

PRESENTATION TO THE MPWMD Board Meeting

November 17,2014

**Funding farms to save cities: An idea on water recycling from CSUMB students
(Jordan Duffner, Jeff Toyoshima, Miguel Padilla, and Mary Ann Hernandez)**

Speaker 1

Chair Potter, members of the Board, my name is Jordan Duffner and I am from Marina. We are a group of CSUMB students concerned about the future of water in our region. We have learned about water issues in our service learning course, Marine Science in the Community. As young people who will be inheriting all of the solutions and their inherent consequences, we are compelled to speak to the benefits of water recycling and offer an idea to help this move forward. As we all know, water resources are becoming more scarce. Arid regions, like California, will get drier and drier while the population will continue to grow. So we feel strongly that we need a diverse portfolio of water solutions. In the near future, we may be forced to use more fossil fuel to meet growing demands for electricity. In communities where seawater desalination is part of the water supply, even more electricity will be needed to generate water. This will raise the cost of living even more. The current drought gives us some insight of what to expect. In the future, we believe there are great cost benefits to cities if we can maximize the development of more energy efficient water technologies now.

Speaker 2

Members of the Board, my name is Jeff Toyoshima and I am from Monterey. Over the last few years, we have witnessed conflicts and fears over economic hardship anticipated by our community over a water crisis. What will happen when there really is no more water?

We have learned that seawater desalination is being considered not only by the Monterey Peninsula, but by the cities of Marina and Salinas, as well. We wonder how our generation will be able to afford water in the future given the current solutions being considered. The highly energy-intensive process of desalination means becoming

almost entirely dependent on fossil fuels for water production. While we realize desalination will be a component of the portfolio, must it become our primary urban supply? And if so, will it leave our generation with a need to find new energy sources to fuel it? Will it create new environmental problems in the ocean to solve later?

It is important to note that desalination technology is progressing rapidly, especially in the realm of fuel efficiency. If we build as quickly as possible without considering these technological advances, we run the risk of being stuck with an expensive and inefficient process.

At the October 20th Board meeting, Chair Potter expressed a future vision for water. That the Monterey Peninsula must reach out across the river and develop collaborations with the Salinas Valley in order to create long term regional water solutions. We are motivated by this vision and stand here tonight to say that future water solutions must be affordable, sustainable, and beneficial to both sides of the Salinas River. Therefore, we would like to humbly submit an idea that provides incentive to maximize the use of wastewater and stormwater resources so that the need for costly seawater desalination can be minimized and the many advantages of a diverse water portfolio can be maximized.

Speaker 3

Members of the Board, my name is Miguel Padilla and I am from Salinas. It is known that drip irrigation can provide up to 40% of water savings compared to conventional overhead spray systems and if coupled with a need based irrigation system, even more water can be conserved. Researchers at CSUMB and NASA-Ames are developing technology that use satellite data in combination with information from agricultural weather stations to track crop canopy development and crop water requirements (due to evapotranspiration) at the scale of individual fields (Melton, et al. 2012). The researchers are developing web and mobile interfaces for this data to help growers obtain information on crop water requirements that can be used to assess and improve irrigation management strategies. Yield vs irrigation trials conducted to date for lettuce

and broccoli have shown that these evapotranspiration-based irrigation management tools can reduce total applied irrigation by 22-34% or more relative to standard practice in the Salinas Valley without any significant changes in yields (Johnson et al. 2014; Melton 2013). In addition, preliminary results also suggest that this approach can substantially reduce the amount of nitrate leached below the root zone during irrigation events (Cahn 2012; Cahn et al. 2014; F. Melton, pers comm.). This technology has not yet been tested on Castroville fields irrigated with recycled wastewater through purple pipes. Nonetheless, we believe Castroville farmers may benefit greatly in the future from increased irrigation efficiency, especially if urban areas like Salinas and the Peninsula turn to expensive seawater desalination.

We considered the possibility that once the CalAm desalination plant becomes operational and water bills rise by a projected 45% (Burnett 2014), more people will take steps to reduce household water use. More homes will adopt grey water technology for landscaping and less water will be sent to the Marina wastewater facility. We have already seen a reduction in wastewater flows in our area during the current drought. All of this will negatively impact the Castroville farmers.

See additional information for this section under ADDENDUM.

Speaker 4

Members of the Board, my name is Mary Ann Hernandez and I am from Marina. Currently, farms do not use recycled wastewater or stormwater in winter. As a result, each year a large volume of clean, valuable water is discharged into the ocean. Unused storm and wastewater could be of great beneficial use to communities that are willing to invest in treating it. It would save them money by reducing their need for expensive desalination water and asking the public to help invest in new technology for farms seems like one way they could give something back to the Salinas Valley. We propose that the Board consider creating a fund that invests in these new technologies to help those farmers reliant on recycled wastewater in order to improve crop irrigation efficiency. In exchange, farmers would allow cities to have access to unwanted winter stormwater and possibly wastewater for recycling and aquifer recharge, as the City of

Pacific Grove is proposing. We acknowledge that the various agreements and MOUs in place regarding wastewater recycling come with a very complicated history, are fragile, and took months of negotiations. Nevertheless, we feel compelled to suggest alternatives in the interest of our future.

Speaker 1, Conclusion

Members of the Board, it does not matter if you live on the Salinas side or the Peninsula side of the river. We all depend on each other. Each day, residents from the Salinas Valley come to the Monterey Peninsula to work. Each day, meals consumed by Peninsula residents or vacationing tourists include fresh, affordable produce grown on Salinas farms. Neither the Peninsula nor the Valley have enough water to continue our independent ways of life if we allow ourselves to be separated by a simple river.

Our group concludes that maximizing the use of stormwater and wastewater projects now would make water more affordable and sustainable in the long run for cities. In return, funding advanced irrigation technologies to help farmers adapt to a future with less available water is just one way cities can help farms.

What we propose might be similar to the Carmel River mitigation fee charged to CalAm ratepayers. This fee raised over \$11 million dollars and is currently used to fund projects that restore the river for the benefit of fish (MPWMD 2012). In the coming years, CalAm will no longer have an impact on the river once their water projects are built. At that time, the mitigation fee will be removed. In a sense, we are proposing a replacement of that fee with an 'irrigation improvement technology fee' so that farmers can use these new systems to irrigate more efficiently, thus saving water - a new financial incentive that benefits cities and farms in the long run.

We respectfully offer this as a solution to bring cities and farms together for a mutually beneficial collaborative future. We thank you for your attention. We would also like to thank Dr. Carol Reeb of Hopkins Marine Station (Stanford University), Forrest Melton, and Kirk Post of CSUMB – NASA Ames, for their time, help and extensive explanations

into this complex issue, as well as Ximena Weissbluth, our Marine Science in the Community instructor at CSUMB. We are happy to answer any questions.

Opinions expressed herein belong to individual speakers and do not necessarily reflect those of CSUMB, its staff, or students.

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Addendum (to presented information):

Forrest Melton, a Senior Research Scientist with the NASA Ames Cooperative for Research in Earth Science and Technology (*ARC-CREST*) and affiliated with the Division of Environmental Policy and CSUMB added this supplement to the information presented by Speaker 3. He notes that their project team found a wide range of approaches to irrigation management in the Salinas Valley and that some growers are already using evapotranspiration-based irrigation management strategies with drip irrigation. For those growers, it is possible no significant gains in irrigation efficiency would be expected with the Satellite Irrigation Management Support (SIMS) tools proposed here (<http://ecocast.arc.nasa.gov/dgw/sims/>). His project team is currently conducting additional validation studies and working to complete the prototype web and mobile interfaces for 2015 and plans to make the data and tools freely available in collaboration with the California Department of Water Resources.

He notes that CSUMB is also collaborating with the University of California Cooperative Extension (UCCE), which is developing a closely related tool called CropManage. CropManage works for lettuce and broccoli. This tool is currently

available at no charge (<http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=8501>).

Both CropManage and SIMS are being developed as free online tools. However, growers will need to supply accurate data on irrigation applications. This data can be obtained at minimal cost through accurate record keeping and frequent calibration of pressure gauges, or through the purchase of flow meters connected to wireless data loggers. Approximate costs range around \$400 per field per year for the flow meter, logger, and wireless data plan.

For further information on SIMS or CropManage irrigation tools, please contact:

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