing coastal erosion, flooding, and wildfires, they will populate nearby and adjacent communities. For those that are unable to move from their current residences, the nation will see an increase in economic disparities.

The first step in addressing migration and gentrification of climate change is to first recognize it for the significant problem that it is. It's too late to reverse the effects of climate change, and communities will need to brace for the impacts ahead in hopes that there will be a decrease in the future. With the intensifying sea level rise, flooding, and wildfires the nation is experiencing, we will begin to see a developing degree of inequalities as community members quickly try to find their own personal solutions through strengthening infrastructure, moving away, or simply bracing for impact.

Few policies have attempted to mitigate climate change. Only 23 states, and D.C., have specific greenhouse gas reduction targets, and 32 states have released, revised, or are developing a climate action plan. Not one policy has yet been able to grasp the entirety of the issue of migrating out of an at-risk area and populating an area unprepared for a population boom and dividing families even more based on their economic status. Resilience does not only come in the form of protecting against natural hazards but also in the hazardous disparities that humans cause one another. Until the federal government and Environmental Protection Agency recognizes climate change as an issue, independent actions by states, cities, and individuals will be taken. What is needed is collective action on a national and global scale in order to understand the phenomena of climate change and how to best plan for resilience and manage retreat.

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