

MOLOKAI PLANNING COMMISSION
REGULAR MINUTES
JANUARY 8, 2020

A. CALL TO ORDER

The regular meeting of the Molokai Planning Commission was called to order by Chairperson Lori Buchanan at approximately 11:08 a.m., Wednesday, January 8, 2020, at Mitchell Pauole Center, 90 Ainoa Street, Kaunakakai, Island of Molokai.

A quorum of the Commission was present. (See Record of Attendance.)

Chair Buchanan: Aloha everyone. Welcome to the January 8, 2020 meeting of the Molokai Planning Commission. I wanna welcome everyone, and I see some people from the community. Thank you for coming. Right up in the front row, we are going to take public testimony on any planning agenda item. If you have to leave, this would be an opportunity to testify and -- but we do ask if you can wait for the agenda item to come up, that would be better, and it's really open to any other meeting, community issue on planning. So if you can, come up and state your name for the record, and I will say, before we move on, we do have one item before our workshop presentation on climate change, and at that time, it's going to be a public -- I mean it's going to be a workshop for the Commission so we're not going to be taking any questions or public testimony on the workshop itself, but I do believe Dr. Fletcher has agreed to stay after and to answer any questions that the community might have off the record. So, with that, we are on agenda item B, Public Testimony, so anyone wishing to testify at this time, please come up and state your name for the record. Aunt Judy, you wanted to testify at this time? No? No? Cora? Okay. Otherwise, I try bring the mike over there for you.

B. PUBLIC TESTIMONY - At the discretion of the Chair, public testimony may also be taken when each agenda item is discussed, except for contested cases under Chapter 91, HRS. Individuals who cannot be present when the agenda item is discussed may testify at the beginning of the meeting instead and will not be allowed to testify again when the agenda item is discussed unless new or additional information will be offered. **Testimony will be limited to a maximum of three (3) minutes, with 30 seconds to conclude.**

Ms. Schnackenberg: Good morning. My name is Cora Schnackenberg, and after viewing the agenda part, I only have one question. I do support the -- the renovation of this request, my only question I had, might not be relevant but it was relevant to me, was the elevation of this home, and I'm not -- I didn't see it in here with the mapping, that was the only question but I do support this renovation permit.

Chair Buchanan: Thank you, Cora. Commissioners, any questions for the testifier? Seeing none, thank you very much, Cora. Anyone else in the public wishing to testify on the public testimony, on item B, please come up, state your name for the record? And again, if you're here to testify on item C, and you can wait, then that would be great. Okay, if no one else wishes to testify under item B, then I'm going to close public testimony, and we're going to move right into item C:

Chair Buchanan read the following agenda item description into the record:

C. WAIVER OR NON-WAIVER OF SPECIAL MANAGEMENT AREA (SMA) ASSESSMENT REVIEW

- 1. MS. MICHELE MCLEAN, Planning Director, notifying the Commission pursuant to the provisions of Section 12-302-13.1(a) of the Molokai Planning Commission’s Special Management Area Rules that the following proposed action located within the Special Management Area is not a “development” and therefore exempt from the requirements of the Molokai Planning Commission’s Special Management Area Rules:**

- a. MR. RAYMOND TENSFELDT, on behalf of MS. MICHELLE M. SMITH, requesting to replace roofing, install new 4’ tall chain link fence with 2 access gates along three sides of the property, and remove non-load bearing partition wall between kitchen and living room, located at 28 Lamaloa Place, Ranch Camp Subdivision, Kaunakakai, Molokai, TMK (2) 5-3-010:151 (SMX 2019/0484) (Valuation: \$10,000) (S. Lopez)**

The Commission may act to waive or not waive its review or defer. If the Commission votes to not waive its review, it may review the subject SMA assessment and act to approve or disapprove a SMA exemption, or defer.

Chair Buchanan: Planner Sybil?

Ms. Lopez: Thank you, Chair. Thank you, Commissioners. I’m Sybil Lopez, the project planner on this SMA application that is in front of you today requesting to waive the review for this exemption, and this property is located in the Ranch Camp Subdivision, in the Flood Zone X, it is in SMA and that is why it is before you today. And, I do have the applicant here today, Mr. Raymond Tensfeldt, if you have any questions, and if he wants to come up and say any additional information and more than what I am sharing with you today, but you do have a packet that was sent to you with the information provided, and the detailed work description, which the -- doing some reroofing, installing the chain link fence especially that he actually has dogs and wants to kinda detain the dogs within -- contain the dogs within the fenced area, and do some interior work. Thank you, Chair.

Chair Buchanan: Thank you, Sybil. And, just for the record, we not altering any of the footprint, original footprint of the -- and for height or nothing like that? It’s just the wall, the roof, and the fencing, yeah?

Ms. Lopez: Yeah.

Chair Buchanan: Okay.

Ms. Lopez: So, there's no expansion or any additional to what is already existing.

Chair Buchanan: Okay, thank you very much.

Ms. Lopez: You welcome. And -- and -- oh, I'm sorry.

Chair Buchanan: Go ahead.

Ms. Lopez: Thank you.

Chair Buchanan: Go ahead.

Ms. Lopez: I'm good. Thank you.

Chair Buchanan: Okay. Thank you, Planner Sybil. So, at this time, Commissioners, maybe we go open up for public testimony, and then if you guys get questions for staff after that? Okay, I going do that. On agenda item C.1.a., we'd like to open up for public testimony at this time. Anyone in the public wishing to testify on agenda item C.1.a., please come up and state your name for the record.

Ms. Lindo: Hi. My name is Zhantell Lindo, I'm the Council Aid for Molokai, and I coming in my capacity as the Council Aid. I just wanted to stand up in support of Mr. Tensfeldt and I -- I tell you why. He's been very faithful to go through the process even though he firmly disagrees on plenty of the ways that we deal with SMA. He's adamant about coming to our office on numerous occasions to help change policy within the Department and the -- the County to looking at ways that we can better set guidelines so that it makes it easier for the Commission and I think these are the kinds of model citizens that we looking for, the kinds that disagree completely with the policies they have but our law-abiding citizens that wanna do that and it's a really refreshing change from those guys who just going doing 'em and then come over here and say, eh, you know what? I never like your rules and so I don't wanna follow 'em. But, I just wanna speak on behalf of our office with out our Council Member's just thank appreciation for Mr. Tensfeldt's pushing forward with looking at our SMA boundary guidelines and -- and we just really applaud him for sticking to the policy even when he is adamantly against it, so thank you.

Chair Buchanan: Thank you, Zhantell. Commissioners, any questions for the testifier? Seeing none, is anyone else in the publish wishing to testify on this agenda item?

Ms. Schnackenberg: ...(inaudible - not speaking into the microphone)...

Chair Buchanan: If -- if you have new information? Okay. Thank you. Okay, if there's no one else wishing to testify on this agenda item, then I will close public testimony at this time. Commissioners, you guys have any questions for staff? Okay, we have no -- but thank you. On the record, I already asked you about elevation so it's not changed, it's everything is the same, and we just doing those improvements, so that's on the record. Thank you very much. That was my only question that I wanted to get on the record, and so, Commissioners, if there's no questions, then the floor is open for a motion on the agenda item.

Mr. Sprinzel: Propose we waive. This is one of those occasions which is exactly fills the reason why we put that clause in in the first place.

Chair Buchanan: Thank you, Commissioner Sprinzel.

Mr. Pele: I second it.

Chair Buchanan: Commission Pele second. Then I will call for the vote. All those in favor to waive, please raise your right hand. Okay, unanimous.

It was moved by Commissioner John Sprinzel, seconded by Commissioner John Pele, then

VOTED: to waive its review of item C.1.a.

(Assenting: J. Bicoy; L. Buchanan; L. Espaniola; W. Moore; J. Pele; L. Poepoe; J. Sprinzel)
(Absent: J. Perez, III)
(Excused: B. Mowat)

Chair Buchanan: Thank you very much. It does work. Thank you. Okay, moving right along where we all in high anticipation and waiting for would be agenda item D:

Chair Buchanan read the following agenda item description into the record:

D. PRESENTATION

- 1. Presentation on the climate emergency, sea level rise, and coastal erosion by Dr. Chip Fletcher, School of Ocean and Earth Science and Technology, University of Hawaii, Manoa**

Chair Buchanan: Sybil, are you going to do an introduction for Dr. Fletcher?

Ms. Lopez: Jeff will.

Chair Buchanan: Okay. And before he goes into that, I'm really excited and happy to see Dr. Fletcher here today. We are old colleagues. We both shared time on the Legacy Lands Conservation Commission for the State of Hawaii, and we valued his knowledge and wisdom then, and we certainly value it now, so, Jeffrey Dack, if you will introduce our esteemed guest.

Mr. Dack: Yes. Thank you. We are very happy that he can come over and speak to the Commission today. Dr. Fletcher has been instrumental helping the -- the County of Maui for a few decades now relative to protections of -- of our shoreline areas particularly I recall he was -- worked, initially, with students back in the -- the end of the last century, in the 1990s in doing some initial work on taking the -- the standard shoreline setbacks that were in place due to State law, just put in -- just numbers, kind of pulled into State law and -- and working with students eventually coming up with a project that, through many, many years of working with the community and the Maui Planning Commission, was able to bring a scientific approach to -- to Planning for shoreline protection, and so, in 2003, the Maui Planning Commission adopted an update to the shoreline rules for that island, which took, again, what had been just numbers as shoreline setbacks and was able to take the positioning, aerial positioning over periods of time and put a scientific base seeing the historical shoreline erosion rates had been and actually worked hard to help the Maui -- Maui County be the first county in the State to adopt a scientific-based setback policy so -- and has been working with us since then, off and on, as I'm sure he'll -- he'll give his appropriate title, I'm -- there's a dean or associate dean, I'm not quite sure exactly which it is at the School of Ocean Science and Technology, at UH Manoa, and he has been most recently helping out the Maui Planning Commission in working towards an update to the shoreline rules for -- for the Commission that takes into account erosion rates as they had -- as -- as his office had contributed to the State Sea Level Rise Report adopted by the Hawaii Climate Change Mitigation Adaptation Commission in 2017, I think at the end of that, so he'll be able to bring some of those -- talk about that, talk about the current state of climate -- the climate emergency and bring what -- what kinds of things might be affecting Molokai and how -- how his office might be able to offer kind of somewhat similar assistance to Molokai, I believe, as he's been able to provide for Maui Island over the years. Thank you.

Chair Buchanan: Chip, are you going to -- you want the screen to -- the screen right there I can see it really good, but, members of the public, if you cannot see the screen, then maybe you guys can make some adjustments. You guys are also welcome to sit on this side, over here, if you cannot see and I -- because it's so lighted in here, but I think we good, Chip, over there. Commissioner Pele, you okay? You can see? Okay. Good. And, Chip, don't forget to introduce your colleague, when you get there. Thank you so much.

Dr. Fletcher: Thank you, everybody. Thank you, Jeff, Sybil. I do want to introduce Kayla Yamamoto, who is an atmospheric scientist with me. She -- that came with me today. She is part of our research team. We are starting a new sea level rise modeling effort at the university with my research group. We, it will take several years, but we hope to do every single island in the state whereas, currently, we've only had the funding and the data to do Kauai, Maui, and Oahu in terms of projected erosion under higher sea levels, projected wave run up under higher sea levels. We do had have every island modeled online just in terms of passive sea level flooding as it rises but, as you know, the ocean is not passive and so the seasonal waves, and the currents, and the storms are not represented there, so there's much improved work that we're going to be doing. We're also going to be trying to statistically produce tropical cyclones under higher sea level and look at how their storm surge and flooding characteristics will change as we move forward in future decades.

I'm not going to spend a whole lot of time on the modeling we have done with local sea level rise, I will spend some, but I wanted to take this opportunity to present to you an integrated look at global climate change phenomena and local climate change phenomena, and how they relate to one another. I want to get started by just sort of passing out a textbook I've written called, "Climate Change - What the Science Tells Us," to the Commissioners. You can just sort of thumb through it over the next short period as I'm talking. I do want it back. And, yeah, so I'm going to go through several different sections of the talk and end up with some solutions so that we don't walk out of here completely depressed.

And note the title, "The Next Few Years will be the Most Important in Human History." So, the greenhouse effect begins with sunlight that enters earth's atmosphere and if it encounters a white surface, like snow and ice, it will be reflected back out to space and it won't do any warming. If it encounters a dark surface, like a body of water or the top of a tree canopy, or rock, basically, anything that's not covered with snow and ice, it will be absorbed and that surface will then reradiate heat; it's that heat that is trapped by greenhouse gases, predominantly carbon dioxide. The reason -- the reason we're concerned with carbon dioxide is because it can have a long residence time in the atmosphere. Once you turn on your car and CO₂ comes out the tailpipe, half of that emission can stay in the air for decades, centuries, and when you get down to 20 to 10 percent of those emissions, it can stay in there, stay in the air for thousands of years. So, this is a long-lived warming blanket that we are throwing around our earth when we emit carbon dioxide. And as you know, when the air is warmer, it's more humid, so we're putting more water vapor in the air, which is, in fact, the most powerful greenhouse gas, so for every degree of warming we get with carbon dioxide or methane, you get an additional amplifying feedback of an additional degree of warming from the water vapor, the additional humidity that is now in the warm air. So, it's these sorts of feedbacks that are very important to understanding important parts of the climate system.

Beginning with 1880, we can measure the carbon dioxide content of the atmosphere; in fact, we can go back much further than that, we can go back over a million years, but it was beginning in 1880 that we are able to get temperature measurements from around the world that we can equate with modern day temperature measurements. So, you see this orange line, this is the temperature, average temperature of the atmosphere. It's highly variable. Those warm points are warm years, for the most part, because there's an El Nino that's taken place, and those cooler points are La Nina years or volcanic eruptions. The rate of CO2 accumulation has accelerated. The rate of warming has accelerated. Currently, the warming is about two degrees Fahrenheit, 1.1 degree Celsius. Okay, so what? I could step outside this building and, when I get outside of the shade, I'm going to experience five, six, seven degrees Fahrenheit warming. What in the world can two degrees Fahrenheit warming be so -- why is that so important? Because it is a fundamental change in the energy of a system just like your body temperature. If you get a two-degree fever, if you go from 98.6 to 100.6, as a body temperature, you'll not feel very good, and if that persist for months, you can begin to experience tissue damage, you can experience brain damage, and we are currently on track to warm the air that we live in over three degrees C, or getting up close to six degrees Fahrenheit, equivalent to running a fever of 104 to 106 degrees. You cannot live for a long time with that sort of body fever. So, that's our analogy. These small increments of temperature rise are fundamentally important.

By 2030, we are likely to hit 1.5 degrees C, which is a -- a keystone temperature according to a United Nations agreement that every nation in the world signed. This Paris Accord or Paris Climate Treaty was designed to stop global warming at one-and-a-half degrees C in order to save the world's atoll nations from drowning. And the Paris Agreement said if we can't do that, then let's certainly stop warming before two degrees Celsius, but based on projections of continued greenhouse gas emissions, there's an estimate that came out in the Nature Science Journal last year that will cross 2.0 degrees in the year 2045.

This is data from NASA showing temperature change over the last 130 years. You can see from place to place, it's highly variable, and from year to year, it's highly variable, but there is a clear long-term trend, and we also have this mystical cool spot in the North Atlantic, that is cold water streaming off of Greenland as the Greenland icesheet melts, and that is, in fact, slowing down an important current system that we will talk about a little bit later. There's also cold water streaming off of Antarctica and you can see the blue sea surface temperatures there as well. You may not be able to see it clearly here, but continents warm faster than oceans, and the emergency that's taking place in Australia this week is typical of what other continents will experience as we warm additionally, and I'll show you that there are large areas of the continents that are already have reached two degrees C, and with that temperature, you get the failure of crops, and you threaten the world's food system. And so one reason that I think Hawaii is in an especially good location is that we are surrounded by water, which absorbs heat, however, as we will talk about, you know that we've had a very hot summer with hundreds

of record-setting temperatures along on all the islands and that's because of a thing called a "marine heatwave," so even the ocean can have heatwaves, and we are surrounded by a body of extremely warm water since about last May and it's still persisting. So, we do experience our share of -- of these heatwaves but I'm glad I don't live on a continent.

Projections for this year, 2019, and for next year, 2020, are shown here from NASA. The rise continues and we are projected to go from 1.1 degree C of global warming to 1.2. So, with only 1.1 degrees of warming, we've already documented that sea level rise has a ten percent probability of reaching two meters, or six-and-a-half feet, before the end of this century. Antarctica is melting three times faster than the previous decade, than just ten years ago. Greenland is melting four times faster than ten years ago. The Arctic ice, sea ice volume is in a state of collapse. It's down anywhere from 50 to 70 percent. That sea ice in the Arctic Ocean is the planet's refrigerator system. It reflects sunlight as we've learned. And as it retreats, it exposes dark ocean that absorbs sunlight and then releases the heat that is trapped by greenhouse gases. There's been a 12 percent increase globally of extreme rainfall because we have more humidity in the air as it warms, and that humidity in the air comes from the ground through evaporation so we have more drought, a ten percent increase in drought worldwide. Sixty-six percent of humans on this planet face a water shortage each year for at least one month. The circulation of the atmosphere has slowed and we have an unable Jetstream, and we will -- we'll dig into those. The ocean circulation, as I mentioned, especially in the North Atlantic, has slowed. The ocean is absorbing carbon dioxide, which H₂O plus CO₂ equals carbonic acid, a light acid which makes it very difficult for corals to secrete their hard materials and shells, and plankton of all sorts to secrete their hard material because that acid tends to corrode it and dissolve it. The oceans are much warmer and they are, in fact, losing dissolved oxygen. There's been a two percent decrease in dissolved oxygen in the oceans since 1950. And, for multiple reasons, the spread of our urban areas, agriculture, climate change, changing rain, and temperature patterns, these -- and hunting, these are decimating wildlife populations, which have now decreased 60 percent across the planet in recent decade, and there are extinctions in the ocean and on the land associated with these, and we'll talk about hurricanes, which are also changing their characteristics.

So, the Paris Agreement, in 2015, in December, all of the nations eventually signed onboard, and now the United States is withdrawing because of our current executive branch of our Federal Government, the Paris Agreement pledged -- every nation pledged to cut their greenhouse gas emissions in order to stop global warming before two degrees Celsius and to make every effort to stop the warming before 1.5, and that was at the request of the atoll nations as well as several other developing nations.

Alright, that was just the intro. So, we're going to go through several subjects. The first thing we're going to talk about is trends in greenhouse gas emissions, then we're going to get into food and water sustainability, extreme weather, the global biodiversity crisis,

tipping points in earth-scale systems, sea level rise, and then we'll end with some solutions.

Since 1850, this is the release of carbon dioxide by different nations. Down there in the bottom, in darkest blue, is Europe, and all the way up through China in -- in dark red at the top. This is a long-term pattern associated with burning coal and oil as part of our industrial activities. This has brought us great health and longevity. Fossil fuels have been extremely important in our economy, but we've become addicted to them, and we should have moved off them half-a-century ago. Too much of a good thing. They pollute the atmosphere and they trap heat, and they also put toxins into the atmosphere that cause human health problems. If we want to stop global warming at 1.5 degrees, we need to drop like a stone. We need to stop our emissions; instead of rising, they need to decrease, and the year at which this must begin is 2020. This year. And the next few years are the most important in human history if we do not cut our greenhouse gas emissions. By 2050, the entire world must be decarbonized in terms of releasing emissions from burning fossil fuels, and, also, we release emissions because of poor land use practices, principally, agriculture, and other types of land use practices that turn soil and natural ecosystems from absorbing carbon to releasing carbon.

But do we want to be fair to the developing nations who want new hospitals, secure food and water systems, highways? Isn't it fair to allow them to enjoy the quality of life that the western world has? In order to achieve this equity, the developed nations need to get to zero emissions in ten years allowing the developing nations a few more decades to burn fossil fuels because that's how construction equipment works, it's the infrastructure for energy and power in their countries. As we assist them to transition off of fossil fuels, we also give them some more time to build up their infrastructure and they don't need to decarbonize as rapidly as we do.

Unfortunately, fossil fuel use is accelerating faster than renewable energy use. So, here at the top is oil, coal, and gas, this is data up through 2019, and the rate of growth of those fossil fuels is outpacing the rate of growth of hydro, nuclear, wind, solar, and other renewable energy. In fact, the projections of the economists associated with all sorts of energy studies, the International Energy Agency, British Petroleum, Equinor, Exxon, Mobil, independent research institutes, and government agencies are all projecting a continued emission or carbon dioxide up through mid-century, and down here on the bottom timescale there, it's 2040 at the end of that timescale, and these -- these two lines coming down in emissions, those are the lines we need to follow for either 1.5 degrees or 2 degrees of stopping global warming.

So, there's a gap, there's a production gap, and this illustration came from the United Nations, it shows, in blue, the decrease in carbon dioxide consistent with stopping warming at 1.5, and then light blue consistent with stopping at 2 degrees, but in red is the planned and projected emissions for most of the world's nations. The world's on track to

produce 120 percent more fossil fuels than is consistent with stopping global warming as in the Paris Agreement. To stop warming at 1.5 degrees C, we have to cut emissions at 7.6 percent per year, and keep that up, or for 2 degrees C, which is a very dangerous temperature that I hope we don't reach, we have to cut at 2.7 degrees per year. Governments can phase out fossil fuel production. We can end subsidies, public money that goes to fossil fuel companies. We can limit permitting for drilling and mining of fossil fuels. We can adopt more ambitious plans to transition away from fossil fuels and several nations are already on the road to do this.

Computer models project future temperature on the basis of scenarios of economic activity, and these many lines that look like an octopus working their way towards the end of the century, the year 2100 here, present different economic scenarios, and the worse case scenario are those gray lines heading up to the top, they will lead us to a temperature of four to five degrees C, which threatens the fundamental socio-economic system that the world operates on, or some of these lower lines that peak at mid-century and then go down; the temperatures there are four degrees or less.

So, in 2017, we saw a rise in emissions of one-and-a-half percent; in 2018, it was little over two percent globally, and this year, the projection is less greenhouse gas emissions on the order of sixth-tenth of percent, but all the economic indicators and the trends in oil and gas exploration and production indicate that we are on track for 3.2 degrees sea warming before the end of the century. This will be devastating. At all costs, we must avoid this.

Alright, so let's talk about food and water sustainability. Agriculture, globally, is responsible for 31 percent of greenhouse gas emissions, and since 1970, food crop production increased 300 percent. Half of all agricultural expansion came at the expense of forests, which store carbon for us, and as we deforest the planet, we release more carbon. The food supply chain is responsible for about 26 percent of greenhouse gas emissions, and another five percent from nonfood agriculture, such as biofuels and textiles. Forty-three percent of all usable land on this planet, and two-thirds of all freshwater on this planet is used to produce food. We use synthetic pesticides and nutrients in order to grow that food and more than three-quarters of it runs off into local sheds and out to the ocean and creates dead zones. Traditional industrial deep plowing of the soil, which turns it over and exposes it to the air, takes the carbon in the soil and allows it to combine with oxygen in the air and form CO₂. This is the traditional style of food production and it releases carbon into the atmosphere. It's extremely extractive and degenerative to the land. Beef is especially egregious. Raising cattle for beef agriculture generates 100 times more greenhouse gases than plant-based food. Over 80 percent of farmland used for livestock or 80 -- over 80 percent of farmland is used for livestock but it produces just 18 percent of food calories and 37 percent of protein. Cattle and the grain that they eat use one-third of all available land surface on this planet; sixteen percent of all available freshwater. One-third of the worldwide grain production is fed to cows, who

would normally have a life of 40 years, but at about one-and-a-half or two years of age, we slaughter them and eat them. And leading up to that, they live lives of torture. We're deforesting the planet at a rate of 30 football fields per minute; largely to raise cattle and the grain to feed them. Most deforestation is not to have land for cattle to run on, it's to grow the corn, the hybrid monocrop, millions of acres that we feed the cattle to fatten then up. Soy, rice, corn, wheat, these have lower protein, lower zinc, lower Vitamin B complex, and lower iron as the CO₂ content of the air rises. The plant that we eat, the portion of the plant that we eat is less nutritious as we pump more CO₂ into the atmosphere. Let's take wheat as an example. Global wheat provides 20 percent of all human protein on this planet, its yield is threatened by drought and flood and higher CO₂ in the air, and by mid-century, 30 years from now, the demand will increase 60 percent as we grow to a population of nine billion people, perhaps more. The actual yield though is going to decrease; it's projected to decrease by 15 percent. This is a perfect recipe for food shortages. By mid-century, it's projected that an additional three million people will be malnourished by these combined effects, and 1.4 billion women and children suffering anemia, iron deficiency.

We also have a water crisis. This is present day. One quarter of humanity faces this looming water crisis. Seventeen nations are under extremely high-water stress; meaning, that they use almost all the water available to them every year. There's a city in India called "Chennai." Ten million people live there. They have four reservoirs and this past summer, each of the reservoirs dried up. Ten million people suddenly without water. They had to flee the city, and not everybody could go with them, not everybody was capable. There is this ten percent increase in land area under drought, and we're pulling more water out of aquifers than rain and runoff are putting back in. Seventeen percent more water is withdrawn from water sources in the Continental US than nature can replenish every year. In China, it's 22 percent. India, it's over 50 percent. And in North Africa and the Middle East, it's thousand percent greater water withdrawal from our sources than nature is replenishing. We're on a collision course with the fundamental one thing we need to live - fresh water. By 2050, the demand is projected to grow by 55 percent. Hawaii is also experiencing a decline in precipitation, so you'll see pairs of arrows for each island, and then in the little box labeled "State," you'll see statewide averages. The arrow on the left is the last century of rainfall change, and the arrow on the right is the last 30 years. In almost every case, there's been an increase from these century year-long rate of precipitation decline to the last 30 year's rate of precipitation decline so that we now are averaging a six percent decrease in precipitation per decade over the last 30 years statewide.

Extreme weather is another characteristic of global warming. Weather disasters have tripled in the past two decades. One reason is that because -- one reason is because the Jetstream is becoming unstable. That rainbow river of wind there normally would be very linear and high velocity, but it's developing huge meanders that pull cold air down into areas where we should not have freezing temperatures, and meanders that pull hot air

up where we have heatwaves and persistent deep drought. This meandering Jetstream, this unstable Jetstream is because the Arctic is warming faster than the tropics, and so the gradient temperature difference between the two is less, and as, you know, the tropics receive more sunlight than they can store and so they shed it off to the north and south through a system of winds, and a system of ocean currents, and as that heat moves, it's slowing down because the temperature difference between the Arctic and the Equator is decreasing, so decreased ocean circulation, decreased atmospheric circulation, and decreased trade wind circulation.

Billion-dollar disasters as a consequence are on the rise in the US. This is year by year since 1980. The little purple portions are winter storms. The blue portions are floods. The light blue portions are freezes, billion dollar freezes that destroy crops, that damage infrastructure. So this is extreme weather of all forms and, unfortunately, one of the places that is experiencing the severe winter storms because of the unstable Jetstream is Washington D.C. They have record-setting snow, record-setting freezes, and so convincing our leaders that climate change is real when they're seeing the coldest winters on record because they don't care to know about the science is proving too convenient for them. Global-extreme rainfall has increased 12 percent, and at current greenhouse gas emissions, 70 percent of the world population and GDP, that's our economic activity, face a 500 percent increase in flooding.

Alright, now my -- this is where my speaker should be working. So, this a rain bomb, this is the rain bomb that hit Houston three years ago, an intense focused deluge of water, so intense that it's capable of damaging wooden structures if they're -- if they're older or not well built. We, in fact, have our own history of rain bombs. In April 2018, a Kona storm system swept over Oahu and Kauai. We had enormous precipitation over East Oahu. We had flooding. One of things we've done with our natural streams is to line them with cement, and they are now called "ditches," and -- or gulches, and Wailupe Gulch, which is near Hawaii Kai, the water rose so quickly, eight feet, it jumped out of its gulch, jumped out of its channel, and it flowed through homes, and then down onto Kalaniana'ole Highway here and covered it with mud. The same system hit Kauai. Some of the north shore communities were isolated by a series of 12 landslides that it took over a year to repair and restore road access; in fact, there was a -- there was a silver lining to that dark cloud that these communities were no longer flooded or buried in tourists, they actually could come out of their houses, and walk the roads, and get to know each other again, and they, actually, they sort of protested the idea that the road would open up again and they're trying to establish some guidelines and some rules about the -- the daily influx of tourists. But this set a national record of almost 50 inches rainfall in one 24-hour period. The Hanalei River rose 15 feet, it jumped its bank, and it cut a new channel to the ocean through a couple of homes, and came out on Black Pot Beach where the -- where the pier is there.

So, in addition to flooding, we also have heat. Heat is in fact the most dangerous natural disaster in the United States. We have more fatalities related to heat than lightning, tornadoes, floods, or hurricanes. At two degrees C of global warming, which we may hit before mid-century, the temperature will exceed 104 degrees Fahrenheit every year in most mid-latitude and tropical continental areas. And, in fact, this past summer, the temperature reached 130 degrees Fahrenheit in Kuwait. This is a failed nation. Temperatures like that you just cannot operate in, you cannot exercise the normal economic activity, the commerce, the farming, the construction, the transportation, it's just too hot to do anything, and so we're going to see a growing migration away from these areas, which no longer can support human life and, in fact, it's already begun. It's not hard to imagine that when you have food stress, and water stress, and you lay in these extreme weather events and heat stress, it can lead to human conflict, it can lead to situations that potentially turn violent. Hawaii is also getting warmer. Our daily wind speeds are declining. We see more days of variable winds or southeast or light winds. Trade winds are decreasing. They're also coming more from the east instead of the northeast. They're coming from temperatures of the same or warmer as our temperature rather than bringing in cooler air from the northeast. They're interacting with the topography of our islands in a way that produces fewer clouds and less precipitation, so that might be partially responsible for the decline in rainfall that we've seen. And I mentioned marine heatwaves, which we've seen a 54 percent increase in these over the last century. We are surrounded by a marine heatwave right now. On Kauai, August saw the hottest month on record, and 31 days of record highs on Kauai this past summer. In Honolulu, August 31 tied the all-time record high for the island, and we had 29 days of record highs over the course of the summer. On Maui, July 29th, the temperature was 97 degrees, which may be the highest ever temperature measured in the State of Hawaii, and there were 41 days of record highs. And on the Big Island, August was the hottest month on record with 15 days of record highs. It's because we're surrounded by this hot body of water, this marine heatwave.

Hot air and drought are conditions you need for wildfire, also introduced invasive grasses, which will sprout up with one rainfall and then, as soon as you get a few days of drought, they die and they are perfect kindling for a wildfire. In the western US states, the fire season basically now goes all year, and the number of large fires has tripled. This has eaten into budgets available for not only fighting fire, but proactive efforts and forest husbandry are now being sapped of all their funding and it's all going to emergency services to fight wildfires. Australia, as of yesterday, had 18 million acres on fire and an estimated -- estimate of one billion animals have died. On Oahu, we've seen a 400 percent increase in wildfire since the 1960s, and these invasive grasses play a very important role. The vast majority, almost 100 percent of these fires, are set by humans either accidentally or on purpose. With climate change, invasive species, they set the background where these fires persist longer and they occur more frequently.

So, hurricanes are changing their characteristics as well. They are larger. The wind speeds are higher so they're stronger. They're moving slower because the atmospheric circulation is decreased. Sea level rise is leading to higher storm surge plus the fact that the pressure in the center of the hurricane is lower, which means it's stronger, causes more of a surge, a lift of the water surface. They're wetter, leading to more flooding. And tropical cyclones around the world are shifting away from the equator and for Hawaii, that means they're shifting towards the same latitude as the Hawaiian Islands. We have not typically had a big problem with hurricane, it's not an annual thing that we've worried about until the last five years or so, and now, we enter a hurricane season every year with much greater awareness because they are migrating into our latitude. There's a typical hurricane season from 1994, all the tropical cyclones and hurricanes past to the south of us, but 19 -- excuse me, 2018, they've migrated north, they're finding their way more towards the Hawaiian Islands.

What happens to a community when a hurricane runs over it? Let's look at Hurricane Michael in October of 2018. Total devastation. In fact, you see two types of houses. You see those that have just -- they completely blown apart by storm surge and high winds. Those homes are not retrofitted or built to modern building codes, or you see buildings that are still standing, they have modern building codes, they are lifted up on post and pier construction, storm surge can flow underneath or through the first floor and not take down the whole building. The cost of clearing the debris in Mexico City Beach was 60 million dollars. The annual budget of the municipality is six million dollars. So, you immediately have to turn to state resources and federal resources. There were very few fatalities because they can evacuate. They can go to Atlanta, Houston, Memphis, and so with forewarning, there were very few people here. We don't have that opportunity. You know, we can head mauka, that's about it. Where I live, I'll head up into Maunawili or, if I'm at work, I'll go to up into Manoa. So, 100 percent of the Hawaiian Islands, if a hurricane hits any part of that island, everybody on it is exposed, which means you can't turn to anybody nearby for immediate relief; everybody's been hit. You have to turn to other islands to come help. If the refineries at Barber's Point are taken out by a hurricane, there won't be any gasoline for the airplanes and the ships to come out and refuel and go back home, so they're probably not going to come out. It's probably going to take aircraft carriers. How long will it take them? How many will it take? Meanwhile, we need to be self-sufficient, so food production is something that we are really lagging behind on here in Hawaii. It's also a way that we can pull carbon out of the air and do our bit in terms of global carbon management and, in fact, pulling carbon out of the air and putting it into your soil is good for the plants, it's good for the agriculture; talk about that more in a little bit. So, these are weather-related losses worldwide. You can see that they're on a strong increase from meteorological events in green, flooding in blue, and heatwaves and fire in orange.

There is a global biodiversity crisis, as I mentioned. The oceans are hotter, more acidic, and they're becoming more anoxic. By mid-century, it's projected that almost every coral

reef will experience annual bleaching. In areas where reefs are located near human communities, the partially treated sewage that we put into coastal waters, fuels invasive algae, that material is plant food, and so if we have also overfished the reef, and even if we haven't, the invasive algae can outcompete the coral, and within just a week or two, that coral, while it is bleached, is incapable of coming back because the algae buries it. If we can stop polluting coastal waters and let corals react to the stresses of climate change without having to battle us at the same time, they stand a better chance of -- of being more resilient. Invasive species or weeds are beginning to characterize many of our reefs, and because corals that have died can no longer secrete the solid material that is a reef, we're now seeing reef collapse. This is off the north shore of Maui. A reef that cannot re-secrete the solid material instead just turns into a pile of rubble because it gets hammered by waves. As I mentioned, we're deforesting the planet as a means of producing food. The number of insect species is in freefall. We've decreased globally by about one-third. Sixty percent of vertebrate animals are gone. Eighty-three percent of mammals and fifty percent of all plants gone, off the face of the planet. If we were to immediately leave this planet, it would take five to seven million years for natural world to recover. I don't believe it when people tell me earth will be just fine if climate change continues. It's humans that are at risk. Earth is at risk as well. Global wildlife population has decreased 60 percent. And if you weighed all mammals, 96 percent of the weight would be cows and people, and 4 percent of mammals are wild. Seventy percent of all birds on this planet are poultry, only 30 percent are wild and they're being extirpated by feral cats. Billions of birds die each year just from cats in the northern hemisphere in -- in, excuse me, North America.

Scientists are struggling to come up with descriptions for this, but we have to report our data. What's troubling is that we have to be seen as unbiased, impartial reporters, and so we cannot use emotional language to describe what's clearly an emotional situation, but we've now entered the sixth mass extinction. "Biological annihilation" is a term that's being used. Has land use pushed terrestrial biodiversity beyond some boundary of planet to recover, approaching a state shift, a fundamental shift in the equilibrium of our living world? A new term, "marine defaunation." Loss of animals in the ocean. This study found that local extinctions have already occurred in hundreds of species. They studied nearly a thousand species and nearly half of them are no longer found where they naturally were found. And this paper has over 15,000 scientists as coauthors and it's a warning. It's the second one. And it says, "Humans have pushed the earth's ecosystems to their breaking point and they're well on the way to ruining the planet." Too many people think that we can live without the natural world, but we can't. We need the natural world.

Scientists are now recognizing certain tipping points. One-tenth of the globe has already warmed more than two degrees C. Nine global scale systems are thought to now be out of equilibrium. The great pine forests of the north, because of drought and wildfire, are on the verge of releasing more carbon than they take in. Permafrost is collapsing 70 years earlier than our models had projected. We're seeing massive craters open on

slightly tilting landscapes because the ice turns to water and the -- all the mud and soil around it turns into a slurry and just flows away. This vertical circulation in the Atlantic threatens the East Asian Monsoon and much of the world's food production, the West African Monsoon, the Amazon is experiencing more drought, and the East Coast is seeing rapid sea level rise because this current is slowing down and it has slowed 15 percent; importantly, this current carries heat away from the tropics and as the heat builds up in the tropics, you see hurricanes in the Atlantic intensifying overnight to Category 5. We're seeing superstorms, and we're now considering a new category of hurricane, a Category 6. Heat is also building up in the South Atlantic because this current is not taking it away and that heat is accelerating the loss of ice on Antarctica. In fact, the West Antarctic ice system is considered in a state of irreversible collapse already. There are areas of East Antarctica where two to three meters of sea level still frozen in ice have accelerated into the ocean. The average elevation of these glaciers has declined nine feet in the last decade, and this is because they are flowing rapidly into the ocean. The Greenland icesheet might already have passed the tipping point. Models suggest that that could have occurred at 0.8 degrees C and we're up to 1.1. Coral reefs are projected to be lost by mid-century. And large forest systems can tip into unstoppable degradation and collapse with less than 50 percent of it being lost. We have already lost 17 percent of the Amazon to deforestation and, potentially, anywhere from 20 to 40 percent lost in the Amazon could plunge it into unstoppable loss. Antarctic sea ice we talked about.

Sea level rise. Antarctic melt has tripled in the past five years. This year, the melt season, which on the bottom graph, goes from November to March. The average 30-year melt in terms of percentage we see anywhere from eight to ten percent of Antarctic surface melting. We're seeing melting all the way up to 15 percent of the Antarctic ice surface melting this year, this summer. Greenland melting has quadrupled. And again, this melt season in red is far above the typical melt that we see in blue or in gray down below, so there's accelerated melting on these two ice systems. This is the record of runoff of water runoff off of Greenland we get from ice cores, it goes back to 1650, and you can see this rapid acceleration in the end here in the last 50 years or so. This is a 250 to over 500 percent increase in freshwater streaming off of the Greenland icesheet. And 90 percent of the heat that we have trapped with our greenhouse gases is actually in the ocean. It's absorbed by the ocean. If the ocean hadn't absorbed this heat, our planet's surface would already be unlivable, and the oceans, of course, are expanding because they're getting warmer; together, these cause sea level to rise, and sea level enters our communities in ways that maybe we don't expect, they come up through the pipes and drainage systems that normally rain is taken away, but this is saltwater coming out through a storm drain in Waikiki and that's saltwater running down the gutter away from the photographer, that's called "storm drain backflow" and that's happening more and more at high tides. And underneath our coastal land is a water table that goes up and down with the tides, and so it is connected to the ocean, and as the ocean goes up over time, the water table goes up over time. In Waikiki, Kakaako, and major parts of Downtown Honolulu, at the highest tides of the year, the water table's only two feet below the ground surface. When that

water table hits the ground surface, when sea level rises two feet and that water table's at the ground surface, there's a special name for that and it's called a "wetland," and we don't want wetlands in urban areas. So that storm drain backflow and that groundwater inundation, and then just saltwater flowing over the shoreline, we've modeled all this at the University, and we have maps showing today's current sea level in Waikiki and Kakaako, that's Magic Island that peninsula sticking out there; at one foot of sea level rise, we see more groundwater coming up around our buildings and in our roads; at two feet of sea level rise, we see our storm drains backflowing, you might notice a few little pink dots, those are individual manhole areas that are backflowing saltwater onto the road, and then where you see blue, that's the edges of the Ala Wai overflowing; at three feet of sea level rise, we see our own type of tipping point, we see a dramatic increase in the flooding, between two and three feet of sea level, there is a dramatic increase of flooding that takes place. And as I mentioned, there's a ten percent probably of sea level rising six-and-a-half feet before the end of this century, alright, so there's three feet of sea level rise, and four feet of sea level rise, and five feet of sea level rise. And those red lines are individual road segments which are undrivable. And while they may not add up to a whole lot of road, all you need is to make one block undrivable and you completely disrupt traffic. Think about the commuting traffic with all the jobs that are in this area. How are we going to adapt to this problem?

Then that's rain on top of it. Our storm drains are backed up by high tide, the water table is high, so there's no dry soil, and then we put rain on top of it. Our highest tides of the year tend to occur in the summer time at the end of the day, or in the winter time right now. At the end of the day, in Honolulu, is when everybody's trying to get home, so we stop commuter traffic, and we prevent parents from picking up their children at school, and we isolate community members that are at home waiting for their caretakers to come home and take of them. And it's quite easy in the summertime for the extreme heat to lead to a blackout. We can have compounding events and that's where the science of climate change, extreme weather is going these days. A hurricane hits, and right behind it comes a heatwave, and the hurricane takes out the electricity and then the heatwave arrives. And there are examples of this taking place. So, our communities need to be armored and resilient in terms of our power sources. We need to turn places that are publicly available into cooling shelters, resilience centers where people can go and find bedding and sanitation and some fundamental medicines and food and water of course. Resilient centers staffed by local -- local folks, and in between these extreme weather events, they become public amenities, public facilities.

We all love to surf. We know the waves arrive from the south in the summer, and the north in the winter. There's a community on Oahu called "Ewa Beach," it gets south swell every summertime, and with two feet of sea level rise, a typically south swell is going to run up and flood dozens of homes, but here's this two feet to three feet of sea level rise tipping point again, this is every summer, the waves, a typical standard wave, the average

of the one-third highest waves is called a “significant wave” floods all these homes. Is this now a viable community?

Alright, are you ready for some solutions? Alright, so our current policies are taking us towards over three degrees Fahrenheit of warming and we need to avoid that at all costs. We know how to solve this crisis. Our current trends are continued emissions of CO2. Nations have stated their policies are to have stable CO2, but not declining. What they’re stating and what they’re doing are two different things, and we need to have declining trends in CO2 emissions. We can do this through efficiency. More efficient motors, and buildings, and devices, and appliances, efficient shipping, aviation, cars and trucks, industrial machinery; it can all be made much more efficient so it doesn’t use as much fossil fuel or electricity. Renewable sources of energy replacing fossil fuels, like solar, wind, biofuels, hydro, and even nuclear, which I used to be against but, at this point, it’s all hands on deck, electric vehicles, pulling carbon out of the air and burying it into the geology, and our personal behavior. All these add up to changing from current trends of CO2 emissions to what we need for a safe world in the future.

This is one of two plants in the world. This is up in British Columbia where they pull CO2 out of the air. This is called “carbon engineering.” It’s called “direct air capture.” You can do a lot of things with that carbon you pull out of the air. One thing you can do is make a fuel, and you can make gasoline, and jet fuel, and diesel fuel, and then you can burn that, it goes back in the air, but then you pull it out again. You’re not adding more carbon to the air from coal and oil, you’re recycling the carbon that’s in the air. Also, once you get that carbon, you can inject it down into the crust. There are different types of rock formations that can hold that CO2 and lock it away forever. You can create agricultural products from that carbon to help with regenerative agriculture. Those are investment opportunities. And there’s 140 trillion dollars of investable income in the world. One-third of that is from a group of investors called “impact investors.” These folks want to do good, and they will give you tens and hundreds of billions of dollars at half-a-percent interest rate or, in many cases, zero percent interest rate. The entire sewage treatment and outfall system for Norway was completely renovated with impact investment money with an interest rate of half-a-percent, so now they’re no longer polluting their coastal zone. I’m working with the Marshall Islands and other atoll nations to get impact investors to provide the funding to dredge sand and gravel in their lagoons and build new islands and raise existing islands. They see investment opportunity in developing green ports and green shipping. A new form of fuels is an enormous investment opportunity for these wealthy institutions. Batteries, which will store the energy that you get from windmills and solar power so that, at night, when the solar power is no longer working for you, you can still have electricity at your house. They’ve been freefalling in price. Utilities are embracing batteries and we now see batteries deployed out in around fields of solar panels, it’s called “baseload,” it is a -- provides you with electricity when you don’t have other renewable forms of electricity available.

There's an amazing movement across the world of youth striking for climate led by Greta Thunberg; that has spawned another movement called "Extinction Rebellion." Extinction Rebellion is led by Roger Hallam, he studied Ghandi at Cambridge University, he got a PhD in Sociology, he was an award-winning scientist, and he studied Ghandi and Martin Luther King, and he studied the practices that they employed to change their world, nonviolent, but disruptive public action, group action. Extinction Rebellion does things like superglue their bodies to the morning commuting trains in London. They chain themselves to places that disrupt traffic and just within the past year, they have driven the British Parliament to declare a climate emergency and to declare finally a goal for decarbonizing the entire United Kingdom. And so, here's a great video by Greta Thunberg and also one of the Extinction Rebellion leaders about how if we invested in natural systems that absorb carbon and stop destroying these natural ecosystems, it's a very powerful way to fight climate change. Alright, help?

Dr. Fletcher presented a video.

Dr. Fletcher: So, this film is available on YouTube. I have a channel. If you just Google Chip Fletcher, or Climate Change - What the Science Tells Us, on YouTube, this channel just filled with videos that you can use. This is -- this is up there as well. We also have better styles of agriculture instead of allowing soil to release its carbon to the air; that's shown here. If we used covered crops, there are various types of covered crops, which will retain moisture, they will put more carbon down into the soil, they can also work in synchrony with the food crop to pull pests away from the food crop, and also not doing deep plowing. This sort of regenerative agriculture alone on every acre of agriculture on the planet could pull all the carbon out of the air that we have put into it and here's -- here's another short video about that.

Dr. Fletcher presented a video.

Dr. Fletcher: Okay, so wrapping up, it turns out that eating plant-based food is the most powerful personal way to reduce our impact on the planet, turning vegetarian or, in fact, even better is vegan, I'm not here to tell you what to eat, but the more plants you eat and the less meat, the less beef you eat, it's better for the planet and, in fact, it turns out to be better for your own health. Talking about climate change is important, raising questions and discussing what you saw today with those who you know. Every day I get news on climate change. There are a number of websites that will feed into your email or Twitter or Instagram. Staying on top of the latest climate news is an important way to keep it present in your consciousness so that you're living a life of awareness. Voting to repair the climate, to protect our natural ecosystems, and voting to build communities that are going to be safer in a future characterized by extreme weather events as well as long-term stresses, such as slowly rising sea level and slowly accumulating heat, are extremely important to do. We want to be safe. And joining protest movements, collective community action with regard to climate change is also extremely important. So, I'll just

recall the title of this talk that the next few years are the most important in human history, and I'll end with that, and I want to thank you all for attention and I'll be happy to take any questions you guys might have. Thank you.

Chair Buchanan: Wow. Wow, thank you very much, Dr. Fletcher. Commissioners, you guys get any burning questions? I'm overwhelmed, Chip.

Dr. Fletcher: Yeah, it does that.

Chair Buchanan: Yeah, it does that 'cause it's on a global scale and so, you know, you don't find this every day taken on a global scale, or most of us don't, so I wanted to thank you for the research and putting all of that data into a concise Powerpoint to convey this urgent message, but, Commissioners, you guys get any questions for Dr. Fletcher?

Ms. Bicoy: I have a question. Is your presentation available to us?

Dr. Fletcher: Absolutely.

Ms. Bicoy: Perfect. Thank you.

Chair Buchanan: That was a good question.

Dr. Fletcher: Up on the YouTube Channel I mentioned, I think I have -- I have a 20-minute presentation that I'm giving strictly about impacts in Hawaii, and I have two other presentations, one that's about 20 minutes focused exclusively on sea level rise, and another one that gives more of the global viewpoint.

Chair Buchanan: I know you -- you told us that after the presentation that you would be here for a while and I wanted to make sure because I know you do have a plane to catch that you would be open to questions. I wanted to thank the students that look like they came from Kaunakakai School. I thank the teachers that -- that have the foresight to bring the next generation in because that -- that's where it really matters, and so I wanted to thank the teachers for bring them, their class over. And I know we said we're not going to open questions to the general public and that's why you can stay after, but, Commissioners, I wanted -- you know that we -- our kuleana, Dr. Fletcher, is the coastal zone and protecting that coastal zone, so would you have any specific recommendations or considerations for this Commission because our rules are pretty general, they haven't been changed for a long time, I know you're familiar with the Papohaku Dune Coastal Report, and, through the years, we've talked about setback, and even in our community update we talked about the impacts to the coastline but, yet, we didn't make any real big movements to try and get off the coastline, but do you have any words of wisdom for us, as Commissioners?

Dr. Fletcher: Yeah, I have a couple thoughts. Thank you for the opportunity. Anything you do to stop a beach from moving landward will kill it. Sea level is rising. A beach has one option only. It's got to migrate landward. There's no better seawall. There's no better vegetation. The beach needs space. We need to leave it alone. Sea level rise is not inherently dangerous for beaches. The last ice age ended about 20,000 years ago. Sea level was 400 feet lower, and sea level has risen as those glaciers have melted and beaches have just rolled in front of the rising water; if they ran into a cliff, then that would become a rocky headland and you would have an embayment on the other side. Beaches can survive sea level rise if we get out of the way. That's message number one. There's no better way to manage it. And there is this false language you see in permits about shoreline protection. I also call that "beach destruction." Shoreline protection is putting a wall in to stop the land from being damaged. A seawall will not stop the groundwater table from coming up and making a wetland behind it. Erosion, yes, is a big problem and there are areas that we don't want to let erode. Ports, harbors, airports, they are valuable infrastructure that, at this point in time, we have already attempted to protect with seawalls and I think that there are places where we should continue to invest in seawalls. We have on the island of Oahu a series of communities on the windward side, which have one umbilical cord, they have one road going in and out, and if we let that road collapse, we have abandoned those communities. The road and the community are the same in this case, and there's a social justice issue here. So, there are places where seawalls are important, but if you want beaches, you gotta stop building seawalls where they are going to destroy beaches. You have to weigh these factors. Also, a beach is not just where you throw your blanket or your beach chair; it's the dune behind it. We have exterminated dunes in Hawaii. We have not protected sand dunes. Sand dunes are part of a beach, and the sand out in the surf zone and on the reef top, that's part of the beach because a beach is a sand-sharing system, up and down the beach, and on shore or off shore. All that sand is part of managing a beach. So, all this suggests what's known as "strategic retreat," retreating from the coastline, and that's where it stops being easy. How do we actually move roads? How do we actually move communities and homes? We're invested in this private land ownership idea and just walking away from, you know, what you've spent your life paying a mortgage on, it's just not viable, so we are stuck in a very difficult position here. How do we walk away from beaches and walk away from our investments? Personally, I believe beaches belong to our children. It's where our kids first learned about the wind, and the clouds, and the ocean, and the waves. It's where they learned to survive in the ocean. Beaches are where children learn to swim and survive in waves. They are in everybody's memory, right? They are family places. So beaches are more than just a pile of sand; I think they are a fundamental cultural foundation. A family foundation. So, they're very, very important. So, we need to preserve a few, but we're not going to be able to preserve them all. I'll try and stop there.

Chair Buchanan: Well, I mean I -- I knew that about seawalls maybe from you many, many, many years ago, and, as an opio during the '70s, my favorite beach in Waikiki was the beach fronting the Sheraton Waikiki, and then I had the opportunity to go back many

years later and there was no beach, and I thought that that was a really clear indication of what happens when you harden the shoreline.

Dr. Fletcher: Yeah.

Chair Buchanan: So, in your education and outreach, using your expertise, what do you think the Department of Land and Natural Resources is doing? Do you see, in yourself, that they're making any strides with trying to combat the shoreline and sea level rise?

Dr. Fletcher: Yes. They're working very hard. Throughout the '70s and '80s and '90s, DLNR was handing out seawall permits like candy. Someone finally pointed out to them like, hey, I thought you were supposed to protect the natural resource, so in the late '90s and early 2000s, they adopted new rules, and they now work hard on the beaches that they are responsible for. At the same time, if you'll forgive me for speaking freely, we have this hangover from the plantation era where we're supposed to have balanced management, we're supposed to, you know, care for private concerns, private landowner concerns, development concerns as well as we care for the natural resource, but as I said, if you want a beach, you can't have it both ways in many cases, and, right now, there is a beach, you know, an iconic wonderful, wonderful beach called "Sunset Beach" on the north shore of Oahu, and we have homes that are being undermined as we speak, and we could -- we could protect those homes with seawalls but we will lose that beach, or we could protect that beach, and that -- that seems like one of those beaches that it's worth making a stand on and DLNR is wrestling with that right now, they're not awarding seawalls, but they are giving geotextile cloth, which is this industrial cloth they put up there and it gives a -- a couple of years of protection, and for the first time, on my island at least, the Mayor and the Governor are not political foes, and they are in agreement, and so they've both said, okay, no seawalls, and I can tell you Department of Planning and Permitting for the City of Honolulu is rewriting its setback and what we're looking at is recognizing certain sort of biophysical zones. There are certain sections of shoreline that perhaps a type of setback regime makes sense. Instead of going parcel by parcel, which can be death by a thousand strokes, let's have a zone here that maybe is different and has a different management regime than a zone there, sort of a place-based approach. So, they're rewriting that and there's going to be a public outreach effort over this year. Kauai has a setback, which is based on the how fast the shoreline is eroding and they build a house beyond that, and Maui is taking a model of where the erosion zone will be under about one meter of sea level rise, which is by the end of the century, and they're saying everything makai of that line is now the setback and developing rules for that.

Chair Buchanan: So, what makes more sense, the Kauai model or the Maui model?

Dr. Fletcher: You know, this is a place-based issue so -- and it's a community issue. I think it's up to each community. I'm not -- I'm not going to say what makes more sense.

I think, you know, every place has its own -- its own community preference provided it is a scientifically-based community preference, in my opinion, in my humble opinion, and I do hope some beaches are preserved.

Chair Buchanan: And I think the science is important when it comes to that because that's something that is valid and -- and what you can really base, you know, those hard decisions on, you really need the hard science, but thank you very much. I do want to save time for -- for the general public to ask you questions offline, so, Commissioners, you guys get any last burning questions? I was going to bring up fishponds but I think I going ask you offline about fishponds since there's so much restoration --

Dr. Fletcher: Yeah.

Chair Buchanan: Wanting to occur on fishponds, and so, with that, I'll let you go, and then we'll finish up here.

Dr. Fletcher: Great.

Chair Buchanan: But you can start side conversations if you need to 'cause I don't think that there's -- oh, that's Akaula School. Sorry, Akaula School, that's you guys? Yay, Akaula School. Okay.

Dr. Fletcher: So, I'll be here for another here for another hour-and-a-half.

Chair Buchanan: Hour-and-a-half.

Dr. Fletcher: Yeah.

Chair Buchanan: Okay. Thank you, Dr. Fletcher --

Dr. Fletcher: Thank you.

Chair Buchanan: Very much.

Dr. Fletcher: Thanks.

Chair Buchanan: And, with that, we can -- is Sybil still here? She had to leave? Okay. We'll go right into item E, we not going take a break, okay, guys, Planning Commissioners, and we'll go right into the Director's Report, and we can do item 1, 2, 3, and item F.

E. DIRECTOR'S REPORT

1. **Pending Molokai Applications Report generated by the Planning Department with the January 8, 2020 Agenda Packet (Appendix-A)**
2. **Closed Molokai Applications Report generated by the Planning Department with the January 8, 2020 Agenda Packet (Appendix-B)**
3. **Agenda Items for the January 22, 2020 meeting**

F. NEXT SCHEDULED REGULAR MEETING DATE: JANUARY 22, 2020

Mr. Dack: You have, as part of your packet, the items E.1 and 2, which were reports of applications pending as well as closed applications. Sybil would be in a better position to answer questions about those but if you do have some, please feel free to raise them, I'll do -- do my best and we can refer anything else to get back to you on that Sybil may have information if I do not. There are no agenda items that we have anticipating for your -- what would normally be your January 22nd meeting, the fourth Wednesday in January, so unless the Commission wishes to come up with some items that we're not aware of, we don't -- the Department doesn't have any -- any items to recommend to you at that time. So, with that, the next -- if you do choose not to have that, then the next regular meeting date would be the first, pardon me, the second Wednesday in March.

Chair Buchanan: Okay. That sounds great too. Probably second Wednesday in February. Commissioners, you guys get any last burning questions about that close, open applications? If not, then I think we stand adjourned. Thank you.

G. ADJOURNMENT

The meeting adjourned at approximately 12:50 p.m.

Submitted by,
SUZETTE ESMERALDA
Secretary to Boards & Commissions II

RECORD OF ATTENDANCE:

Present:

Lori Buchanan, Chairperson
Laakea Poepoe, Vice-Chairperson
Julie-Ann Bicoy
Leonora Espaniola
William Moore
John Pele
John Sprinzel

Absent:

John Perez III

Excused:

Bridget Mowat

Others:

Jeffrey Dack, Planner VI, Current Division, Dept. of Planning

Sybil Lopez, Staff Planner, Molokai, Current Division, Dept. of Planning

Stephanie Chen, Deputy Corporation Counsel, Dept. of the Corporation Counsel

Suzette Esmeralda, Secretary to Boards & Commissions II, Current Division, Dept. of Planning