

**WATER RESOURCES COMMITTEE**  
Council of the County of Maui

**MINUTES**

**December 1, 2008**

**Council Chamber**

**CONVENE:** 9:15 a.m.

**PRESENT:** Councilmember Michelle Anderson, Chair  
Councilmember Michael P. Victorino, Vice-Chair  
Councilmember Gladys C. Baisa  
Councilmember Danny A. Mateo  
Councilmember Joseph Pontanilla

**STAFF:** Kim Willenbrink, Legislative Analyst  
Clarita Balala, Committee Secretary

*Seated in the gallery:*

Jock Yamaguchi, Executive Assistant to Councilmember Michelle Anderson

**ADMIN.:** Jeffrey K. Eng, Director, Department of Water Supply  
Steve Parabolici, Water Recycling Program Coordinator, Wastewater Reclamation Division, Department of Environmental Management (Item No. 28)  
Edward S. Kushi Jr., Deputy Corporation Counsel, Department of the Corporation Counsel

*Seated in the gallery:*

Cheryl Okuma, Director, Department of Environmental Management (Item No. 28)  
David Taylor, Wastewater Reclamation Division Chief, Department of Environmental Management (Item No. 28)  
Michael Miyamoto, Deputy Director, Department of Public Works (Item No. 28)  
Tui Anderson, Water Conservation Specialist, Department of Water Supply

**OTHERS:** Meghan Dailer, Hawaii Coral Reef Initiative, Department of Botany, University of Hawaii at Manoa (Item No. 28)  
Russell Sparks, Education Specialist, Division of Aquatic Resources, Department of Land and Natural Resources (Item No. 28)  
Robin Knox, Water Quality Consultant (Item No. 28)  
  
Jocelyn Perreira, Executive Director, Wailuku Main Street Association/Tri-Isle Main Street Resource Center  
(6) additional attendees

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

December 1, 2008

---

**PRESS:** *Akaku: Maui Community Television, Inc.*  
*Harry Eagar, The Maui News*

---

CHAIR ANDERSON: . . .(*gavel*). . . Good morning, everyone. Thank you for being here, the Water Resources Committee meeting of December 1<sup>st</sup>. Today, we're going to have a presentation by U.H., and we also have Committee referrals for the next term.

With us this morning, we have Vice-Chair Victorino.

VICE-CHAIR VICTORINO: Good morning, Madam Chair.

CHAIR ANDERSON: Good morning. Members Pontanilla, Baisa, and Mateo. Thank you all for being here on this early Monday morning. Also, we have from the Department, Director Jeff Eng.

MR. ENG: Good morning.

CHAIR ANDERSON: Good morning. And from Corporation Counsel, Ed Kushi. Good morning. Staff with us today is Kim Willenbrink, our Staff Analyst, and Clarita Balala, our Staff Secretary. So, Members, I think, so that we can, I think we're going to have questions and discussions regarding the presentation. So, what I'd like to do is take the second item on our agenda first so that we can take care of that. It's really a housekeeping measure. Do we have anybody, anybody signed up to testify? Okay. I'll leave that open just for a few minutes.

As you can see on the agenda, there are items from the current Committee's agenda, master agenda, and they're quite a few. And Kim and I went through these items and the ones that are listed on your agenda are items that I am recommending that the Committee refer to the next Council for various reasons. There might be information that we need to keep on the record. Some of them have outstanding legis..., legislation that may be considered. Some of them might have requests from constituency, and some of them just have historical information that I think would be valuable for the next Council to have at their availability. And just for those who are not certain what happens at the end of a Council term is that all the items that have been agendized in each Committee's master agenda gets filed, and filed means filed in the circular file unless the Committee refers it to the next Council term. And then of course it's up to the new Chair of the Committee to bring any of the items forward. They, they can just sit there and languish if the Committee Chair chooses.

**ITEM NO. 1      WATER SUPPLY RULES** (C.C. No. 05-46/C.C. No. 06-228)

**ITEM NO. 4      WATER USE AND DEVELOPMENT PLAN** (C.C. No. 05-38)

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

December 1, 2008

---

- ITEM NO. 8      IAO AND WAIHEE AQUIFER SYSTEMS** (C.C. No. 05-47)
- ITEM NO. 14     WATER-CONSERVATION PLAN** (C.C. No. 05-273/C.C. No. 06-166/C.C. No. 07-40)
- ITEM NO. 16     DEVELOPMENT OF NEW SOURCES OF WATER** (C.C. No. 05-319)
- ITEM NO. 21     RESIDENTIAL FIRE PROTECTION** (C.C. No. 05-331)
- ITEM NO. 22     HAMAKUAPOKO WELLS** (C.C. No. 05-356)
- ITEM NO. 24     WATER RATE STUDY** (C.C. No. 05-43)
- ITEM NO. 25     CONSUMERS' WATER-RELATED CONCERNS** (C.C. No. 07-146)
- ITEM NO. 27     ACCESS THROUGH THE HANS MICHEL PROPERTY FOR MAINTENANCE AND OPERATION OF KANAHA VALLEY STREAM** (C.C. No. 06-160)
- ITEM NO. 29     UPCOUNTRY WATER METER LIST** (C.C. No. 06-279)

CHAIR ANDERSON: So, Members, any comments or discussions about these items that are being recommended for referral? No comments. Okay. Thank you, Members. Then I would entertain a motion.

VICE-CHAIR VICTORINO: So moved.

COUNCILMEMBER BAISA: Second.

CHAIR ANDERSON: We got to see what the motion is. I appreciate your eagerness. But I would entertain a motion that we refer the items attached to our agenda to the Council Chair for the term beginning January 2, 2009, pursuant to Section 19 of the Rules of the Council.

VICE-CHAIR VICTORINO: So moved.

COUNCILMEMBER PONTANILLA: Second.

COUNCILMEMBER BAISA: Second.

CHAIR ANDERSON: It's been moved and seconded. Any comments? All those in favor?

COUNCIL MEMBERS: Aye.

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

December 1, 2008

---

CHAIR ANDERSON: Opposed? Okay. Thank you, Committee. So, good luck to the new Chair of the Water Resources Committee. I'm not going to say anything more about that because we have one more meeting where I'll probably get teary eyed.

**VOTE:       AYES:       Councilmembers Baisa, Mateo, and Pontanilla, Vice-Chair Victorino, and Chair Anderson.**

**NOES:       None.**

**ABSTAIN:   None.**

**ABSENT:    None.**

**EXC.:       None.**

**MOTION CARRIED.**

**ACTION:     REFER COMMUNICATIONS TO THE COUNCIL CHAIR FOR THE TERM BEGINNING JANUARY 2, 2009.**

CHAIR ANDERSON: So with us this morning is Meghan Dollar [sic]...Dialer [sic]...Dailer. Sorry, Meghan, and she has a presentation for us. She is the...a junior researcher for the Hawaii Coral Reef Initiative from the University of Hawaii Manoa, Department of Biology or rather Botany. And her assessment is of the nuisance macroalgal blooms in coastal Maui, and assessment of the physical factors and biological processes, and the program is supported by NOAA (National Oceanic Atmospheric and something else "A", maybe Association). Anyway, Federal government and their concern with the ocean waters.

As you all know, we had a presentation last year that was basically the same study only earlier on. There's now been more conclusive determinations made in the study. It's more detailed and I wanted to bring it to your attention, Members, because we must deal with this. In ten years we've lost 50 percent of our coral cover. That is critical. In fact, I would say we are in a middle of a crisis and if it keeps going in another ten years and we have no coral, coral reef, what then? The repercussions would be devastating, not only to our fisheries, to our tourism industry, to the ecological health of our beaches, the ramifications are quite scary. So, we're bringing this forward to further educate people and to hope that we can call those agencies and people who have the power really to do something about this, to take note and step forward and give us some solutions, and some, some actions that will actually stem the tide, sorry for the pun, of what's going on here, so we can restore our near shore waters and reefs.

So with that, Members, we're going to take a brief recess and bring down the screen and then I'll turn it over to Meghan and then afterwards we can have questions and an answer

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

December 1, 2008

---

period. And, you know, I am going to leave testimony open until after the presentation. Okay, Members, Committee is in recess. . . .(gavel). . .

**RECESS: 9:22 A.M.**

**RECONVENE: 9:24 A.M.**

CHAIR ANDERSON: . . .(gavel). . . Committee is back in session and I'm going to turn it over to Meghan Dailer who is going to give us the presentation this morning. Good morning, Meghan, thanks for being here.

**ITEM NO. 28 WATER QUALITY (C.C. No. 06-182)**

MS. DAILER: Good morning and thank you for inviting me to talk about our most recent research on algae blooms occurring here on Maui. Russell Sparks from the Division of Aquatic Resources presented the decadal monitoring data showing substantial reef decline of many areas on Maui. These decline can be a result of a number of tragic events, excess algae growth from excess land based nutrients, which is the focus of this presentation, is only one of the many pieces in the puzzle.

Nutrients are transported from land to the ocean in a number of ways including, but not limited to, agricultural and urban runoff, which travels through the groundwater system to the ocean and can also flow from land directly into the ocean. This occurs with heavy rainfall events. . . .(static coming from mic). . .

CHAIR ANDERSON: Meghan, hang, hang on we're going to try to fix that.

MS. DAILER: Okay.

MS. WILLENBRINK: Test, test.

MS. DAILER: Can everyone hear me? . . .(speaking out loud without a mic). . .

CHAIR ANDERSON: No, no, I want to make sure *Akaku* picks this up. Okay, we're going to take a short recess while we fix this. . . .(gavel). . .

**RECESS: 9:22 A.M.**

**RECONVENE: 9:24 A.M.**

CHAIR ANDERSON: . . .(gavel). . .

MS. DAILER: Starting from the beginning again. Nutrients are transported from the land to the ocean in a number of ways including, but not limited to, the following ways: agricultural and urban runoff, which travels through the groundwater system to the ocean and can

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

December 1, 2008

---

also flow from land directly to the ocean. This occurs usually with heavy rainfall events. During and after such heavy rainfall events, many of the coastal waters around Maui turn brown and murky. The brown and murky water contains land based sedimentation and associated land based pollutants, such as fertilizers, pesticides, and dead or decaying materials. Leaky cesspools and sewer lines and septic tanks can potentially leach into the ocean. Underground sewage injection wells also contribute to nutrient, nutrient loading on Maui. Up to five [sic] million gallons of sewage effluent a day are injected into the ground in three areas of wastewater treatment plants on Maui: Kahului, Kihei and Lahaina or North Kaanapali Beach. Unaffected groundwater, rivers, and streams and associated naturally occurring nutrients also. . .are also a component of the system.

These sources of Nitrogen entering the ocean are often difficult to detect with basic water quality assessment tools such as water column nutrients and salinity measurements because the ocean is a dynamic environment where wave action and currents can mix this solution and potentially dilute elevated Nitrogen levels and signals. This is a graph from Charles Hunt at USGS. It's showing how the N15 value is directly related to the source of the Nitrogen. For example, fertilizers are low ranging from negative five to five. Sewage Nitrogen is normally higher, ranging, ranging in the literature from nine to 38. The N15 value is increased through denitrification, which is a process driven by bacteria. Sewage is--

CHAIR ANDERSON: Meghan, Meghan, you got to tell us what the N15 value is? What is N15?

MS. DAILER: N15 is the ratio of N15 to N14. It's a stable isotope that's measured with a mass spectrometer.

CHAIR ANDERSON: But what does it indicate?

MS. DAILER: It indicates the source of the Nitrogen.

CHAIR ANDERSON: Okay, thank you.

MS. DAILER: And the value ranges anywhere from on this graph negative five up to. . .in the literature the highest value for sewage is 38. So, it'll, it'll, it's explained again in a second, so. But basically it takes bacterial processes to increase the N15 value and that's how the Maui County currently scrubs Nitrogen out of their wastewater. And therefore, the sewage effluent coming out of this injection wells and such are high with N15 values. Fertilizer Nitrogen is provided to plants for their use and is generally not affected by bacteria so it has a low N15 value.

Since Nitrogen is often limiting in the marine environment, macroalgae will utilize Nitrogen from additional sources, such as land based fertilizers and sewage effluent when available. The N15 values of macroalgae growing directly in front of sewage outfalls are often highly enriched, with values generally ranging in the literature from 9 to 15. The

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

**December 1, 2008**

---

highest documented macroalgal N15 value in the literature is currently 25. Because macroalgae current. . .sorry because macroalgae continuously utilize new Nitrogen from their environment, their N15 values become an integration of all sources available to them. And so their signal when it's analyzed with the mass spectrometer is the signal from the most common persistent source. And it has been suggested that since these sources are integrated over time that N15 values are macro..., of macroalgae are more useful in detecting anthropogenic sources of enrichment than monitoring Nitrogen levels in the water column.

This is a study by Costanzo et al in 2001 in Australia. This figure is showing the loads from sewage outfall sites of Nitrogen in tonnes per year. Oh, sorry. This is the associated N15 values from similar places. So, the values in the red circles are from areas "in close proximity" to sewage outfall sites and they have higher N15 values than those in the green circles, which are not anywhere near a sewage outfall site. This and, this and many other studies have successfully linked the elevated N15 values in macroalgae to the presence of sewage effluent in the marine environment. But I want to just make sure that everyone understands that it's not a measure of load by any means. We can see that the highest values that are in the bigger red circle of 11.3 and 11.1 are not where the highest load of Nitrogen is actually coming out. It's just a measure of source.

In the summer of 2007, a survey of intertidal macroalgal for N15 values from all accessible coastlines on Maui was conducted to locate areas and potential sources of anthropogenic enrichment. A total of 130 sites, over 600 samples, were sampled around the island and at each site attached macroalgae samples were collected in triplicate from the intertidal zone. Samples were prepared for laboratory analysis and sent to the University of Hawaii Manoa, Isotope Biogeochemical Laboratory.

This survey shows that the average macroalgal N15 value generally reflects the areas exposure to anthropogenic impact. Low impact areas like Olowalu, La Perouse, Nahiku, and Haleakala National Park ranged from zero to three in the blue circles, while developed areas such as Waiehu, Kahului, Kihei, Wailea, and Kaanapali all have enriched values ranging from 6 to 11 in the yellow circles. The elevated N15 values in the 6 to 11 range are above background levels, and potential sources of enrichment in these areas include, but are not limited to, runoff from the use of fertilizers and/or reclaimed water for irrigation and leakage from septic tanks and cesspools. These areas definitely merit further investigation. Heavy N15 signatures, meaning 18 and above are in the orange and red circles, and correspond to areas with sewage injection wells in Kahului, Kihei, and Lahaina, or North Kaanapali, which shows that the injected reclaimed water is percolating into the near shore marine environment.

Since the Maui coastline study was able to successfully detect areas of concern due to the presence of elevated N15 values, we conducted another survey in May to map the injection well plumes from the Lahaina and Kihei Wastewater Treatment Plants. These maps show the collection sites for the Lahaina injection well plume. The previous N15

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

December 1, 2008

---

values of 43 and 35 are also displayed. The N15 of . . . and the N15 value of 43 is currently the highest known macroalgal N15 value in the literature.

At Kahekili Beach Park and .5 kilometers to the north, the shallow fore reef area harbors . . . has algae blooms in the summers when the large north swells are no longer persistent and the south swells are fewer and farther between. The Kahekili area also has bubbles that are released from the benthos up in the right hand corner and they have fresh water seeps that are warmer than ambient water. So, if you put your hand over the seep that's in the left corner there, it's actually quite warm, and the seeps are surrounded by rocks and coral rubble with black precipitates. These black precipitate is currently getting analyzed by USGS, but it is likely a result of an iron oxide, which is a result of anoxic conditions in the groundwater.

These are pictures of the same coral and crustose coralline algae or CCA interaction over time. This displays the loss of CCA to turf algae and subsequent coral tissue loss. Many examples of this were observed during our study, which strongly implies that the ability of turf algae to overgrow both CCA and corals is largely underestimated and is likely a strong factor in coral decline at Kahekili or North Kaanapali. CCA is an important factor in coral recruitment because the coral planulae, which is actually the first stage of a coral's life cycle, seek CCA to, to settle out of the water calm and create the next reef. So, in the absence of CCA it is likely that less and less coral recruits will settle and grow to maintain or even increase coral abundance in this area.

CHAIR ANDERSON: Could you explain what CCA is again? I mean I know you. . .

MS. DAILER: Right. I'll go back if it will let me. . . there. CC..., so in the first, first column, upper left corner, you can see that there's a white portion and then under that is a pinker sort of portion of the, of the--

CHAIR ANDERSON: Coral.

MS. DAILER: --coral piece. So, the pinker portion is the crustose coralline algae. It's a reef building algae and it's a very, very important part of the reef, not only for coral, coral recruitment but also to cement the reef together and make it strong.

CHAIR ANDERSON: So, it's a good algae?

MS. DAILER: Yeah, it's a really good algae. We need that.

CHAIR ANDERSON: Okay, thank you, that's fine.

MS. DAILER: Okay. Sorry. These are pictures from Kalama Park in Kihei, where we found the highest N15 values in Kihei in close proximity to the Kihei Wastewater Treatment Plant shown by the arrow.

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

**December 1, 2008**

---

CHAIR ANDERSON: Meghan?

MS. DAILER: Yeah.

CHAIR ANDERSON: Just for clarification, N15 value is the type of Nitrogen that is--

MS. DAILER: Yeah.

CHAIR ANDERSON: --found in sewage effluent?

MS. DAILER: Right.

CHAIR ANDERSON: Okay.

MS. DAILER: It's a signature if you want to think of it that way. Kind of like a signal. So, if you have a low signal, then it's either a background situation or it's a fertilizer situation, but any time you have an elevated signal it's indicative of some kind of serious microbe bacteria processes, which elevates the signal in and of itself. So, it drives it high.

CHAIR ANDERSON: And it's found to be specific from injection wells?

MS. DAILER: Not exactly injection wells specifically but any kind of sewage, you know.

CHAIR ANDERSON: Right.

MS. DAILER: Cesspools and septic tanks and all that would have high N15 as well because it has a lot of bacteria, anything with a lot of bacteria.

CHAIR ANDERSON: Okay, thank you.

MS. DAILER: Okay.

COUNCILMEMBER PONTANILLA: Got a question.

MS. DAILER: Yeah.

COUNCILMEMBER PONTANILLA: Did this study that you're, well this presentation, the study was done when?

MS. DAILER: Oh, this part..., that, the map that I showed was done in 2007.

COUNCILMEMBER PONTANILLA: Do you have anything like back in the '70s and the '80s when there weren't any treatment plant or sewer lines, you know, in Kihei but mostly cesspools, cesspools actually.

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

**December 1, 2008**

---

MS. DAILER: Well, unfortunately N15 wasn't really thought of back in '70s. So, we don't have any base line N15 data from that time.

COUNCILMEMBER PONTANILLA: Okay. Thank you.

CHAIR ANDERSON: Ms. Baisa.

COUNCILMEMBER BAISA: How far back do you have any other kind of base line that you could look at?

MS. DAILER: Unfortunately, the only base line of N15 was done by some colleagues of mine in 2003. So, very...

COUNCILMEMBER BAISA: Is it essentially the same or is it different?

MS. DAILER: It is the same where we have La Perouse is the very bottom of that map there and it's a low value and then it increases as you go north through Kihei and then they weren't able to find an 18 per se in their study but they did find elevated values. So, it is very. . . we do have some kind of reference to it but not 18. Eighteen was the first really pretty elevated value that we were concerned about.

COUNCILMEMBER BAISA: Thanks.

MS. DAILER: Yeah. Okay, any more questions?

CHAIR ANDERSON: Go ahead, Meghan.

MS. DAILER: Okay. So, this is pictures of Kalama Park in Kihei where we found the elevated value of 18 or 17.9. But these blooms in Kihei consist primarily of hypnea musciformis, which is in the lower right corner, and ulva fasciata, which is or. . .lower left, sorry, and ulva fasciata, which is in the lower right corner.

These are the maps showing the Kihei injection well plume collection sites for algal N15 values and a previous N15 at 17.9. The water on the reef flat in Kihei generally has high residence times, meaning that the reef flats have really poor water circulation so nutrients entering the reef flat will likely stay there until they are consumed by algae or bacteria. The magnitude of biomass continuously supported by the condition of the Kihei reef flats is relentlessly astonishing.

This is a picture Waipuilani Beach Park, which is quite far north of Kalama Beach Park but and actually has lower N15 values. So, this is probably not driven by effluent from the injection wells. Anyway, here's a picture of Waipuilani after the bulldozer has gone through and removed all of the algae on the beach.

By 6 p.m. that day, the algae is densely accumulated once again.

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

**December 1, 2008**

---

And by 7 in the morning, the beach is not a pleasant place to be, and so the bulldozer starts going all over again, every day.

Hypnea musciformis is actually dominating the benthic cover of another bay called Tavares Bay, just a little north of Paia, in the summer months. The excessive biomass washes ashore where massive, massive amounts of dead algae decompose on the beach. The low N15 value of 1.9 suggests that fertilizers are likely driving this bloom.

These are more pictures of Tavares Bay showing the excessive growth of hypnea musciformis and just how much it really takes over.

Since 2006, we have been running nutrient enrichment experiments on hypnea. They were all conducted with a set up very similar to this where each sample is grown in an individual one liter beaker with its own bubbler for aeration. We have tried a number of Nitrogen and Phosphorus addition experiments to explore the effects of Nitrogen and Phosphorus independently and in combination of the two on the growth and photosynthetic status of hypnea. These experiments usually lasted for about seven days and during the experiments the water in each one liter beaker is changed every day to maintain the desired nutrient concentrations. One of the most consistent observations was the response of hypnea to the lack of nutrients.

This is an example from one of the experiments. It is the response of hypnea on day seven to the treatments where those . . .the plants given any combination of Nitrogen is clearly distinct from those that were not given Nitrogen. So, these ones were only given Phosphorus and these ones were only given Nitrogen. And you can see that it takes a Nitrogen addition to maintain this dark purple color. The dark purple color is actually from a pigment called a phycobilin and the fact that it turns this color only when given Nitrogen sort of indicates that it can be used as a Nitrogen indicator in the field.

Surprisingly, we found no significant difference between the growth and the No Addition treatment and any combination of Nitrogen and Phosphorus.

CHAIR ANDERSON: Meghan?

MS. DAILER: Yep.

CHAIR ANDERSON: Is the hypnea. . .does it have a Hawaiian name? Is it?

MS. DAILER: No, it's invasive.

CHAIR ANDERSON: It's invasive?

MS. DAILER: Right.

## WATER RESOURCES COMMITTEE MINUTES

Council of the County of Maui

December 1, 2008

---

CHAIR ANDERSON: It's not ogo or any kind of Hawaiian?

MS. DAILER: No. Unfortunately, people don't like to eat hypnea. It's not native here. It was introduced by a researcher from the University of Hawaii in the '70s. Okay.

CHAIR ANDERSON: Glad you're on the job.

MS. DAILER: Right.

CHAIR ANDERSON: Okay.

MS. DAILER: So, the previously mentioned Maui coastline survey of intertidal macroalgae successfully detected, you know, elevated N15 values of samples that were likely influenced by sewage effluent percolating into the near shore marine environment. But we were not able to reproduce observed growth rates of these plants in . . . that we've seen in the field while we were doing our laboratory nutrient enrichments. So, for this reason, we decided to try to see how these plants would respond to additions of sewage effluent. So, we tried these experiments on four different algae, both bloom and non-bloom species and the treatments were as follows: no addition of sewage effluent at all, 25, 50, 75, 100, 150, and 200 mls of sewage effluent.

These are the plants that we ran our experiments on. Hypnea and acanthophora are both invasive. Ulva and dictyota are both native. Hypnea, acanthophora, and ulva are all bloom forming in some kind of way on Maui. And dictyota is just a very common, high light reef plant that's found throughout Hawaii.

Okay. So, all species were acclimated to water from Olowalu, an area of low anthropogenic impact for seven days to obtain nutrient deplete status. Then all species were separately subjected to the, the series dilution experiment to determine their response to effluent in terms of growth, photosynthetic status, N15 values, and nutrient uptake rates. In addition, we wanted to determine if the tissue composition, so their percent carbon, percent nitrogen, and percent phosphorus, was representative of their surrounding available nutrient concentrations, and what micro-nutrients, such as Zinc, Iron, Molybdenum, and Manganese, could possibly limit photosynthesis and growth in these species.

This is going to display the sequential photographs of the same piece of hypnea per treatment over time. All samples initially look and weigh the same on day zero. By day three, you can see that the plants in the upper additions starting around 75 mls and above are a little bit darker, but they don't seem larger . . . *(change tape, start 1B)*. . . than those in the lower additions. By day six, you can see that the increased pigmentation has continued. They are obviously darker and now they are larger than those in the lower treatments, which continues to the ninth day, where the pattern of increased pigmentation and growth is clearly displayed in the higher treatments.

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

**December 1, 2008**

---

This graph shows the percent increase in wet weight of hypnea in response to the treatments for different time periods. The black circles are from day zero to three. The blue squares are from days zero to six and the green diamonds are from days zero to nine. As you can see, just from a small addition of 25 mls there is a clear elevation of growth. The highest growth was found in the 200 ml treatment at over 300 percent increase in wet weight in nine days.

This graph shows the Nitrogen content in micrograms of hypnea musciformis to . . . in the following conditions: the Waipuilani Beach Park bloom, acclimation to water for, from Olowalu for seven days, the No Addition of sewage effluent treatment, and additions of sewage effluent from 25 to 200 mls. Significant differences are represented by different letters. A significant decline in Nitrogen content occurred when plants were acclimated to water from Olowalu for seven days. A significant increase occurred when samples were given 50 mls of sewage effluent and above. No significant difference was found between treatments of 75 mls and above.

This graph displays the N15 values of hypnea in response to the following conditions: Waipuilani Beach Park bloom status, acclimation to water from Olowalu for seven days, No Addition of sewage effluent, and additions of sewage effluent from 25 to 200 mls. Significant differences are again represented by different letters. No significant difference was found between the Waipuilani Beach Park's bloom status, acclimated samples, and the No Addition treatment. Whereas, a significant increase was found with the addition of 25 mls and above. No significant difference was found between the samples in the treatments of 75 mls and above.

This displays the sequential photographs of the same piece of acanthophora per treatment over time. All samples again look . . . initially look and weigh the same on day zero. On day six, the plants in the upper addition treatments are obviously darker but not larger than those in the lower additions. On day nine, the pattern of increased pigmentation is clear but the samples do not appear much larger.

This is the percent increase in wet weight of acanthophora for the time periods. Day zero to day three in black circles. Day zero to day six in blue squares and day zero to day nine in green diamonds. The highest growth was found from day zero to nine in the 100 ml treatment coming in at under 100 percent increase.

This displays the sequential photographs of ulva over time and let's see. All samples again look and weigh the same on day zero. By day six, the plants in the upper addition treatments are obviously darker and larger than those in the lower addition treatments, similar to the . . . to hypnea's response, which continues again to the ninth day, where the pattern of increased pigmentation and growth is clearly displayed in the higher treatments.

So this is the percent increase in wet weight of hyp..., of ulva. Day zero to day three is black circles, day zero to day six is blue squares, and day zero to day nine is the green

## WATER RESOURCES COMMITTEE MINUTES

Council of the County of Maui

December 1, 2008

---

diamonds. And as you can see, there is a clear elevation from just a small addition of 25 mls of effluent from the day zero to day nine time period. And the highest growth was found from the 100 to 200 ml additions and it came out around 300 percent increase in nine days.

COUNCILMEMBER PONTANILLA: Question, question?

MS. DAILER: Yep.

COUNCILMEMBER PONTANILLA: Is this the seaweed that some of the farmers use for fertilizer?

MS. DAILER: They can. I think actually we're still waiting on some of the data from these experiments, but I think hypnea might be better to use as a fertilizer, probably has more Nitrogen in it.

COUNCILMEMBER PONTANILLA: And not ulva?

MS. DAILER: They could, they could use it, they do. Yes, they can.

COUNCILMEMBER PONTANILLA: Okay, thank you.

MS. DAILER: Okay, and the last species. These are the sequential photographs from the same piece of dictyota per treatment over time. All samples initially look and weigh the same on day zero. On day six the plants in the upper addition treatments are obviously darker, but they're not larger than those in the lower treatments. This is similar to acanthophora's response. On day nine the pattern of increased pigmentation is clear in the higher treatments, but the samples do not appear much larger than those in the lower treatments.

This is the percent increase in wet weight of dictyota in response to the sewage effluent addition treatments. And the highest growth was found in the 200 ml treatment coming in at about 100 percent increase in nine days.

Okay. This is the Relative Growth Rate or RGR from days zero to nine of hypnea in blue squares, ulva in green diamonds, acanthophora in black circles, and dictyota in brown triangles. Significant differences are represented by different letters and pertain to comparisons between treatment for the same species and between species for the same treatment. Highly significant differences in Relative Growth Rates were found between the No Addition and all treatments above 25 mls for hypnea and above 50 mls for ulva, while no significant difference was found among any treatment for acanthophora or dictyota. In addition, the RGR's or Relative Growth Rates of hypnea and ulva from the 50 ml all the way through the 200 ml additions were significantly higher than those of acanthophora and dictyota. This shows that in terms of growth, hypnea and ulva

## WATER RESOURCES COMMITTEE MINUTES

Council of the County of Maui

December 1, 2008

---

similarly respond to excess nutrients more positively and faster than acanthophora and dictyota.

In closing, some of our important findings so far are that on Maui, the most elevated, elevated macroalgal N15 values are in close proximity to sewage injection wells. Ulva and hypnea grow faster with the nutrient mixture in sewage effluent than without nutrients. This mixture is likely similar to agricultural, urban, and landscaping runoff, meaning that the plants don't need effluent to grow per se. They just need the right nutrient mixture. In only nine days, hypnea is capable of significantly increasing Nitrogen content and N15 values in response to sewage effluent. With the nutrients in the treatments of 50 milliliters and above hypnea and ulva grow faster than the other two reef plants tested the, the invasive acanthophora and the native dictyota. In response to elevated nutrients, all species look healthier. Hypnea and acanthophora had changed the most in terms of color, which is because of the phycobilin pigmentation. From these experiments it is clear that algal blooms on Maui of hypnea and ulva are driven by an excess of land based nutrients.

This is a picture of the reef flat at Kalama Park and there are a few surfers way off in the, the left hand corner there that you can barely see. But all of the dark coloration in the water is the algae bloom of ulva and hypnea. Any questions?

CHAIR ANDERSON: Thank you, Meghan. Members, do any of you have questions that would be related to a slide that you would have. . .like to see again? Ms. Baisa? Otherwise, we're gonna put the screen up and ask questions with the lights on, but if you have questions that relate to the screen. . .to the slides on the screen, let's take those now.

COUNCILMEMBER BAISA: Well, I don't know if you want to ask this now, if I should ask this now or later. But I'm looking at this slide and what it's done is remind me of the days when Kahului Harbor used to look like this and they used to go in and rake it out. And remember we had that horrible problem with smell and whatever.

CHAIR ANDERSON: Yeah. They vacuumed it up.

COUNCILMEMBER BAISA: It's gone. Now what happened there to change that? I'm just curious.

CHAIR ANDERSON: Yeah, Russell can answer that for us.

MR. SPARKS: Okay. Again, my name is Russell Sparks with the Department of Land and Natural Resources, Aquatic Resources Division. That's something I mentioned the last time I was speaking with you folks about a year ago as well. And unfortunately, we didn't have a lot data prior or after but what clearly coincided with that was the discontinuance of injection wells that Maui Land & Pine Cannery was using to dispose of dirty wash water. So, when the pineapple was coming in and being processed there was a lot of slurry of high organic pineapple material that was washed off the equipment and

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

December 1, 2008

---

that was injected into the ground right by Sears, the corner of Sears and Kaahumanu Avenue. That stopped, I think in the late 1997 or early 1998 that discontinued, partly because there was an explosion that occurred at the cannery when a lot of methane gas was percolating up through the ground from all that organic matter that was underground. And so there was an investigation on that and then they, they discontinued the injection and they piped the water over to the cane fields, more in the Central portion of the island.

Then it, you know, basically the records of the County show that by about 2000, the year 2000 or so about half as much seaweed was needing to be removed. And by 2001 or 2000, yeah, I think around 2001, they no longer had to pump it out and remove it at all. So, that coincides roughly with some estimates from the US Geological Survey that it takes about three years or so for the groundwater to kind of flush out and clear. So, again, it's just anecdotal. It's kind of correlating things. We don't have any hard water quality data to, to correspond with that but it seems pretty clear.

COUNCILMEMBER BAISA: Thank you very much. That's a good explanation because, you know, it used to look really bad like this and with that picture that we saw also of all the algae on the sand, we don't see that anymore. Thank you.

MR. SPARKS: You're welcome.

CHAIR ANDERSON: Well, we see it in Kihei.

COUNCILMEMBER BAISA: Well, not, not in the harbor.

CHAIR ANDERSON: Yeah. Okay, Members, any other questions while the screen is up? If not, we're going to take a recess, bring our resource people up, and put the screen up, and reconvene. So, please stay nearby. Committee is in recess. . . .(gavel). . .

**RECESS: 10:02 A.M.**

**RECONVENE: 10:05 A.M.**

CHAIR ANDERSON: . . .(gavel). . . Water Resource meeting is now reconvened. Members, we have with us today as resource people to help with any questions you might have, not only Meghan who just gave us, Meghan Dialer [sic] is that, right?

MS. DAILER: Dailer.

CHAIR ANDERSON: I have to respell that. Sorry. Dailer. Thank you, Meghan, for that presentation. And I'm sure we'll have many questions 'cause we are not biologists here. Also, we have Russell Sparks who is the Education Specialist for the Aquatic Resources Division of DLNR, and thank you for being here, Russell. Also, we have Steve Parabolicoli. He's with the County's Wastewater Division. He is the Water Recycling Coordinator for the County of Maui. So, Members, did I ask if there's anyone here who

**WATER RESOURCES COMMITTEE MINUTES**

**Council of the County of Maui**

**December 1, 2008**

---

wants to testify? I was going to do that. Okay, seeing none, then we will close public testimony.

COUNCIL MEMBERS: No objections.

CHAIR ANDERSON: Okay, thank you. I'm going to open it up to questions to see where we want to go with this, Members. Mr. Victorino.

VICE-CHAIR VICTORINO: Yes, thank you, Madam Chair. My first question would be basically going out to Paia to Tavares Bay because I think I have a pretty good understanding about injection wells and what ramifications that it's had. But out there in Tavares Bay, there really isn't any injection wells or anything close proximity. This has been an agricultural area for more years than many of us can count or even been on this earth. So, my question to you is this bloom that has been occurring and you said that this is only recently, there's no background, there's no former studies, anything to show how long this has been occurring, Ms., yeah.

MS. DAILER: Okay. So, actually, is that, is that good. Can you hear me?

CHAIR ANDERSON: Yeah.

MS. DAILER: So, conveniently the land owner at Tavares Bay is Tavares himself and it has been in his family since 1910 or something. So, they do remember when hypnea showed up there and when the blooms started to happen there. It was in the '80s, '85 about. And apparently, there was. . .it's, I could be wrong, maybe Steve can help me out on this but when the sewer lines were put in, in that area, they seem to think that it was around the same time that actually when the sewer lines were put in all of a sudden the blooms started happening. And since it does have a low N15 value maybe what happened is that they sort of. . .it was a natural river there anyway. So maybe when they dug through and made the lines it sort of opened the gateway for water to flow through again or something, and it, I mean, it's a low N15 so I'm very, I'm, I'm, I thought it was some kind of, you know, sewage thing again too. But since it's a low N15 I'm pretty certain that it's, it's a fertilizer driven situation. And there's a lot of fresh water coming out of that ground in the, in the bay that's very, very cold. So, we have to. . .that's sort of the next investigation but we're. . .the reason of it, of it happening, you know, it wasn't always there. It happened in '85. It was linked to, you know, when the sewer lines were put in so all of those things just maybe the groundwater was allowed to flow through again or something.

VICE-CHAIR VICTORINO: So, you think maybe through prior years to that it was somehow blocked or not allowed to flow?

MS. DAILER: Maybe, yeah, I mean. . .

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

December 1, 2008

---

VICE-CHAIR VICTORINO: Because, I mean, this has been an agricultural area, area for a long, long, long time and then Mr. Tavares can verify, verify that.

MS. DAILER: Yeah.

VICE-CHAIR VICTORINO: I would assume every time you had heavy rains and I remember as a kid when we had heavy rains down there. Tavares Bay would be brown and, you know, comes off of the, the sugarcane fields and in fact today probably less production in that area than used to.

MS. DAILER: And less fertilizers.

VICE-CHAIR VICTORINO: Yeah, see so, I mean, yeah, kind of. It's kind of a baffling one and I guess you need to look more into but I was curious why this particular area had such a bloom.

MS. DAILER: It's not only there.

VICE-CHAIR VICTORINO: Yeah, okay, where else?

MS. DAILER: Oh no, no, no, no. It spreads from. . .it spreads along the entire coastline. Paia Bay is just. . .it was an easy place for us to work because Tavares was very concerned about the algae problem in his bay. And we could put a whole bunch of experiments out there and not have people come and vandalism them. So, that's why we like to work there in specifics but I mean all along the whole coastline is. . .you can find excess algal growth of hypnea and ulva from Paia, from a little north of Paia or I mean little north of Tavares Bay all the way to Spreckelsville, you know, all the way through that area.

VICE-CHAIR VICTORINO: So, you think maybe and, and our treatment plant may be injecting in the, the injection wells along that area? Maybe also having effluent in that, in that respect?

MS. DAILER: I would doubt it because most of those sites have low N15 values as well.

VICE-CHAIR VICTORINO: So, this low N15 values, not. . .you seem to keep talking about that and, and again, Ms. Anderson asked you a number of times.

MS. DAILER: To explain it.

VICE-CHAIR VICTORINO: Yeah, kind of just give us a real simple, you know, I mean, real simplistic way of what does that mean--

MS. DAILER: Okay.

VICE-CHAIR VICTORINO: --to me as a person?

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

**December 1, 2008**

---

MS. DAILER: Right. So, it's basically just a measure of the source. So, it's like the plants in and of themselves growing excessively is the indication that you have some kind of nutrient loading going on from what our recent work shows, right. The right combination of too much nutrients coming in. So, the next question is where does it come from? And if you have this N15 as a new measure and I know it's not an easy concept to understand, but in the most simplistic form if you have a low value, then it's, it's basically a fertilizer signal. If you have an elevated value, a high value, it's a, it's a sewage signal. That's in the most simplistic form of anything, that's what it is.

CHAIR ANDERSON: And, and N15 is a high value?

MS. DAILER: N15 is the terminology. It's really Delta N15, but I left the Delta out because it's even more complicated. So, it's a, it's real..., N15 is just the way it's the terminology. So, like in the title of a paper it says heavy N15 signatures, you know, and then it's like the actual value is up at 25 in the particular paper that has 25. So, like our highest N15 value on Maui is 43, you know, like our. . .the actual value itself is the number that you get back from the laboratory that analyzes it for you. But they're all N15, you know, so.

CHAIR ANDERSON: It's the type of Nitrogen.

MS. DAILER: Yes.

CHAIR ANDERSON: N15 is the type of Nitrogen.

MS. DAILER: Yeah, basically.

CHAIR ANDERSON: Which is, which is?

MS. DAILER: It's the type of analysis, really.

CHAIR ANDERSON: Which is significantly connected with injection or sewage?

MS. DAILER: Or fertilizers, if it's really low.

CHAIR ANDERSON: If it's really low, it's fertilizer?

MS. DAILER: Yeah.

CHAIR ANDERSON: And if it's high, it's sewage?

MS. DAILER: Right.

CHAIR ANDERSON: Okay, does that help?

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

**December 1, 2008**

---

VICE-CHAIR VICTORINO: It does. Thank you, Chair. I'll let others . . . *(inaudible)* . . .

CHAIR ANDERSON: None of us are scientist here.

VICE-CHAIR VICTORINO: Yeah.

MS. DAILER: I know, sorry.

CHAIR ANDERSON: Mr. Pontanilla.

COUNCILMEMBER PONTANILLA: Thank you. Along that lines of Mr. Victorino, the injection wells at the Kahului Treatment Plant, how does current. . . does current plays a part in regards to moving of effluent, you know, going north of the coastline or even south towards Kahakuloa in those areas?

MS. DAILER: Russell, you know about the currents in that area?

CHAIR ANDERSON: Russell Sparks.

MR. SPARKS: Yeah, the currents are really, really difficult to interpret. What, what Meghan's looking at is right on the shoreline, the algae itself, the seaweed, and the analysis will tell her if that source of nutrient is from the wastewater plant. What happens when those nutrient rich waters get up into the ocean is anybody's guess. Now, one thing you can notice if you. . . calm days after a lot of, you know, not too much surf, not too much wind, you look at Kahului around Kanaha area, the water tends to be kind of green. You guys notice that? That's phytoplankton. So, microscopic plant cells in the water will bloom on all that nutrient and the water just comes kind of green. But once it gets a little deeper offshore it probably flushes into the open ocean pretty quick. One of the, the main concerns we have with groundwater whether it be injected or just percolating down from the agricultural fields is that when the groundwater percolates back up in the near shore, it's coming up through the sediments, through the reef up, and that's where the plants are of seaweed, and the seaweed then grabs that nutrient really effectively and grows. And that probably if you were to take samples of water in the ocean just above that you would get really low levels because the seaweed itself is scrubbing it out and removing it. So, what we're seeing with the seaweed is, you know, it's doing what it's supposed to do, but it blooms because of the excess nutrients. That impacts the health of the coral reef and also causes it to pile up on the beach and rot and stink and so forth.

COUNCILMEMBER PONTANILLA: Thank you. You, you mentioned the wash off from Maui Land & Pine at one time used to go Kahului Harbor but now it's being directed to a cane field probably across Maui Lani.

MR. SPARKS: Yeah.

## WATER RESOURCES COMMITTEE MINUTES

Council of the County of Maui

December 1, 2008

---

COUNCILMEMBER PONTANILLA: How does that affect the ocean through groundwater, you know, going towards the ocean?

MR. SPARKS: You know, it probably affects the ocean somewhat just like use of fertilizers and, and excessive irrigation on these ag fields does as well, right, if you have a lot of agriculture there is excess runoff. It works its way down into the ground, comes up into the ocean. But if you think about it, if you inject that water, you bypass any plants, any other chemical or biological processes as it percolates down. If, if used properly and Steve probably can talk to this more, but if you use reuse properly and you cut back on your fertilizer input, the plants themselves should pull a lot of that nutrients out of the water while it's in the root area and then it, you know, it will clean, it will percolate down into the groundwater and then work its way out. So, it should remove a lot of that excess nutrients. There's very little chance for that when you inject it straight down, you bypass the plants.

COUNCILMEMBER PONTANILLA: Okay, maybe a question for Steve. You know, we always talk about recycling that water at the Kahului Treatment Plant, and I've got estimates in regards to, you know, how much it's going to cost to retrofit the plant itself, how much it's going to cost to bring in a transmission line. I don't know, maybe if you know the answer. What's the possibility of probably hooking up towards that Maui Land & Pine line that goes into the cane field as a means of, you know, providing water to agricultural or even the Maui Lani Golf Course, so that we don't utilize, you know, well water, probably in the golf course for one thing?

MR. PARABICOLI: Well, that's certainly an option. You know, years ago we looked at building a pipeline. We did a feasibility study looking at the, the major irrigated areas in Central Maui, such as, you know, War Memorial Stadium, Maui Community College, and places like that. And their water source that they use is nonpotable brackish water, which is very, very inexpensive and pretty good quality. So, you know, we didn't feel like it was cost effective for us to spend money in that area of Maui. We focused our resources in South and West Maui to develop recycled water lines. But, you know, the option always is there to possibly send a line to agriculture where, you know, they could probably take every drop of that R-2 recycled water from Kahului Treatment Plant. It's just a matter of trying. . .finding the funding, making, developing recycled water distribution lines a higher priority within Maui County. At this point in time, it is not a high priority to, to develop more recycled water systems.

COUNCILMEMBER PONTANILLA: Thank you. One question for Meghan, final question.

CHAIR ANDERSON: Yeah.

COUNCILMEMBER PONTANILLA: You know, your, your study in regards to the three treatment plants here in Maui County, the Lahaina Plant, the Kahului Plant, as well as the Kihei Plant. Give me your thoughts about, you know, development, subdivision, or, or resorts utilizing or constructing their own plant and reusing the recycled water that they

**WATER RESOURCES COMMITTEE MINUTES**

**Council of the County of Maui**

**December 1, 2008**

---

get from their subdivision or resort area for irrigation. Would that help stop the algae bloom because of, you know, things being pumped into the ocean?

MS. DAILER: That's an excellent question. I think as long as the developments are treating their water sufficiently enough to not. . .if that water actually leached off the land and went into the ocean, if it wouldn't cause an algae bloom because it doesn't have a lot of nutrients in it, then it's fine. If they are not going to treat it to levels that won't impact the environment, then it's probably not a good idea. So, it all depends on the level of treatment.

COUNCILMEMBER PONTANILLA: Thank you. Is, is there someone in the State that probably can provide us that study whenever, you know, private plants are built?

MS. DAILER: Provide a study to see if it's impacting them--

COUNCILMEMBER PONTANILLA: Yeah.

MS. DAILER: --or not? Yeah, that would be a Total Maximum Daily Load Study. So, Robin Knox is in the audience here and she is very familiar with the procedures of those kinds of studies and is very capable of handling that kind of situation.

CHAIR ANDERSON: Let's have Robin come up.

COUNCILMEMBER PONTANILLA: Yeah.

CHAIR ANDERSON: Robin is a water quality consultant who has experience in...actually a civil engineer in wastewater training, treatment design, and a former wastewater permit writer. And I know has done work on Total Maximum Daily Load, which is a measurement that the State actually and the Federal government uses to determine how much pollutants loadings are in runoff. So, Robin, could you answer Mr. Pontanilla's question? Thank you for being here.

MS. KNOX: Can you state the question again to make sure that I am pointed on my answer? Because I can talk all day on the topic.

COUNCILMEMBER PONTANILLA: Good morning. Yeah, my question to Meghan earlier was about private wastewater plants in regards to, you know, how do we know, you know, those recycled water that, you know, they're utilizing for irrigation, you know, what is the effect to the environment and, and if there's studies made? And Meghan kind of explained that there is a report that goes to somewhere, probably Department of Health, that would review this thing to make sure that, you know, the environmental, the environment is not harmed.

MS. KNOX: Right, and I, I thought her answer was excellent in that it depends on how you treat the wastewater, as well as how you distribute it when you reuse it and how . . .(change

## WATER RESOURCES COMMITTEE MINUTES

Council of the County of Maui

December 1, 2008

---

*tape, start 2A).* . . that if you think of everything in terms of movement of materials, you know, how. . . where are those materials going, just keep asking yourself, where does it go from there, and, and what happens. And there actually is a Federal program that is implemented by the State Department of Health that looks at this exact question of trying to decide what treatment level is good enough and it also has to include all these things we've been talking about today like different sources may affect environmental conditions or ecology differently and conditions like the ocean conditions and the groundwater flow conditions. All of these things we know and, you know, I can tell from your questions that these things are all, all must considered. It's not just looking at injection wells and saying this is the problem.

So, there, there is this Federal program under the Clean Water Act, where DOH does continuous monitoring, well, not, they continually monitor at different places, and they report to Congress every two years on how we're doing on meeting the State Water Quality Standards. Now, the State Water Quality Standards are established under the Clean Water Act and they're designed to protect the biology, the physical integrity, and the chemical integrity of the water. So, when we see the biology being disrupted, the coral dying, the, the algae blooms, that's telling us we're not meeting our goals here.

So, DOH has reported to Congress that the coastlines from Kaanapali all the way to Makena are impaired waters and I was doing some quick calculations when I looked at Meghan's graph where she graphed out the sewage additions. She started seeing. . . it looked. . . there was like a break point in the curve at 50 mls, and if I backed that out if my numbers are right, that's like 350 micrograms per liter of, of based on Steve's number of seven milligram per liter average total Nitrogen. And that is above the State Water Quality Standards. So, if we were meeting the standard we wouldn't be getting to that break point where the algae bloom is happening. So that for me was kind of a good confirmation that maybe our standards are on track but, you know, we need to control sources.

And so this process that they have, they report to Congress that the waters are impaired. Once that happens then the TMDL study is required. So, it's already required for our whole coastline where our major resort areas and major population areas are, and Kahului also has been listed. So, these waters are already officially reported to Congress as impaired. These studies are already required. Unfortunately, because in our State we have problems like the Ala Wai Canal going on where there is serious and immediate risks to human health Maui is kind of rating a little bit low on the priority list. But that doesn't mean that, that we have to wait. It's considered the Court's have found that it's eight to 13 years is considered a reasonable time frame for a State to get around to doing a TMDL once they've listed these waters. And I think most of these first got listed in 2004 through 2008. If we wait that long to start to address the problem, you know, I think Russell would probably support and Meghan that we're not going to have much left to save.

## WATER RESOURCES COMMITTEE MINUTES

Council of the County of Maui

December 1, 2008

---

So, there's nothing that stops us right now from starting to do what the Clean Water Act is going to do anyway. And one of the things I think we could do is whenever the County is writing all these permit requirements for SMA permits if we could somehow congeal those into a unified monitoring program, we could support the State, and we could set the stage for getting the studies done faster because the more data that's available the higher the priority goes. And also if we acknowledge this connection to the injection wells that, that also raises priority because EPA is mandated to control pollution from sewage sources. So, we can take the monies that are already being spent by resorts and developers and permit applicants and we can consolidate that into some kind of Countywide monitoring program for these areas that could support the State and help us get higher priority.

Now, these lists, this impaired waters list and the TMDL studies are also significant because they. . .it's like the TMDL is the pie and we're going to divide the pie up. We're going to give the County a piece for their sewage wells. We're going to give all of these individual treatment plant owners that we're talking about potentially having give them a piece of the pie. And we have to have a piece for the natural background level that Meghan talked about. And then agriculture and other runoff has to have a piece. And right now urban runoff is not considered under mandatory controls but in the near future as Maui's population increases and water quality problems get worse EPA may come in and say to the County you have to control your runoff quality. So, these things are coming and it's just a matter of time before the Federal government gets around to it. But I think it would behoove us given that, you know, life itself, not to mention our economy and quality of life are dependent on these ecosystems, on these reefs. None of us want to live on a Maui that doesn't have these reefs.

And so, you know, my, my read on the thing is that there are things that we can all agree on and move forward with right now as a community. We saw this at the Lahaina injection well permit hearing with EPA. The community, all different sectors of the community were saying to EPA, we want this problem solved. And I think water reuse is part of it. Right now is an opportunity like I've never seen before in 25 years in wastewater work for, you know, since they stopped the construction grants program there hasn't been much opportunity for funding. But right now I got a, I'm on the Water Environment Federation Watershed Planning Committee and they sent out an email asking do you know any green infrastructure projects that could go to construction within six months because Obama has requested a list of them. And, you know, our Senator is head of the Committee giving out the money, a Hawaiian native is the President, we, the economic stimulus there's no reason the economic stimulus can't be solving this problem and putting in water reuse improving our wastewater treatment. I think we can get Federal funding but we have to get in the game. We have to define the problem and I think as a County that the County of Maui really has an opportunity to be a significant facilitator here in helping the State to implement these Federal requirements.

CHAIR ANDERSON: Thank you, Meghan [*sic*].

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

**December 1, 2008**

---

COUNCILMEMBER PONTANILLA: Thank you, Chairman.

CHAIR ANDERSON: Yeah, I think you got more than you asked for.

COUNCILMEMBER PONTANILLA: For real.

CHAIR ANDERSON: But that's okay.

COUNCILMEMBER PONTANILLA: I, I got one more.

CHAIR ANDERSON: Yeah.

COUNCILMEMBER PONTANILLA: Animal waste. How does that play a part in, in regards to runoffs?

MS. KNOX: That is definitely a part of it and in recent years it's become a regulated mandatory control on, on what are called Concentrated Animal Feeding Operations, and I understand that this has been an economic factor for some of our producers on Maui and why they've gone out of business because the cost of compliance. I think again that's where if we do watershed planning and we try to identify where all the problems really are coming from that we can help like get NRDC and some of the USDA agencies involved in helping those producers so we don't lose that part of our economy.

The watershed planning is something else the County can get involved with without any, you know, waiting for the Federal government. And it's a way to look at things within each ahupuaa and try to determine where do we need to put our focus and it, it stops all this finger pointing of it's your fault, it's your fault, and it looks at it we're all together in this, you know, how can we best spend our tax dollars to solve this problem and help each other because some, you know, like Meghan's work is showing maybe sewage might be a richer mix to fuel algae than some other sources of Nitrogen. We don't know that yet but it's got a lot of micro nutrients and other things in it.

And one more thing back to your original question. I, I would just caution the County against the idea of having a lot of individual treatment plant, either water or wastewater treatment plant owners, just looking at regulatory scenarios across the country. That can be a formula for disaster because right now the State and the County are struggling with trying to manage a limited number of these sources. If you start having every as we. . .we have some example of in Maalaea if you start letting every condo have their own treatment plant it gets to be something more difficult to manage from the resource standpoint. So, I would be one to more support the County, you know, working with the County and our, our Congressional delegation to try and get money to improve the County's infrastructure rather than saying you guys provide your own.

CHAIR ANDERSON: Okay, thank you, Meghan [*sic*].

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

December 1, 2008

---

COUNCILMEMBER PONTANILLA: Thank you.

CHAIR ANDERSON: Thank you, Mr. Pontanilla. You know, I, I just want to kind of focus back a bit on Ms. Dailer's report if I could because, you know, it's very alarming to us who are concerned about the near shore waters and our reefs to see the study that the DLNR folks did that show the, the death of our reef actually from this, you know, extreme algae growth. And, you know, now that you've isolated the type of Nit..., Nitrogen that is coming from sewage treatment plants that is associated with the higher growth of algae. Could you, you know, I know in the study that we got, excuse me, from DLNR Aquatic Resources, that they identified the decline of the coral reef system off Maalaea as, you know, the fastest known degradation of a reef system in the world. So, I mean, for that to happen on Maui is pretty astounding to me. So, is there any indication that there are other places in the world with high N15 indicators like we have here on Maui? Or are we a . . . go ahead and say it Meghan.

MS. DAILER: We have the highest N15 value in the world right now.

CHAIR ANDERSON: Could you get yourself closer to your mic?

MS. DAILER: We currently have the highest N15 value in the literature, meaning after a pretty substantial search of through scientific articles on N15 values. Nobody has as high of a value as we do. That doesn't mean though that, you know, we have the highest loads of Nitrogen in the world. We basically for some reason as the water is traveling from the sewage treatment plant through the ground to the reef, it's getting more and more and more denitrified. So, that's just. . .it's, it's indicative of the fact that we probably have a lot of bacteria growing in the ground there with the water or something.

CHAIR ANDERSON: And we're volcanic and, you know, we're not, we're kind of unique, I think.

MS. DAILER: Yeah.

CHAIR ANDERSON: A unique, geographic or geological formation. The fact that we have these salt water basal lens that force the water even with nutrients to the surface along the seeps. A lot of those things probably contribute to the high Nitrogen value from the sewage treatment causing, you know, getting right out there to the reef system without a whole lot of anything holding that back.

MS. DAILER: Right, I do, if I could. I just want to reiterate the fact that even though the algae seem to like growing in effluent it's not only sewage effluent that has that mixture of nutrients that the plants like. Fertilizers are used specifically to grow plants. So, they are going. . .if they're going to runoff into the ocean, they're going to fuel a bloom just as easily as effluent will. It's just that. . .Steve Parabolicoli who was willing to let me use the effluent and I thought of using that first. So, we do know that it is an array of micro

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

**December 1, 2008**

---

nutrients that the algae also need but I'm pretty sure that it's also in agricultural runoff, so.

CHAIR ANDERSON: Ms. Baisa.

COUNCILMEMBER BAISA: Thank you very much, Chair. I thank you and I'd like to also thank Robin for all of the information. Robin answered a lot of my questions. But I do have a question. You know, we've heard a lot about the problem. We've heard about. . .we think we know what the causes are. I'm very interested, Steve, all this effluent apparently is coming out of, you know, wastewater. What do you see as things that we might be able to do here in order to stop some of this?

MR. PARABICOLI: Well, I said it earlier. Well, let me back, back up, you know, we, we have developed fairly good recycled water distribution systems in South Maui and West Maui. And basically, it was the Wastewater Division that, you know, took the loans, you know, the State revolving fund loans or floated bonds to fund those. . .that, that infrastructure. And that was ten to 15 years ago. So, we took on the debt service and you know we've been doing pretty, pretty good job reusing maybe 25 to 35 percent of the respective facilities effluent in those areas. But since that time, as time has gone on, the priority of funding more distribution for recycled water has, has, has been dropping lower and lower with each year. And in order for us to reuse more recycled water we need to distribute it to where it, it needs to go. It's a valuable water resource that is being wasted. At the same time, there were concerns that the injection wells may be contributing or are contributing to coral reef decline and invasive seaweed.

So, if you, if you ask me I think we can kill two birds with one stone by making the construction of recycled water distribution a much higher priority here in Maui County, now whether, whether those funds will have to come from Wastewater, from the Water Department, from the General Fund, that's not really for me to decide. But in general, we need to make the distribution of recycled water distribution a much higher priority. Right now, it's, it's nothing. We're not getting any money at all or, or requesting any money for more distribution. Any extension to our systems are now being funded by developers who need the water but that doesn't really solve the problem of excess recycled water 'cause those developers while they will be using some recycled water their developments will also be producing sewage. So, you're lucky to break even. That result will be even more water being injected.

COUNCILMEMBER BAISA: I have two more questions along this line. The other is what do you think is a, you know, I know this is just guesstimate of what it would cost us to begin this process of using more recycled water. How many millions are we talking about?

MR. PARABICOLI: Well, I mean, if you look at the three areas of Maui. If you gave me \$200 million right now I could do. . .work wonders for you.

CHAIR ANDERSON: For all three systems?

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

**December 1, 2008**

---

MR. PARABICOLI: That would get. . .that would be a good start.

COUNCILMEMBER BAISA: I, I think it's really important to, to know this and to think about this and put it foremost because, you know, until we solve the problem we can sit here and talk about it 'till the cows come home, but we need to get going on trying to solve it and obviously there's a big money issue here that we have to deal with.

The other thing that I heard was the quality of the water coming out and being injected into the injection wells. Is that adequate or can we fix that?

MR. PARABICOLI: Well, the quality of the, the water is probably is, is as good as it's ever been and, you know, ten to 12 years ago in, in, at our Kihei and our Lahaina Plants, we instituted biological nutra removal systems at those facilities. Now, prior to that, we were probably injecting effluent with total Nitrogen concentrations of about 20 milligrams per liter and now we're five to seven, five to eight milligrams per liter, and that's been going on for quite some time. And most recently at the Kahului facility, about three years ago the Kahului Treatment Plant we incorporated biological nutra removal at that plant as well. And, and of course at Kihei and Lahaina, you know, we're making mostly R-1 water, which is very, very highly treated, tertiary treatment. So, it's very, very clean. And the Kahului effluent actually, it's an R-2 plant. But it actually meets R-1 standards, so the, the water quality is, in my opinion, quite, quite good. Now, if you want to reduce nutrients even further you would have to either go to some type of chemical nutrient removal, which is expensive and then creates another sludge you would have to deal with or you would need large land area where you could create some, some type of a wetland, a constructed wetland that would remove nutrients through aquatic plants.

COUNCILMEMBER BAISA: You mentioned the quality of the water coming out and the amount you gave some numbers. Does that necessarily indicate the, the N15 impact? I mean is that water still full of that or is it better?

MR. PARABICOLI: Oh, it's, it's still going to have N15. You know, we're, we're just basically reducing the, the overall Nitrogen load when we incorporated that. But Robin, you want to comment on that?

MS. KNOX: . . .*(Inaudible)*. . .

CHAIR ANDERSON: Robin, you got to come up to the mic.

COUNCILMEMBER BAISA: Come help us.

MS. KNOX: Thank you, Ms. Baisa. I, I just wanted to point out that an important question here is are we talking about concentration or are we talking about load and I wish I had my slide show here 'cause I have a picture that demonstrates the difference. But

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

**December 1, 2008**

---

concentration is like if you can imagine one of Meghan's one liter beakers of water that we saw the algae growing in. Steve saying seven milligrams of Nitrogen per one liter.

So, the question is over this period of time, has our total number of liters gone up? Because if it has, then our total pounds, however all those milligrams add up, and you can convert 'em to English units that we can all understand, and then their pounds per day, which I can get a better grip on. But that's what a TMDL does is it looks not only at the injection wells but at the runoff and all the other sources, including water reuse, and it says what is the total load that we can have and still not get over the concentration in the ocean that's going to trigger the algae blooms. And so, you have to kind of protect for the worse stillest ocean days and limit that total load to where it won't exceed that value on those days. So, how to best do that is complex and that's what these studies are about, these TMDL studies.

COUNCILMEMBER BAISA: Just one more question and then I'll be quiet and give somebody else a chance but if we take that water that we're injecting into the ocean now, underground and then it winds up in the ocean and we reuse it. Say for instance, we use it for irrigation and it gets into the fields or whatever we're going to do and then we have rain and that water washes down into the ocean, have we simply transferred one source to another of the pollution?

MS. KNOX: I think there's always a chance of that if we're not careful. For instance, when someone referred back to what it, what it used to be like before they had the injection wells, you know, surely the injection wells were an improvement over raw wastewater running into the ocean. So, treatment and injection is better. And I think that reuse will be better but we want to be cautious in how we do that. There are a lot of issues with bacteria and our water tests very well but even the criteria that EPA uses for safety have come into question and are being researched right now. So, I think that the key to the whole thing is have an overall planning process that is monitoring these things because. . .and it needs to be flexible because every day we're learning more and so we don't want to put a rigid thing into place that can't change. So, again, the Clean Water Act programs kind of recognize us with this every two year kind of assessment. So, I think the more the County can align with those programs the better you can help implement and get some of that funding that we need here because people at EPA like to do studies in Hawaii and then come here.

COUNCILMEMBER BAISA: I wonder why?

MS. KNOX: And, and because it is unique there needs to be work done here that hasn't been done other places.

COUNCILMEMBER BAISA: Thank you very much. I, I could go on but I will defer to someone else. Thank you, Chair.

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

**December 1, 2008**

---

CHAIR ANDERSON: Thank you, Ms. Baisa. Thank you, Ms. Knox. I just wanted to get a clarifying question out here. Mr. Parabolicoli, the, the idea that there is 5 million gallons a day injected. I think it's. . . isn't it higher than that all three systems as far the--

MR. PARABICOLI: Yeah.

CHAIR ANDERSON: --amount that's injected?

MR. PARABICOLI: Yeah, a total, it's, it's closer to about 11.7 million total Countywide.

CHAIR ANDERSON: And, and, can you tell us which systems inject how much?

MR. PARABICOLI: Well, generally we'll start at Kihei where we have the most reuse, you know, we treat, you know, four to four-and-a-half million gallons a day. It's actually dropped a little bit since then. During the summer time, of course, when irrigation demands half that is being reused and about half is injected. But overall throughout the course of the year about a third of the effluent is reused. So, you know, we treat four to four-and-a-half million gallons a day total and of that amount we're probably injecting about two-and-a-half to three million.

CHAIR ANDERSON: Okay.

MR. PARABICOLI: Yeah, on a, on a yearly average basis. In the Lahaina, we're reusing about maybe 20, 23, or 24 percent throughout the year. Treating again about five, five to 6 million gallons a day. So, a quarter, you know, maybe a quarter of that is being reused. So, anywhere from 3 to 4 million is probably being injected over there.

In Kahului, we really have very little reuse. So, virtually, you know, I would say 95 percent of that five to five-and-a-half million gallons a day is being injected.

CHAIR ANDERSON: Okay, that's good to know.

MR. PARABICOLI: And Molokai, you know, we do have some injection wells there as well but probably about 200,000 gallons a day is injected there.

CHAIR ANDERSON: Okay, thank you. Has anybody done any reef study work on Molokai? Do you know, Meghan?

MS. DAILER: No, I would love to go over there.

CHAIR ANDERSON: Hook up with Danny after the meeting. So, in total there's like 11 to eleven-and-a-half million gallons a day being injected. So, can you also give us, I think, it always helps to look at a huge problem in increments 'cause it's easier to solve things in increments. So, if you could give us an idea, I know you said 200 million would solve, I guess, distribution lines and whatever else you need to do. You probably have to

**WATER RESOURCES COMMITTEE MINUTES**

**Council of the County of Maui**

**December 1, 2008**

---

expand ponds or whatever so that you could recycle more of the water more efficiently. But it. . .and I know this is like probably an unfair question but you know all about this, Steve, so give us your best guess estimate on how much money would need to be allotted to the Kihei Plant in order to do away with injection there?

MR. PARABICOLI: Well, first of all I don't think you'll ever be able to do completely away with injection because or some other form of disposal because even if you had 100 percent reuse during the summer, during the winter time the irrigation demands drop by about, about 50 percent.

CHAIR ANDERSON: Right.

MR. PARABICOLI: So, you got to have a place to put this effluent. We just don't have the ability to store it. But as part of the Water Use and Development Plan for Central Maui, I sit on the committee, the consultant, Carl Freedman, I believe you know him--

CHAIR ANDERSON: Right.

MR. PARABICOLI: --evaluated an option to send a recycled water line to Wailea where the R-1 water could be used to irrigate the resort areas that currently use drinking water.

CHAIR ANDERSON: To Wailea from Kahului?

MR. PARABICOLI: No, from Kihei.

CHAIR ANDERSON: Okay.

MR. PARABICOLI: Kihei. And, you know, I think he was looking at about anywhere from \$30 to \$50 million depending on the size of the line and, and what not. There would also need to be some additional storage. So, about \$30 to \$50 million and that would use anywhere from one-and-a-half to 3 million gal..., 3 million gallons a day, which basically would take--

CHAIR ANDERSON: Take care of it.

MR. PARABICOLI: --be able take care of it, yeah.

CHAIR ANDERSON: Okay, that's...

MR. PARABICOLI: And at the same time you would save all that drinking water.

CHAIR ANDERSON: Right.

MR. PARABICOLI: And that's, that's a good number, I think, 'cause his studies were, you know, are, are recent and, you know. For Kahului, you know, it's really hard to say. It

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

**December 1, 2008**

---

depends on what you want to do with that water. Now, if you want to use it for landscaping where people frequent, such as parks and places like that, you would need to upgrade the facility to R-1, which would cost, you know, anywhere from probably ten to \$15 million.

CHAIR ANDERSON: Just to go from R-2 to R-1?

MR. PARABICOLI: Yeah.

CHAIR ANDERSON: Wow.

MR. PARABICOLI: Well, I mean you would need ultraviolet disinfection and, and coagulation. It may be a little bit less than that but you would need a storage facility at the treatment plant itself and then distribution lines to where, where you want to go. That could be another \$20 to \$30 million for that. But if you were to use it for agriculture, such as sugarcane irrigation, you wouldn't need to upgrade to R-1, you could just leave it as is at R-2, it's perfectly good enough at R-2 quality, and just basically fund distribution to the near, nearest sugar..., sugarcane ditch or wherever they, you know, they could blend the water with their, their current source, which is surface water.

CHAIR ANDERSON: Right.

MR. PARABICOLI: And that would be far less costly because you wouldn't need to go to R-1.

CHAIR ANDERSON: Right.

MR. PARABICOLI: So, and the beauty of that idea is, you know, you could if you use 5 million gallons a day of R-2 water for sugarcane irrigation, you could leave 5 million gallons a day of stream water back in the streams in East Maui.

CHAIR ANDERSON: That's a thought.

MR. PARABICOLI: Yeah, I kind of like that idea.

CHAIR ANDERSON: Thank you, Steve.

MR. PARABICOLI: And then Lahaina, you know, we are having some work done out there or it looks like we're going to have some improvements to our system by developers at North Beach, and they're going to be moving towards our Master Plan of developing elevated storage, which will allow us to pressurize our existing pipeline. By pressurizing our system 24 hours a day, we will be able to then tie in commercial properties, such as hotels and condos that are in close proximity to our existing pipeline. And they're looking at spending around eight to \$9 million for those improvements. But if you really want to get more and more reuse, of course, we would need more pipelines and more tanks and that could be another, you know, say if you wanted to go all, all the way up to,

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

December 1, 2008

---

to the Civic Center, for example, where the Villages of Leialii are. For example, you know, that's . . . would be very expensive. We'd need pump stations and storage tanks. That could be another \$30 to \$50 million roughly.

CHAIR ANDERSON: Okay, thank you very much, very much. That gives us a kind of a working idea. Mr. Pontanilla, you had a question?

COUNCILMEMBER PONTANILLA: Yeah, I, I was just going to say that Mr. Taylor did a calculation for me in regards to the Kahului Plant. Just to retrofit the plant and, and provide a transmission line up to Keopuolani Park it would cost the County about \$25 million. So, it's a lot of money just to do that. . . .*(change tape, start 2B)*. . . And maybe I have a question for the Directors for Water, as well as Environmental Management, and my question to them would be, you know, are, are we looking at trying to get some grants from the Federal government to, to help us in, in regards to utilizing all of the effluent that presently we injecting for either irrigation, for cane fields, irrigation for parks, so that we can save our groundwater or, or surface water? So, I, I don't know where the Department is, is at, at this time because it seems like somebody got to be. . . some Department got to be the champion for this.

MR. PARABICOLI: There is one grant that we're being. . . well, we are actually was authorized for West Maui. It's the Bureau of Reclamation's Title XVI funding. It's not a great grant but it's basically they would fund 25 percent of construction and the County would have to come with 75 percent. At the time it was offered, we, we couldn't commit to the 75 percent but one thing that is being considered is that the developer contribution would be counted as a County component of that grant. So, they're rethinking their, their, their strategy on that from the Bureau of Reclamation's point, standpoint. And they're now, looks like they're going to allow the developer contribution to be counted, which would be great 'cause we might be able to get at least a few million dollars from that program to enhance what we're already doing in West Maui.

COUNCILMEMBER PONTANILLA: Good, thank you. Thank you, Steve, for that information. Thank you, Chairman.

CHAIR ANDERSON: I'm just going to mention very briefly that our office, my office, did get a grant through Mazie Hirono to study the alternatives for the Maalaea area because we lost 80 percent of the reef cover, cover down there. There's so many small sewage treatment plants and injection wells going on down there. So, we got a grant that will be going through Steve's department and Director Cheryl Okuma. . . she is probably the one that's going to be managing the grant, the Director of Wastewater Management. And it's a small grant. It's a little less than \$200,000 but you have to start somewhere, somewhere with the Federal government. If they. . . I was told if we can get a study showing what the alternatives could be, then we can get bigger money to fund the alternatives. So, we're looking at maybe a larger, more modern, I guess, or technologically updated type of sewage treatment plant so that you're, you're maybe treating all of that water and

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

December 1, 2008

---

redistributing it all for irrigation instead of injecting it. So, that's one foot in the door with the Federal government that could blossom into something bigger.

But I agree that we need to be more aggressive and as Ms. Knox said that the Obama Administration is going to be more favorable towards green projects. And I think that we, you know, it's sad to say that we are in such a state but if you don't name it and claim it, you can't change it. And I think the fact that we are in such dire straits here with the highest N15 reads in the, in the world, in, in scientific literature that we've lost our coral reef cover at least 50 percent of it along the south and, and west shores in ten years is a scientific abomination if I may say so. And in the scientific world, it's going to, it's going to draw attention. So, when we can use these extremes to draw attention to the need to solve the problem, then we're more apt to get attention from the Federal government. You know, Mazie Hirono's office told me that the reason that they, they were able, and you know, there. . .many people are competing for these kind of monies. The reason that we were able to get money through her office was because of the dire situation because it is, you know, it's a critical indicator of where we could be in ten years. So, and that's why I'm bringing all of this forward, Members, 'cause I think we need to face the situation while it's ongoing here and, and that we still have a chance to turn the tide on it, and hopefully restore what's been lost.

And this also gives us an opportunity to look at new sources of water. If we can replace irrigation water with our R-2 water that is currently going in the ground, then you got to balance that off on the cost of developing new wells because that water is already developed, already in the lines, already hooked up to the system. And think of the cost effectiveness of using more of that water, of the current water we have that's going to irrigation for domestic use because we've invested money in using the sewage effluent for irrigation. I mean, you know, if, if \$30 million can give us 3 million gallons a day extra in potable water that's looking. . .that's like 10 million gallons, I mean, \$10 million per 1 million gallon of potable use. Well, that sounds kind of high but what does it cost us to develop a well that gives us 1.5 million gallons so we can use a million gallons, including all the, you know, the design, the testing, the EIS, the time, everything it takes to get a million gallons of potable water. I'm hoping Carl Freedman, who's doing all the, who's doing the Water Use and Development Plan. . .he is going to be at our next meeting to give us a current update on the Water Use and Development Plan that he is speculating will be ready for Council review by June of next year, okay. So, he, he can, he can tell us more about the cost effectiveness of looking at using the R-1 and R-2 water as opposed to developing new potable sources. So, that's why I wanted you to all be aware of this now and, and if, Steve, if you have anything else you want to add to that, you know, breakdown that you gave us, I'll give you that chance now and then I'm going to open it up to more questions for the Members.

MR. PARABICOLI: Oh, they're just estimates. I think Carl's numbers for South Maui are probably the, the most accurate because he actually contacted contractors and got good bids and, you know, estimates.

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

December 1, 2008

---

CHAIR ANDERSON: Right, right.

MR. PARABICOLI: But, just one comment on, on recycled water. It's very sustainable and it's drought proof. It's never going to go away. So, I think it's a good investment in the long run.

CHAIR ANDERSON: Thank you, Mr. Parabolicoli.

VICE-CHAIR VICTORINO: Madam Chair?

CHAIR ANDERSON: Yeah, Mr. Victorino.

VICE-CHAIR VICTORINO: Thank you and, and you've all shedded a lot of what I call important and factual information for which the general public sitting out there who watches, and well, hopefully will watch this, and what *The Maui News* puts out will make the reality that we have a source of water that we've longed not used in the right way, which is degradating our reefs, causing problems in that respect, but yet could be and not God sent, but probably like you said drought proof, never have a problem 'cause we'll always have crap flowing somewhere. Putting it in literal sense. My question really is more to DLNR, and I haven't heard anybody say anything in this area, because the number of speakers who have come before us, before this Coun..., this Committee, not only talking about the algae bloom and the degradation of our, our reefs but also the tremendous decline in our fish population, which has always been one of the natural means of cutting some of this algae bloom or cutting some of the algae. And I know the State has been working on a number of projects limiting or off limits areas for fishing and, and things of that nature. How has that come about and how. . .what are the studies showing in that because that's one of those things that we can do this here but I think that's another area we just don't want to forget because that is one means of, of helping solve some of these problem?

CHAIR ANDERSON: Okay, before you answer, Russell, if I may, Members, I'm going to interrupt so we can say goodbye to Meghan Dailer who's got to get on a plane to Oahu. And so, thank you very much, Meghan. We really appreciate you coming and bringing this information. I'm going to let Mr. Mateo ask her one quick question.

VICE-CHAIR VICTORINO: Yeah, go ahead, yeah, no problem. We can wait. I can wait.

COUNCILMEMBER MATEO: Thank you. Thank you, Madam Chair. In addition to the data you're collecting now, based on your study, is part of that study also to provide recommendations in terms of addressing the issues that you are now coming up with?

MS. DAILER: Not exactly. It was never really intended to prov..., provide recommendations but an interesting observation of the hypnea plant and its ability to uptake Nitrogen in the, in the 100 ml treatment, it was able to scrub out almost 100 percent of that Nitrogen.

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

December 1, 2008

---

COUNCILMEMBER MATEO: But as you're seeing the growth continues, you know, you're going to come up with a summation based on a longevity or, or a calendar, or a period before we totally kill our reefs.

MS. DAILER: Right. Well, based on the, the data provided by DLNR already that just shows that reefs have been declining. They're on a trajectory. So, based on that data, it looks like we don't have much time if things continue going the way that they are. And there's no doubt that if things do keep going the way that they are, nutrient loading is just going to get worse, you know, the more people that are here, the more, the more development, the more runoff, the more everything. So, if we don't really think about it, then it's, it's highly likely that it's just going to get worse. But I'm, I'm not really trying to give anyone a calendar or, you know--

COUNCILMEMBER MATEO: No, but it's...

MS. DAILER: --provide any kind of, you know, but it is, I mean, it's already happening. What's going to stop it if we don't start to do something?

COUNCILMEMBER MATEO: No, and, and I appreciate, I appreciate your comments. It's just that the, the, the reality of the numbers you're showing us, the finality of the end result is so, it's, it's kind of alarming at this point.

MS. DAILER: Oh, yeah.

COUNCILMEMBER MATEO: So I'm hoping that your study's not just going to be another one of University of Hawaii's studies put on the shelf, let's move on to the next. And I hope that perhaps even DLNR can benefit from the information so we actually can take that next, next step.

MS. KNOX: ...*(speaking from the gallery)*... Did you tell them about Celia's program?

MS. DAILER: Why don't you come up?

CHAIR ANDERSON: Um. . .

MS. DAILER: Yeah, it's by no means just going to end with this study. It's definitely gone pretty far already, so.

CHAIR ANDERSON: And that's why we're bringing this forward because, you know, we are the policy makers and the decision makers and we have the power to put in place solutions. And Meghan we're going to say thank you very much and let you catch your plane. And, I think, you know I'm going to ask. . .Meghan is part of a larger group, Dr. Celia Smith from U.H., she came, I think, it was last year. And, you know, they're looking at bigger solutions too, and they're, they are actually quantifying the loss as far as dollars, economic impact on the loss of the reef, and what it means to our economy.

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

December 1, 2008

---

So, and I used a lot of that information to convince, to help Mazie Hirono convince the Congressional Delegation to give us some money. So, if Robin can address that question you had Mr. Mateo in a little more detail.

MS. KNOX: Thank you, Madam Chair. Mr. Mateo, I just wanted to let you know that Dr. Celia Smith is conducting a workshop on Oahu on December 9<sup>th</sup> and 10<sup>th</sup> that will convene all of the scientist who have been involved in all of these various aspects of research. And they're going to present their findings to each other. And we've also invited Cheryl Okuma and some other representatives of governmental agencies, EPA, Department of Health, and there are plans that's already kind of come out in the discussion that it would be nice after the scientist have gathered and put everything together to bring it to Maui, and to present it to the governmental officials here such as this body. So, I think, in very near future you would be able to see maybe a consolidated overview of everything and specifically oriented towards your question of what do we do next and what else do we need to solve this problem.

CHAIR ANDERSON: Okay, thank you, Ms. Knox. So, we're going to go back to Mr. Victorino's question. And I think as a reminder he, he wanted to know about the reef fish and the grazers that are supposed to be taking care of a lot of the algae growth.

MR. SPARKS: Okay, good question, and it, it's one that, that goes directly to the jurisdiction and the ability of the Department to act. What we, we've, we've begun to understand much better in the last few years is that the coral reef is a very dynamic system and there's a lot of players involved. You could have tons of nutrients going into an area but if the corals are thriving there's no room for seaweed to attach and grow. Okay, when the coral starts to die back space opens up. Then those nutrients can fuel algae growth and the algae itself can further kill back the coral. But there's other checks and balances and healthy reef fish assemblages, grazing fish, manini, parrot fish, things like that, are important kind of control mechanisms. So as more algae starts to grow these things eat it, you know, that's what they're there for or one of their main roles on the reef.

But what's happened over the years is we've started to affect a lot of these things so, you know, maybe too much use. You know, maybe dirt washing into the ocean has killed some of the coral opening up more areas for the seaweed to grow. And over the years maybe intensive fishing or irresponsible fishing has removed a lot of the fish that are important to eat that. And so as these things build up all of a sudden boom, we have a bloom of algae and the decline on the reef can happen quite quickly as we've seen with Maalaea. You know, the nutrients flowing into Maalaea have probably been there for 50 years or more coming off of all of the ag in the Central isthmus. But it's only recently that the algae has bloomed out of control.

So, with that in mind the Department has put a lot of effort recently into addressing the fish issue and the herbivorous fish and we are on the final steps of implementing an area in Kaanapali, North Kaanapali, from Kekaa Point, Black Rock all the way out to Honokowai Beach Park that we are calling an herbivore fisheries management area where

## WATER RESOURCES COMMITTEE MINUTES

Council of the County of Maui

December 1, 2008

---

we would continue to allow fishing to occur but not for three families of grazing fish: the parrot fish, the surgeon fish, surgeon fish being everything from the kala, the unicorn fish, all the way to the manini, things of that sort, and the chubs or rudder fish, the enenui, as well as not allowing any harvest of urchins, which are also important grazers, they scrape seaweed off the bottom. That will be going to hearing probably in two to three months. And if all goes well, we should have that rule implemented by mid summer or late summer, hopefully. It takes a while unfortunately. But what we, we want to see there is if, if we can protect those herbivorous fish and urchins and those populations come up, can they start to control the seaweed?

It's only going to buy us some time though, I mean, ultimately if we really want to improve our coral reefs so that they begin to thrive again, we have to address it in a holistic fashion. We have to improve the fish populations. We have to reduce the impacts that are coming off from land and over use of various sorts, reduce the nutrients reaching the area, get everything back into a more natural state. And, and that's not easy and it's going to take efforts to address sewage injection wells, to address coastal development, changes to the normal coastal ecosystem. Wetlands serve an important function but we tend to fill them in and build. You know, all of these things we need to start to address them and bring it back into a more natural state.

But certainly fish populations are important. Islandwide we do expect to see improvements because of the gill net, lay net ban on Maui. Lay nets are, are one of the means by which you can collect and harvest a lot of herbivorous fish. So, a well laid lay net, paipai, chasing fish, you could get an entire school of manini from one area. So, 500 or more fish could be captured that way. Whereas if you went out with a spear maybe a good day, ten or 15 fish something right, so. Fishing methods like that, changes to those we hope to see some impact.

One thing to keep in mind though just to give it some perspective is that these reef fish, these herbivorous reef fish, usually take about five years to reach adult size and they live for about 30 to 40 years in age. So, changes that have occurred over the years are going to take a while to improve. You know, we, we expect meaningful impacts from the lay net ban to be ten years away and similar with our herbivore fish, fisheries management area, it's going to take a while for things to come back.

VICE-CHAIR VICTORINO: Is there any, in like in many places throughout the country and, and in fact in many foreign countries, you have fisheries where you produce, you know, like salmon, and you produce the, the offspring, the, the eggs, and then you reintroduce them into these areas. Have we had any studies or have we made any attempts to try to work in that respect? 'Cause, again, nature takes a while to get caught up. We, we understand that but if we have protective areas where we can develop the youth, the, the manini and all these other fish and reintroduce them into these areas which then promulgates quicker growth. Have we looked at that or is that not something on the, on the radar right now?

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

December 1, 2008

---

MR. SPARKS: Unfortunately, stock enhancement is extremely expensive and it works fairly well like on the mainland with salmon, they come up the river, they spawn, you can have them, they come back to the same hatchery, you know, and you can collect your spawn. And, and, you know, help kind of fuel them along. But in Hawaii it's not quite so simple.

One thing that's problematic is how did the fish that we have here native in Hawaii, how did they get here in the first place? And generally, they have really long larval periods where they drift in the, in the ocean. So, if you try to raise those from babies, you have to raise them through these very difficult larvae stages for many months in some cases. And it's very easy for them to starve to death. It's very difficult to do that and very expensive. But there has been some effort with quicker growing species, things like papios, you know, other fish enhancement, moi, and aquaculture where possible has really taken a hold of those as well. So, moi is being actively raised a lot for food.

I would not expect stock enhancement to help us with herbivorous fish just because of their biology, how slow they grow and everything else. More important would be to improve the habitat so that nature can do it itself 'cause there's still a lot of them out there. You know, you still see a lot of spawns, you know, recruits from time to time but they don't have the adequate habitat or fishing has removed them, too much fishing pressure. So, we need to kind of look at it that way and could be some areas like Maalaea where the reef is so degraded we could couple mechanical removal, go out there with the super sucker type of machine, and then reimplant, replant some fish once you remove the seaweed, and hopefully in small plots get things going. That's going to be real expensive, real labor intensive, and, and, again, I'm not terribly optimistic it'll work long term unless we deal with the root causes, you know, right now and try to get the situation back where it can thrive again.

VICE-CHAIR VICTORINO: Okay, Mr. Sparks, thank you. And I, I think that you've shed some good light in that respect, and I, and I want people to understand that, you know, it's a multi-faceted problem that we must--

MR. SPARKS: Absolutely.

VICE-CHAIR VICTORINO: --you know, address in multi-manner. And I think right now we, you know, we can do recycling, we can do that. But everything has a price and are the people ready to pay the price and I think that's what the public has to understand that we've got to get out and the get money to do this, whether it's through grants, Madam Chair. And I think that's part of it or some how, some way, we here in Maui County going to have to pay the piper or we're going to be just like Oahu with busted mains and all kinds of sewer leaks and water, which may not sound like but it's a, it's a similar situation if you wait long enough, and you put it off long enough you don't, you never catch up and you're always going to be paying the price behind, behind the eight ball, right, Mr. Parabicoli?

MR. PARABICOLI: That's correct.

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

**December 1, 2008**

---

VICE-CHAIR VICTORINO: Thank you. Thank you, Madam Chair.

CHAIR ANDERSON: Yeah.

MR. SPARKS: Can I, can I have one quick thing?

CHAIR ANDERSON: Sure, Russell.

MR. SPARKS: You know, the work we're doing a lot of it is along the Leeward shoreline where we're seeing the declines, you know, where there's a lot of more urban development, and a lot more people, a lot more accessibility. There is a lot of habitat around Maui that's doing quite well, you know, in fact if you were to look at coastline-wise percentage probably most of it, you know, along inaccessible Windward coastlines and so forth. What we really need to do 'cause everybody wants to think about fixing things when they're broken. What we really need to do is identify areas that are still okay or doing quite well and put our effort at protecting them. That should be top priority number one because once these reefs decline to the level they are at some spots, like Maalaea. To bring them back maybe, you know, it's going to be long and arduous and may just not be possible period because things have declined to that point where you've lost habitat. So, I just want to put that out in your minds that identifying healthy, more pristine areas, and really putting that, you know, measures in to protect them is important. Okay, and just, just think about it that way as much as possible.

CHAIR ANDERSON: Thank you, Russell. That, I mean, and I appreciate that from an aquatic resource perspective, but we also want to have aquatic resources available in accessible areas, you know, for the public and for our visitors. I'd hate to foresee the day where you have to take a helicopter to go snorkeling.

MR. SPARKS: No, point taken, point taken. But it's just, I just want to make that clear.

CHAIR ANDERSON: Yeah.

MR. SPARKS: As you continue to experience growth and, and, you know, people want to build more places here, more urban concentration areas. Think about the long term impact that's going to occur to the reefs in those areas. And, and that may be some of the most valuable things we can do moving forward.

CHAIR ANDERSON: Thank you for that, Russell. That's a good warning. You know, I just wanted to inject one thing that you didn't specifically say when you talked about fishing the reef. I know that we have a big problem with aquarium collectors that are also fishing the reef and that a good portion of those fish never make it to a tank somewhere. And I know there's efforts to try to restrict that too because that's. . .it's a big money maker for people who want to go out and take salt water reef fish and put them in into a pet store, ship them off to the mainland.

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

December 1, 2008

---

Okay, Members, we've gone a long ways today in discussing this and you've all been so eager that not one of you have asked me for a break, which we normally have, and, and I just let it keep going 'cause I thought it was good for us to get all this information out. Are there any other comments or questions from the Members? This is just a seed that we're planting here, you know, for future discussions. We have our Wastewater Division Chief, Dave Taylor, here listening; the Wastewater Director, Cheryl Okuma, has been here with us today listening; the Director from the Water Department here is listening; and all of you are listening, the decision makers for the next term of the Council. So, I think we've fairly covered the subject.

Okay, Members, any other comments, closing comments? Mr. Pontanilla.

COUNCILMEMBER PONTANILLA: Yeah, I, I just want to thank Meghan, as well as Robin, Steve, and Russell for being here. I think we got some really good information from the last review we had and it's good to hear, Chairman, that, you know, your staff along with the Environmental Management received some grants through Congresswoman Mazie Hirono. I think, you know, being here for five or six years, I think that's the first grant we ever got for the Environmental Management Department in regards to getting grants from any of our Congress people because I, I tried six years ago, but I was asking in the millions for a transmission line between the Kihei Plant towards Monsanto, north, north of the plant. So, you know, thank you for going out and getting those grants. Thank you.

CHAIR ANDERSON: Yeah, well, we, we'll see where it takes us. It's the first step. It's not millions. So, thank you all for, for being here, Russell Sparks from DLNR Aquatics Division, Steve Parabolicoli from the County's Wastewater Recycling Division, and my staff, and all of you Members in attendance. Thank you so much. Water Resource Committee meeting, December 1<sup>st</sup> is now adjourned. . . .(gavel). . .

**ACTION: DEFER PENDING FURTHER DISCUSSION.**

**ADJOURN:** 11:24 a.m.

APPROVED:

  
MICHELLE ANDERSON, Chair  
Water Resources Committee

wr:min:081201

Transcribed by: Delfey Fernandez

**WATER RESOURCES COMMITTEE MINUTES**  
Council of the County of Maui

**December 1, 2008**

---

CERTIFICATE

I, Delfey Fernandez, hereby certify that the foregoing represents to the best of my ability, a true and correct transcript of the proceedings. I further certify that I am not in any way concerned with the cause.

DATED this 22nd day of December 2008, in Wailuku, Hawaii

  
Delfey Fernandez