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The Work To Convert Hawaii's Cesspools Continues

There is federal money on the horizon — and promising new technology too.

By [Stuart Coleman](#)

June 6, 2021 · 9 min read



17



Last July, in my [IDEAS Essay](#) about how Hawaii has the highest number of cesspools per capita in the country, I advocated that the pandemic should motivate the state and counties to diversify our economy and develop the wastewater workforce that is needed to convert all of these cesspools.



Now, almost a year later, Hawaii has a major new ally in the work to convert cesspools: The federal government under a new administration is pushing policies and offering funding to do just that.

If there's one thing most Americans should be able to agree on, it's the need to repair our nation's deteriorating infrastructure. Despite partisan politics, the U.S. Congress passed the Biden administration's American Rescue Plan Act and its members are currently arguing over the proposed budget for the American Jobs Plan.

The new AJP bill would invest \$1.7 trillion to get people back to work restoring our aging roads, bridges, water and wastewater treatment systems.

As co-founder of the nonprofit WAI: Wastewater Alternatives & Innovations, I'm focused on the last issue. Hawaii has some 88,000 cesspools across the state that discharge 53 million gallons of untreated sewage into our groundwaters each day. This sewage pollution poses harmful threats to public health, drinking water, the near-shore environment and coral reefs, along with Hawaii's reputation as a world-class destination.

WAI helped to create the Work-4-Water Initiative by bringing together leaders from Hawaii Community College, the University of Hawaii Sea Grant College, the Water Resources Research Center and the Hawaii Department of Health's wastewater branch. Over the last year, our W4W group has been meeting weekly, focused on four long-term goals: workforce development, infrastructure investment, cesspool replacement and water protection.



Hawaii’s 88,000 cesspools discharge 53 million gallons of untreated sewage each day. No other state in the country has a higher per capita number of cesspools.

Thankfully, Hawaii’s congressional delegation is increasingly aware of the severity of the problem.

“Wastewater has really been disregarded for years and years and years and it’s something we have to address as a state,” Rep. Kai Kahele [wrote recently](#).

“This is a great time to do that with the American Rescue Plan because it can provide millions of dollars for jobs and investment into Hawaii’s wastewater infrastructure.”

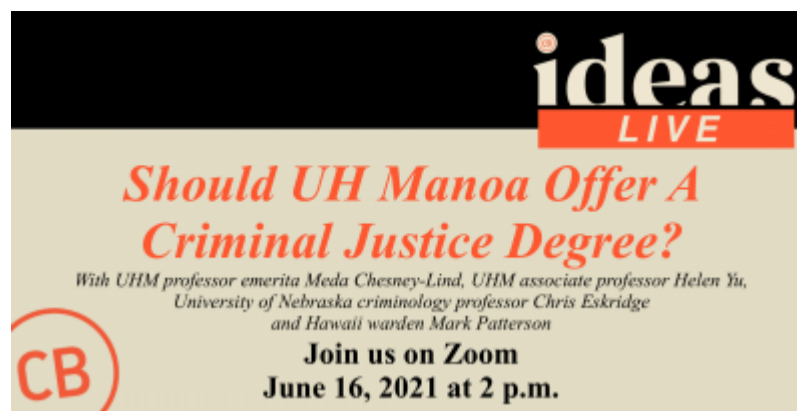
“We have a cesspool problem on our neighbor islands where they’re really not going to be complying with the Clean Water Act unless we provide them the infrastructure,” Sen. Brian Schatz said in a [recent Civil Beat interview](#), “either for big sewer systems or small distributed sewage management systems or something even more distributed like the Gates toilet.”

Half of the state’s cesspools — 49,300 — are on Rep. Kahele’s home island, Hawaii island. Kauai has 13,700, Maui County has 13,640 and Oahu has 11,300.

Something Has To Be Done

As Kahele notes, “The county of Hawaii has been in violation of the Safe Drinking Water Act and EPA federal rules and regulations since 2010 when the county took over responsibility of the large capacity cesspools at Pahala and Naalehu.” In the face of these federal regulations, what should the counties do — go with the old, expensive sewer systems or find a new and cheaper technology?

When Sen. Chris Lee and I attended the Bill & Melinda Gates Foundation's Reinvented Toilet Expo in 2018, we began to realize that our current sewer system is not the answer.



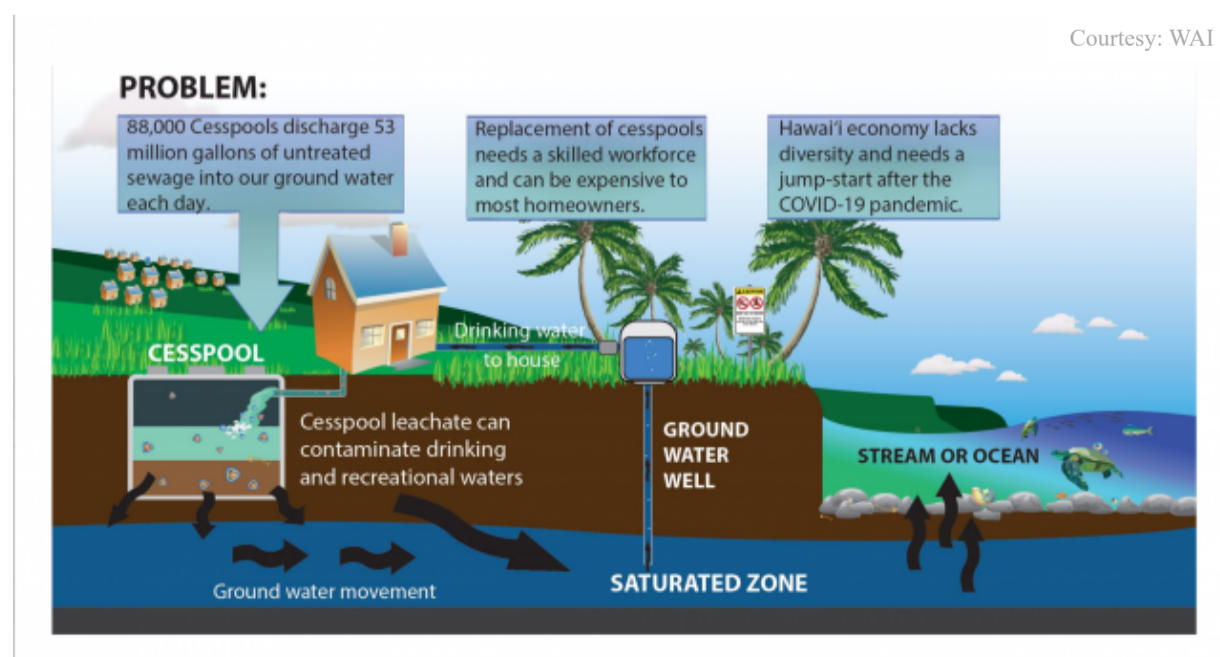
These systems served a purpose once, but now they are the definition of a vicious cycle: We use clean drinking water to flush our toilets, then expend massive amounts of energy and miles of sewer lines to pump that waste across the Island to municipal wastewater treatment plants, which require even more energy to separate the liquids from the solids; and in the end, we pump the clean water out to sea and truck the sludge waste to landfills that are already full.

In her new book "Pipe Dreams," Chelsea Wald writes, "Every day, according to one estimate, people worldwide use almost 40 billion gallons of freshwater — nearly six times the daily water consumption of the entire continent of Africa — to flush toilets. We can do better." Yes, we can.

There are basically three different scenarios for dealing with our cesspools and sewage issues.

On one end of the spectrum are the big sewer systems. While it may be possible to extend sewer lines into certain communities in Hawaii near existing facilities, it would be financially impossible to create this kind of massive, centralized and outmoded infrastructure in more remote areas of the islands. Building wastewater treatment plants and installing traditional sewer lines and pump stations would be prohibitively expensive and disruptive for small, rural areas.

On the other end of the spectrum, each individual cesspool is going to cost tens of thousands of dollars to be converted into a more environmentally sound septic system. Many homeowners don't have the money, which is why the Work-4-Water Initiative is seeking federal funding to help homeowners with the costs of conversion.



This illustration demonstrates why cesspools can cause large problems for our waters. On the positive side, the work to convert Hawaii's cesspools can help to diversify the economy and restore the environment.

We are also now collaborating with community colleges on each island to develop training programs to certify more workers in the wastewater sector and developing hands-on internships with local companies to create enough jobs to help convert 88,000 cesspools.

As I noted last year, there is gold to be mined from these dark, underground rivers of waste. By training thousands of workers for long-term, well-paid jobs, we can install new wastewater systems across the state.

In 2017 the Legislature mandated the conversion of all cesspools by 2050 by passing [Act 125](#). To convert all cesspools in the state within the next 30 years, the state will have to increase its current rate of cesspool conversions from some 200 per year to 3,000 per year.

The Middle Ground

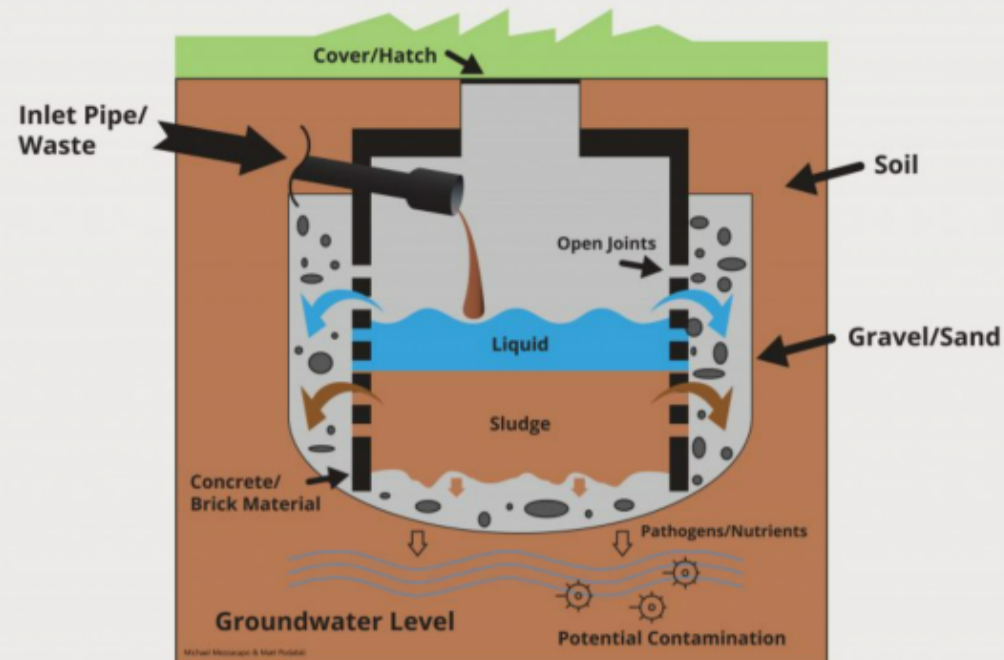
Instead of big sewer plants or individual cesspool conversions, the best option for at least a third of the households in Hawaii currently on cesspools may be to connect to smaller “distributed sewage management systems,” as Sen. Schatz outlined.

There is promising new technology for decentralized, more efficient, less expensive wastewater treatment systems. The central message of the Gates Foundation's Reinvented Toilet program and “Pipe Dreams” is that we need to not only reinvent the toilet but to reimagine the whole sanitation system.

With the federal government's commitment to rebuilding our decaying infrastructure, now is the time to develop mobile, community-scale sanitation systems that recycle the valuable resources and nutrients in our liquid and solid waste. Instead of pumping nutrients like nitrogen, phosphorus and potassium out to sea, we can recycle them on land to enrich our soils (instead of expensive, synthetic fertilizers).

These systems can be financed by federal funds, county bonds and in some cases by the wastewater companies themselves.

Cross Section of a Cesspool



A cesspool is essentially a hole in the ground that takes in raw sewage. Bacteria, chemicals and nutrients like nitrogen can leach out of cesspools and into groundwater. From there, they can be carried to nearshore ocean waters and reefs.

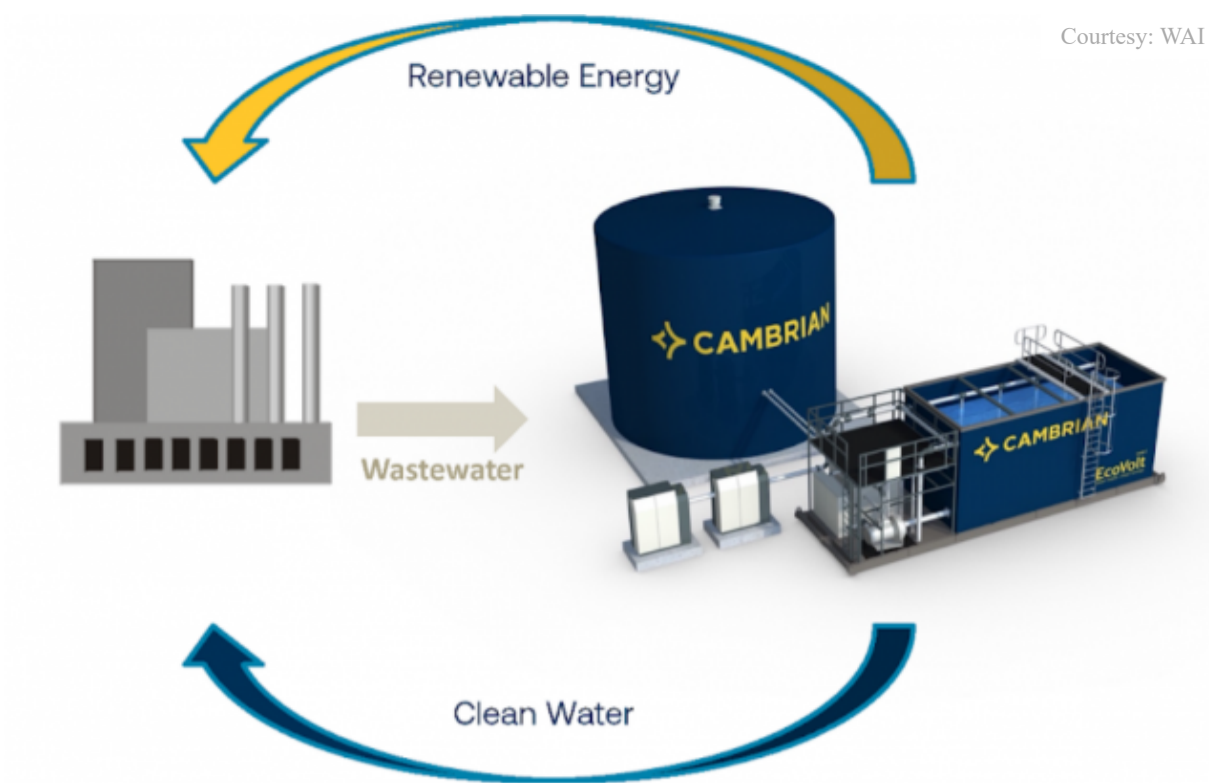
How do we recycle our wastes safely and affordably? WAI is collaborating with Elemental Excelsior to introduce innovative technology and financing models to Hawaii. One of Elemental's new cohort companies is Cambrian, whose small-scale modular treatment systems are designed for approximately 30 to 300 households.

Cambrian has created a Water Energy Purchase Agreement that allows the company to build these systems with a service agreement instead of large upfront capital costs.

This "sanitation as a service" approach can save millions of dollars for the counties and provide state-of-the-art facilities to rural communities like Pahala and Naalehu on Hawaii island or coastal areas like Maalaea on Maui.

As Rep. Kahele notes, right now in Maalaea, "Wastewater is treated at each individual condo and then that wastewater gets put right back into the ground (via injection wells), and that has had major effects on the Maalaea coral, as well as the nearshore fisheries."

Counties like Maui could focus on installing conveyance lines to connect Maalaea's 10 condo complexes and nearby businesses to these smaller treatment systems.



The Cambrian system employs an aerobic digester that uses aeration and filtration to remove contaminants from wastewater. It is an example of a small-scale system that can move Hawaii in a much more ecologically sound direction.

Cambrian's systems are capable of transforming liquid wastewater to clean R1 water that can be used for irrigation and farming. Other companies can recycle the solid waste sludge.

Biomass Controls, which was originally funded by the Gates Foundation, uses a process called pyrolysis, which employs high heat and low oxygen to burn the waste and transform it into 100% pathogen-free biochar. This thermodynamic heating process can reduce the sludge volume by 90% and remove more than 95% of pharmaceuticals, plastics, PFOS and other toxic contaminants.

The resulting odorless biochar can be used as a soil amendment or a medium for water and air filtration. It can also be used for carbon sequestration to help the state reach its goals for carbon neutrality by 2045.

Jim Mothersbaugh, CEO of WaterTectonics, operates a wastewater treatment plant in Makena on Maui. He is working to integrate Biomass' technology into his treatment system. By avoiding trucking 90 loads of sludge to the landfill each year, he will reduce his carbon footprint and save hundreds of thousands of dollars in trucking costs and tipping fees. Using the biochar as a soil amendment for agroforestry, he hopes to turn his facility into a model for the future of waste recycling.

These two treatment systems are examples of mobile, scalable and affordable solutions that can help transform our problematic wastes into valuable products. Hawaii could become a national leader by recycling 100% of its liquid and solid waste.

As we emerge from the cocoons of our quarantine, let's make sure we don't drift back to outmoded ideas and technologies. Instead, we should work together to repair our aging infrastructure and build a better foundation for the future.

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About the Author



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Stuart Coleman is the executive director and co-founder of WAI: Wastewater Alternatives & Innovations.



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Newest

– **Concernedtaxpayer** 4 hours ago

There are still cesspools in parts of Kahala, Diamond Head, Tantalus, Round Top, Windward & North Shore. It is ridiculous that they still exist.

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Report

– **uknowwho** 7 hours ago

I like to follow the money. Where is WEI in all of this? Which company(s) do they own that would take in BILLIONS of dollars of federal money?

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Report

– **Whatarewedoing** 7 hours ago

Very disingenuous. That sign was because of a sewage spill from a sewer pipeline, not ground water from a cesspool. I'd be very interested in contamination results attributed to cesspools. I don't think there has been a contamination reported attributed to cesspools as long as I can remember.

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– **CKMsurf** 8 hours ago

Been following this for years. I think the article should mention Sedron Technology as well (spelling? It's been a while). I believe that's the basic technology developer. I think the Gates Foundation worked miracles with the Janeki Omniprocessor (raw sewage into fertilizer, potable water and energy - later became Sedron). They got a good scale pilot project in Senegal. News of Phase 2 of the Senegal project came out fairly recently. They reduced the scale to a single toilet (fairly large housing for the toilets) for remote areas. I believe optimal installation for US is like dairy farms or pig farms that can service small agricultural communities in energy, fertilizers and waste water. Always thought Molokai'i would be a good place to start that kind of community oriented pilot to produce farming products for the entire Hawaiian economy and service the community's basic needs as well. Don't know how settled the technology is now, but it seems to work. Whatever else is going on with the Gates family now they deserve great credit for work helping the world. Pandemic relief is another area - their work helped us before a pandemic hit & it's not in daily media coverage. Kudos to them.

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Report

– **naalehunet** 8 hours ago

Thanks to WAI for promoting a commonsense solution to a huge problem. This year ALONE (not counting the millions given to County contractors from 2005 to this year) the County of Hawaii Department of Environmental Management is spending \$31,528,000 (Bill 22, Draft 2 passed June 3, 2021) on the Naalehu and Pahala gang-cesspool (LCC) closure. Actually, the \$31,528,000 is going to pay Brown and Caldwell and other consultants to design the very outdated \$83 mill. sewage plants Stu Coleman disparages. That amounts to spending \$131,000 tax dollars per house on the LCCs in Ka'u - as I said - in just FY 2021-22.

While \$131,000 might not buy much property in most areas of Hawaii, it is more than the taxable property worth of 90% of the homes in the affected areas (check the County of Hawaii RP Tax records if you don't believe me - Pahala TMKs are 3-9-6-014:001 and up).

Please - SOMEONE - bring sanity to the Ka'u wastewater problem and get

rid of all the expensive consultants who are just gobbling up another \$31,528,000!

Good luck to Stu and his sensible team. He will need it to overcome the present Ka'u-type wastewater insanity all over the State!!

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– **Mauitutu** 10 hours ago

Interesting article. According to the Clean Water Act, septic tanks also discharge liquid into the ground and can effect ground water, like cesspools. Often they are installed when a cesspool fails. Shouldn't they be added to the conversion calculations?

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– **Patutoru** 12 hours ago

One size does not fit all. Lost in conversations are thousands of us on the Island of Hawai'i who live ma uka. I absolutely understand the need for septic systems along densely populated shorelines. But. Here in Puna, dig down several inches: Solid lava 600 to 700 years old. Much of it covered by ohia trees, uluhe ferns, and many other native species, with a mix of invasives. Thousands of homes on thousands of acres. No County water (we live on rain catchment), few paved roads, few utilities, people ekeing out a living.

I've searched and haven't found info regarding our hydrology: How long do bacteria and viruses live in the ground? How long does it take liquid from my cesspool to get to the watertable? Are wells ma kai polluted with pathogens?

"Converting a cesspool" is a tidy phrase. Bulldozing forest, jackhammering into solid rock, getting septic tanks in place...not so tidy, and I'm guessing way out of budget for people, including me.

And too, who is checking that places like Kalapana Gardens and other Puna ma kai subdivisions are fully compliant with all building and health codes?

Unanticipated costs and consequences must be considered by decision-makers.

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– **Konarandy** 12 hours ago

Whatever happened to "BAT" Best Applied Technology? Hawaii does have a nasty sewage problem and it seems as one reader said, the can gets kicked down the road.

No official likes any major funded project that basically looks the same when completed. Dense populated areas and smaller lots need to be on a County sewer line and rural areas will be fine with the septic tank system. Containment is key to keeping urban runoff and groundwater pollution from harming drinking water and impairing coastal water contact recreation areas.

Maybe look at an area "assessment districts" for sewage conversions costs, this will help property owners especially if all bids are transparent and fair to property owners to keep costs minimal.

If Hawaii can grossly overspend on a rail system, I'd hope state-of- the art sewage systems will hit the mark better than any archaic septic/cesspool tank system. This isn't rocket science, its basically what the rest of the nation does by having State of the art tertiary sewage lines and treatment systems well as tap-to-toilet RO systems.

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– **Jeremyb** 12 hours ago

I live upcountry in Makawao at 1800 foot elevation eight miles from the coast. Wells in my area are drilled through 1800 feet of mostly solid rock. The contamination indicated by the state was found close to the coast in a shallow elevation well in Haiku. The problem upcountry is

likely nonexistent so the one size fits all solution is bogus but it was easy for Ige to sign off on for mandatory conversions by 2050.

The septic tank pumpers are never honest about how often one should pump a tank and should be regulated. Cesspools will often go generations without being pumped.

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– **pull** 13 hours ago

each individual cesspool is going to cost tens of thousands of dollars to be converted into a more environmentally sound septic system

I have never understood this alleged cost: I converted my cesspool to septic for under \$10K, including the cost of a new lateral. It would have been even cheaper if I were allowed to do some of the work, but Hawaii doesn't recognize my license.

There is promising new technology for decentralized, more efficient, less expensive wastewater treatment systems.

A big upside to these smaller systems is that they can be sited to leverage local topography, thereby eliminating pump stations and extra miles of pipe. I'm guessing none of these have been approved for use in Hawaii.

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– **Vandy63** 7 hours ago

↩ In reply to **pull**

Pull, you are probably correct and more cesspools should convert to septic tanks. I haven't kept up with the wastewater business over the last 35 years but there are less costly (construction+operation) answers to requirements that I see forced on us here on the Big Island.

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– **LarryS** 13 hours ago

If a neighborhood-level approach to conversion is the right scale, it seems like this issue should be specifically addressed in the community plan update process.

And instead of stating an abstract goal (conversion) we need to get specific. E.g., for Ma'alaea, to focus on a single wastewater facility to address the needs of both Waikapu Town and the coastal condos. Wastewater treatment technology has advanced far beyond the conventional technology in use around the state, making siting concerns less of an issue.

A different solution is required for Maui Meadows, but the appropriate scale the entire hillside neighborhood, rather than individual homeowners.

Finally, in lower density areas where a community-scale approach seems out of reach, perhaps the upgrade-upon-sale approach used in other communities is appropriate.

If we start with a strategy, we won't have to improvise down the road.

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– **Ranger_MC** 14 hours ago

Mufi & Jeremy had the chances. Many times over the years. But they didn't act. Other competing priorities. And here we are today.

👍 Respect 2 ⬅️ Reply ➡️ Share

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– **Chigao** 12 hours ago

⬅️ In reply to **Ranger_MC**

The only cesspool that truly needs immediate attention here is on the SW corner of Punchbowl and Beretania.

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– **mtf1953** 14 hours ago

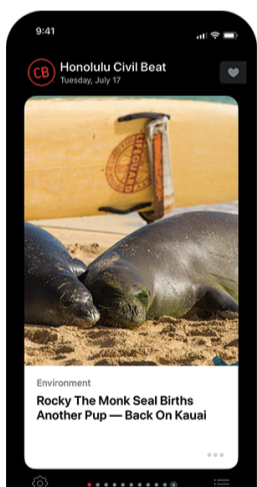
Hawaii's approach to environmental protection remains woefully inadequate. One would think the concept of human waste going into our streams and near shore waters would elicit a more vigorous response. State and County governments keep kicking the can down the road, and I for one do not believe this problem will be solved by 2050. In 2049, everyone will scream they need more time. Stuart Coleman should be commended for highlighting this problem and for his common sense, and economically feasible solutions. Whether our elected officials and bureaucrats have the guts to solve this problem is yet to be seen.

👍 Respect 6 ⬅️ Reply ➡️ Share

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– **luckyd** 15 hours ago

My family purchased a foreclosed home near Papakolea in Punchbowl. We demolished the existing home and applied for a sewer connection to build a new home. That's when we found out that 2 neighbors share a common cesspool on our lot, which wasn't disclosed anywhere. C&C won't let us connect to public sewer ("no capacity"). DHHL won't let us connect to their nearby private sewer ("you aren't Hawaiian"). DOH won't let us unilaterally close the cesspool ("work it out with your neighbors"). In fact, DOH has suggested in writing that we apply for a variance to convert the cesspool to a septic, which would restrict our development to 2 bedrooms (the neighbor already has a 3 bedroom home). Finally, 6 years later, it looks like we need to pay for our new septic, along with our neighbor's new septic!



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