Here's the Blue Deal

Compiled by

AltaSea at the Port of Los Angeles

2020

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Dear Reader,

The following articles are part of AltaSea's *Here's the Blue Deal* blog.

In response to the global pandemic, and as a way to provide science curriculum for all students and adults staying safe at home, AltaSea launched Project Blue. Through live chats, webinars, and ocean science curriculum, we have provided a resource that gives the next generation a window into the Blue Economy's science and innovations. We are proud to have reached over 10,000 people this summer.

One such resource is *Here's the Blue Deal*. With contributions from subject-experts to business leaders to college students aspiring to make positive change, this series covers the Blue economy, the history of the ocean economy, and the future of economic sustainability. Together, these blogs tell the story of the Blue Economy's potential in Los Angeles. It's a story we are pleased to share with you.

We hope you enjoy this collection.

Timothy B. McOsker
Chief Executive Officer

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Blue Economy

What's Next? Blue Economy, 'New Space'

April 22, 2020

By Jonathan Woetzel and Michael H. Kelly

An "innovation cluster" of researchers and startups is starting to form in long underutilized warehouses at the Port of Los Angeles, in pursuit of the idea that the planet's oceans have the answers to some of mankind's most perplexing challenges. Aquaculture, algae fuels, and robotic exploration of the unmapped depths are the focus of an emerging "blue economy" that has the potential to provide sustainable solutions to long-range environmental concerns, along with tens of thousands of middle-class jobs.

The nascent epicenter of this emerging new economy is AltaSea, a non-profit organization that has begun the development of an ocean research and development campus on 35 acres at the long underused City Dock 1. The project has L.A. looking to the future as political discussions about income inequality and the plight of the middle class continue to be mired in the idea of somehow turning back the clock to restore well-paying jobs connected to coal, steel, oil and the manufacture of high-polluting vehicles. We are instead embracing the resurgence of manufacturing jobs based on the blue "ocean" economy that AltaSea is pioneering, and the booming "blue sky" economy linked to the growth of private initiatives in aerospace – the SpaceX generation.

These nascent sectors show great promise in providing pathways to middle-class wages linked to skilled manufacturing, not just technology, with a larger mission of serving, even saving, the planet. We're seeing the possibilities already with the resurrection of aerospace –an unexpected third act in a fraught regional story.

Starting in the 1930s, companies such as Douglas Aircraft, Lockheed, and North American Aviation established operations in and around L.A. because of the region's large labor pool and mild weather, which is ideal for flight-testing aircraft. At the height of the Cold War, 15 of the 25 largest aerospace companies in the United States were located in Southern California. By 1990, 1 in 10 U.S. aerospace jobs were located in L.A., providing a key source of upward mobility. But as Pentagon spending slumped later that decade, aerospace moved elsewhere.

At the same time, national ambitions and budgets for space exploration shrank. What remained, though, was a landscape with the entire equation of human space flight in its DNA. Entrepreneurs were quick to see the potential in the early 2000s, and private and public companies now sit alongside each other, employing the region's legacy aerospace assets to push the boundaries of commercial space activity.

The "New Space" industry, which has attracted hundreds of millions of venture capital dollars, is expected to be worth $600 billion by 2030 and more than 70 aerospace firms are now located at the Mojave Air and Space Port at the northern border of L.A. County. At the southern end, SpaceX recently signed a long-term lease at the Port of L.A., just across a harbor channel from AltaSea, to begin rocket development work there.

These activities are fueled by a desire to explore and develop ways for humans to live and work in space, but the New Space economy has more present-day applications. Some of the industry's startups are developing smaller, lower-earth satellites that are already providing higher-speed Internet access and GPS tracking, generating data that can be used to manage natural resources, measure agricultural yields, or aid first responders after natural disasters. During the recent California wildfires, firefighters relied on data from these new satellites to better estimate hot spots and predict what direction the fire may turn.

There is no doubt lives and homes were saved in the process. Overall, the number of jobs being created to launch these and various other projects is exceeding forecasts, and when viewed in combination with job "replacement" as workers retire (30.5 percent of aerospace workers are over the age of 50) or change jobs, there is great opportunity for residents who are gaining the needed skills. Entry-level electrical engineers earn $75,000 to $80,000, according to Aviation Week data. Entry-level software engineers in aerospace and defense make about $76,000.

Raytheon had about 600 job openings in the South Bay as of last month, and Northrop Grumman plans to add more than 2,000 jobs in the region by late next year. The L.A. space industry has created more than 6,000 jobs in the past decade, with an average wage of over $100,000, linked to the production of unmanned space vehicles.

At the same time, projections are rosy for jobs linked to ocean exploration, whose presence alongside aerospace in the nascent Blue Economy is no accident. Aerospace entities are among the anchor tenants at AltaSea, repurposing space vehicles as advanced underwater robotic probes. This work is already spawning industries of the future, such as ocean robotics, mobile sensing, and offshore renewable energy – and producing a spectrum of jobs from low-wage assembly to advanced manufacturing to high paying white collar jobs.

By 2025, the entrepreneur and author Gunter Paul estimates, the oceanic Blue Economy could create 100 million new jobs worldwide based on hundreds of innovations, as well as empower people and sustain communities. A split between rising wealth and deepening poverty should no longer be the storyline of L.A. and these nascent Blue Economy ventures offer genuine hope for not only L.A., but our nation and its workers.

Rising wealth and deepening poverty should no longer be the storyline of L.A. and these nascent Blue ventures offer genuine hope for not only L.A., but our nation and its workers. Now it is up to the public and private sectors to up their bets on a vision that could have been scripted by Jules Verne and Carl Sagan. Then, and only then, will our struggling middle class find a Hollywood ending.

Jonathan Woetzel *is a senior partner at McKinsey & Co.;* ***Michael H. Kelly*** *is executive director of the Los Angeles Coalition for the Economy & Jobs and a trustee of AltaSea at the Port of L.A.*

Growing a Blue Economy Entrepreneur Ecosystem in the LA Harbor Region

May 8, 2020

By Ann Carpenter

Blue Economy Overview

According to the *2018 Annual Economic Report on EU Blue Economy* produced by the European Commission, the Blue Economy includes concepts that encourage stewardship and ocean health within "interlinked established and emerging sectors." Sectors included within the Blue Economy extend to areas such as shipbuilding and repair, offshore oil and gas, power generation, fisheries, minerals and mining, desalination, marine habitats and coastal ecosystems, ocean garbage cleanup, waste disposal and even carbon sequestration. Bluetech is best described as an emerging cross- and multi-disciplinary ecosystem within the broader Blue Economy, which seeks to solve problems related to the ocean, marine and maritime sector.

Why Us? Why Now?

Every startup needs to answer the questions, "Why us? Why now?" We can apply these same questions to understand why we're well positioned to grow this Blue Economy ecosystem here in the Harbor area.

Global Momentum

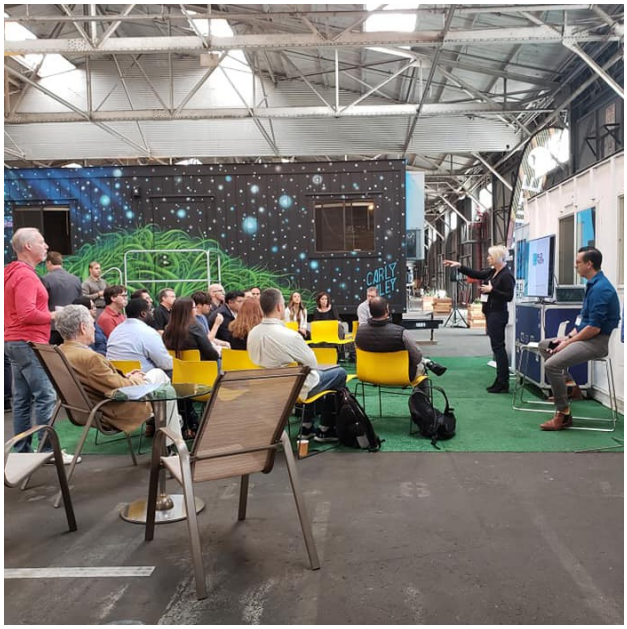
In 2015, seventeen United Nations Sustainable Development Goals were adopted by world leaders. Goal 14, Life Below Water, called out the need to conserve and sustainably use the oceans, sea and marine resources for sustainable development. The first five years were largely dedicated to awareness and stakeholder building. Now through 2030 has been designated as a Decade of Action to "supercharge ideas to solutions." With scores of newly-established ocean-focused business clusters, accelerators and incubators worldwide it's clear that we are in "solution mode." Likewise, there has been an exponential rise in investment in in these clusters as well as the individual startups.

Regional Resources

With rapid technological advancement in many of the industry sectors that dominate LA County – biosciences, aerospace, trade and logistics, food manufacturing, advanced transportation – our region is starting from a strong base. Bluetech broadly encompasses many of the same technologies found in

sectors such as agriculture and food technology; water and energy; biotech and life sciences; aerospace; construction and infrastructure; and transportation and logistics. In 2019, the growing investment in science and engineering-based startups in the Greater Los Angeles Area resulted in $2 billion in startup investment and 60 new funds, plus 168,000 biotech jobs – more than San Francisco.

Local Need and Commitment



"As the talk of automation starts to present some new realities… We must put a plan in place to make sure that the next generation is a well-equipped workforce. The Port has long been a job center for the goods movement workforce, but now, with the establishment of AltaSea, the port's new bluetech incubator, the Port will also become a job center for the technology workforce. AltaSea will be a catalyst to research, the creation of new businesses, new industries, new technologies." This quote from Councilman Joe Buscaino, City of Los Angeles, Council District 15 speaking at the 2019 State of The District illustrates the need to transition to the emerging Blue Economy. Designating the first ever Chief Innovation Officer in any district in the City of Los Angeles and allocating resources for entrepreneur programs and activities, demonstrates the commitment.

Conclusion

In summary, if we continue to connect with global innovators focused on ocean solutions, harness the technical resources and domain expertise available in our region, and continue to build out programs for science and engineering-led startups, we will foster the growth of countless entrepreneurs, create jobs, and help sustain the planet.

Ann Carpenter *is CEO, Braid Theory; and Chief Innovation Officer, City of Los Angeles, District 15*

Revolution 5.0 and the Ocean Economy

May 15, 2020

By AltaSea

Introduction

The Fifth Industrial Revolution is at Los Angeles' doorstep, and AltaSea at the Port of Los Angeles is ready to embrace it. Our Center of Innovation focuses on Aquaculture, Blue Technology, and Ocean Energy. Our Aquaculture Cluster invites companies to tackle issues such as sustainable food production. Our Blue Technology Cluster constructs and uses underwater robotics and other ocean exploration technologies. Our Ocean Energy Cluster will focus on kinetic wave energy and algae fuel technologies.

Why does this matter? The Fifth Industrial Revolution brings focus back to humanity by coupling the concepts "for-profit" and "for-benefit". While revolutions of the past have focused on efficiency and productivity, the Fifth Industrial Revolution asks us to become accountable to our neighbors—to save our planet and to sustain its population. To do this, we need to evaluate the entire workforce system and its relationship to the world at large.

One of the leaders at the forefront of this movement is Marc Benioff, the CEO of Salesforce. At the World Economic Summit in 2019 he described his vision for the Fifth Industrial Revolution:

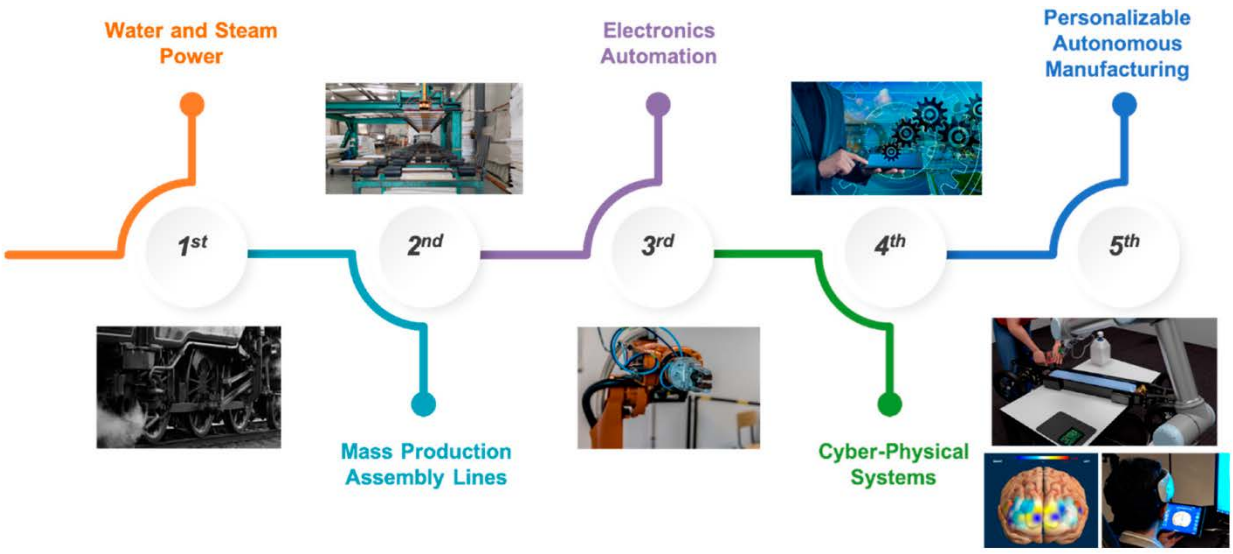
"It will be about saving the planet. We have a lot of work to do. We can see the rising temperatures. We can see how that affects the oceans, changes our ecosystems. We see how it impacts our forests. We're still de-foresting at an acre every second. We have to ask ourselves – is this the world we're going to leave our children?"

He went on to say: "The future is about every one of us taking personal actions to improve the state of the world." Turning these words into action must be part of L.A.'s economic recovery. A 2019 report from the United Nations Intergovernmental Panel on Climate Change indicated that there are five ocean-based practices to mitigate climate change: renewable energy; shipping and transportation; protection and restoration of coastal ecosystems; aquaculture; and carbon sequestration. With AltaSea, L.A. has a platform at the Port of L.A. to drive

economic growth, to create good paying jobs, and to improve the quality of life for everyone on this planet.

5 Revolutions? How did we get here?

Most of us are familiar with the First Industrial Revolution, that mechanized the textile industry and saw the invention of the steam engine. The Second Industrial Revolution centered around mass production, while the Third Industrial Revolution saw the introduction of the Internet and vastly improved communication and high-tech production. The Fourth Industrial Revolution circles around smart technologies, smart factories, and how everything will be automated and connected. These four bring us to the Fifth Industrial Revolution. In it, sustainable technologies, saving the planet and humanity will be key. Some of the previous Revolutions were isolated to their time, sometimes taking nearly two centuries to play out, but especially with the pressures of a global pandemic, the Fourth and Fifth Revolutions are overlapping each other.



The Fifth Industrial Revolution

This overlap of the Fourth and Fifth Industrial Revolutions will create an opportunity to not only develop a workforce in which jobs are fair and equitable, but to also work towards sustainable goals for the planet. The years ahead will see major changes in the United States as smart automation, a key factor in the Fourth Industrial Revolution, will have a large impact on society.

The McKinsey Institute reports that over half of jobs in the US– equivalent to around $15 trillion in wages – have the potential to be automated and will be by 2055; the World Economic Forum also forecasts that key shifts in technologies will create the "world of tomorrow" in the next decade. But such a shift in and of itself is not enough.

The late Peter Drucker, who many believe is the inventor of modern management, once stated that culture eats strategy for breakfast. In other words, values last and success cannot be more important than trust. It's not that strategy is trivial, but the people involved with an organization or cause need to be excited about it in order to effect change. And this, in essence, is the Fifth Revolution: People want to make a difference and leave a responsible footprint. To this end, marrying jobs that are efficient, equitable, and promote sustainability will encourage a workforce and inspire the next generation. A key issue of the Fifth Industrial Revolution is how to affect sustainable and equitable change in the workforce together with technological advancements that make tasks more efficient and productive.

Connecting to the Ocean

In this Fifth Industrial Revolution, it is the emerging Blue Economy sectors that can best combine technology, equity, and sustainability. The Blue Economy will do this through measures that address food, energy, and water security, as well as climate change. With AI replacing jobs on land, the ocean is the key to creating the workforce of tomorrow. In fact, the Blue Economy is already witnessing the birth of new industries, such as algal biofuels and carbon sequestration technologies, alongside the development of current ones, such as aquaculture. All these will contribute to a better planet. The job loss seen in other industries can be replaced by jobs in the Blue Economy, and on a much more level playing field. Most important, these industries and the jobs they create can be built with the guiding principles of the Fifth Industrial Revolution in mind. Adopting these solutions will create jobs that are at the same time sustainable and help our planet.

Collaborations

AltaSea Applauds the Center for the Blue Economy

June 12, 2020

By AltaSea

There are many organizations fighting for a better earth and a better future. One of these is the Center for the Blue Economy at Middlebury Institute. Their mission is to promote a sustainable, resilient ocean and coastal economy (the "Blue Economy") through leadership in research, analysis, and education. Their research focuses on the economics of climate change adaptation in coastal regions and helping organizations manage the changing nature of economic relationships with the oceans and coasts.

Recently, the Center for the Blue Economy partnered with Blue Frontier to address a need to put oceans and coasts front and center in climate solutions. While there are calls to rally around a "Green New Deal," those calls must also rally around a "Blue New Deal." These two organizations have created the Ocean Climate Action Plan to provide a template for some of the first ocean climate legislation and policy actions in U.S. history.

In April, the Center for the Blue Economy and Blue Frontier hosted a webinar that examined the issues addressed by the Ocean Climate Action Plan with a focus on the importance of the ocean in climate solutions and the importance of climate preparedness to the U.S. Economy. With the webinar attracting over 700 viewers from all over the world, speakers outlined the four parts of the Ocean Climate Action Plan:

– Financing & Coastal Adaptation (Financing mechanisms for coastal adaptation in the context of social justice)

– Fisheries, Aquaculture, and Marine Biodiversity Conservation (Climate adaptation solutions in fisheries and aquaculture, including adaptive MPAs)

– Offshore Renewable Energy (The challenges facing offshore clean energy and onshore links, including ocean zoning)

– Ports & the Maritime Sector (Greening ports and shipping and decarbonizing other maritime industries)

With consideration of input from attendees, the next draft of the Ocean Climate Action Plan will be translated into legislative and policy language at state and federal levels. The Center for the Blue Economy and Blue Frontier will also continue to build support for ocean climate bills in Congress through media campaigns, opinion pieces, and relying on the public to spread the message.

AltaSea is proud to be working with the Center for the Blue Economy. We understand that the ocean has the solutions to many of the current challenges. We also work to keep moving policy changes forward and are proud to support actions that do so. People are excited to take on this challenge as it means a better world not only for them, but also for the generations to come. Through our own programs, such as live chats, webinars, and education programs, AltaSea works to instruct students and support innovators.

As stated by the Center for the Blue Economy: The climate emergency is an ocean emergency. There is no time to waste.

Collaboration with World Resources Institute (WRI) and California Institute of the Arts (CalArts) to combat climate change and protect the ocean

July 24, 2020

By AltaSea

Cover Art: Recipe for Action (still). PSA animation: Yoo Jung Hong. Graphic design: Makena Janssen. Courtesy of the artists.

The ocean is the life source of our planet and vital for healthy human societies and a thriving world economy. Over-fishing, marine pollution, and climate change threaten to undermine the environmental health and economic vitality of the ocean unless we take urgent action. To address these issues, students at California Institute of the Arts (CalArts) collaborated with World Resources Institute (WRI) to create a series of innovative informational projects.

During the 2019–20 academic year, the class CalArts Collaborates: Design for Non-Profit Partners teamed students and faculty from CalArts' Graphic Design Program and School of Film/Video.

With the goal of engaging a young global audience, students developed materials informed by Blue Papers commissioned by the High Level Panel for a Sustainable Ocean Economy, for which WRI serves as the Secretariat. Results ranged from upcycled apparel and a habit-changing app to a multimedia campaign exposing illegal fishing practices and an Instagram-based approach to promote sustainable seafood.

On June 29, the webinar **Arts and Activism for a Sustainable Ocean Economy** showcased the students' projects and featured artists, activists, educators, and ocean experts discussing collaborative strategies to save the ocean.

Please click here to view the project video, webinar, and students' presentations.

To learn more about CalArts Collaborates, read "Turn the Tide" in The Pool, CalArts' alumni magazine.

World Resources Institute is a global research organization with more than 1,000 experts and staff around the world working to turn big ideas into action at the nexus of environment, economic opportunity, and human well-being.

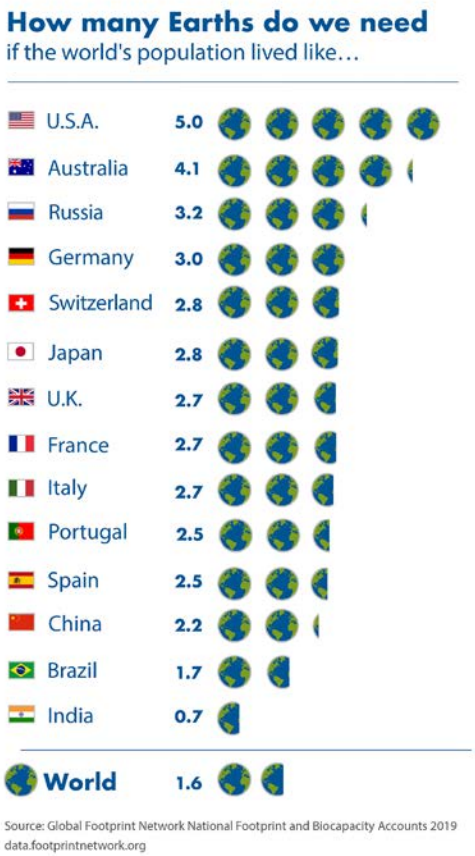
California Institute of the Arts has set the pace for educating professional artists since 1970. Offering rigorous undergraduate and graduate degree programs through six schools—Art, Critical Studies, Dance, Film/Video, Music, and Theater—CalArts has championed creative excellence, critical reflection, and the development of new forms and expressions.

Earth Overshoot Day

August 14, 2020

By Emily Anderson

In today's world, people tend to use resources in excess. From traveling by automobiles and planes to using immoderate amounts of plastic, society has created an unhealthy obsession with the consumerism lifestyle. While many are blinded by the "one use" culture, movements globally have brought awareness to the health of the Earth. Scientists have dedicated their careers to calculating and reducing carbon footprints worldwide and with modern tools available to us, we have the capability to create a compatible energy efficient world.



Each year scientists gather to understand the human effect on this planet. Earth Overshoot Day is an annual date calculated revealing how badly humanity has exhausted our natural resources for that given year. Scientists and activists estimate how many Earths would humanity need in order to survive. Humanity currently uses 60% more than what can be renewed – or as much as if we lived on 1.6 planets.

Each individual country maintains their own Overshoot Day. A country's overshoot day is the date on which Earth Overshoot Day would fall if all of humanity consumed like the people in their country. In 2019, the United States would have needed five individual Earths in order to accommodate our production needs. In 2020, the United States Overshoot Day landed on March 14th. Sadly, this was an actual improvement over 2019.

This year, scientists from the Earth Overshoot Day initiative have anticipated the planet's date falling on August 22, 2020. Although this seems like a troubling date, Earth Overshoot Day was reduced by 14.5% from last year, when the date landed on July 29, 2019. This year's calculations show there has been a deduction in usage of raw materials. The last time we had

a deduction in natural materials was in 1982. How have we successfully helped push the date back towards December where it should be?

Due to recent pandemic events, Covid-19 has had a lasting impact on the environment that cannot be dismissed. Researchers from the University of East Anglia share, "…there has been an expected drop in emissions for sectors including transport, power, industry, aviation, and residential use." The paper argues that at their peak, confinement measures resulted in a worldwide 17% daily reduction in emissions, leading to a potential annual emission reduction of between 4.2% and 7.5% compared to the year prior. The article explains how the pandemic has limited the surplus demand on natural resources. The temporary hold on in-person consumerism led to a decrease in carbon usage, forest products, and food footprints.

Beginning in 2006, founder Andrew Simms partnered with Global Footprint Network to design the first global Earth Overshoot Day campaign. Since this collaboration, millions of people have joined the movement of minimizing humans' impact on the planet. In 2007, Earth Overshoot Day partnered with the World Wildlife Fund (WWF) to expand their mission. Although this is a new organization, scientists in this field can successfully create estimations of overshoot days in the past. Since 2005, this day has fallen between early to mid-August. Now as we approach the second decade in the 21st century, we have happily reached the latest date calculated, August 22, 2020 but we can do better in our attempt to push towards the optimal date of December 31st.

Earth Overshoot Day is a reminder that society should critically think about their excessive use of natural resources. The data captured helps to illustrate the negative impact we have on raw materials. In efforts to discourage excess usage, the calculated Overshoot Day will clearly demonstrate how much we are stripping future generations of essentials. As the date moves closer to January 1st in any individual year, the more pressure we put on our lives as we go forward. Earth Overshoot Day can be influential on how we use materials today. Being aware of our usage will create opportunities for society to assist in a thriving future.

The computed date brings attention to individuals' impact on the planet's natural resources. Included is a link that demonstrates how your actions would alter Overshoot Day. This survey illustrates how many Earths the population would need if everyone used the same amount of resources as you. In addition to the footprint calculator, researchers determine our impact on Earth each year using the following calculator.

(Planet's Biocapacity / Humanity's Ecological Footprint) x 365 = Earth Overshoot Day

2019 was the earliest overall planet overshoot date recorded in history so far, July 29, 2019. Due to Covid-19 precautionary steps that we have all exercised in 2020, the overshoot date improved slightly to August 22nd, yet there is more we can do to help create a more sustainable world. Global Footprint Network experts shared some insight how we can work to produce a one-planet compatibility, “Moving the date of Earth Overshoot Day back 5 days each year would allow humanity to reach a one-planet compatibility before 2050. Likewise, minimizing carbon usage in everyday life by half would set the date 3 months later than years prior. By shopping at local farmers markets and using sustainable energy resources, such as, solar energy, we can move the date back even further approaching December 31st where it ought to be.”

Humanity must continue moving the date back towards December, year after year. Each of us can help to improve the health of the Earth by taking simple steps. Being mindful of our surroundings and reducing our one-use habits as consumers can lead to increased sustainability and a positive lasting impact. Practicing small gestures of awareness will enforce that one day.

Emily Anderson *is a Junior at Arizona State University. She is working on a bachelor’s degree in Nonprofit Management.*

Project Blue! Project Blue! Project Blue!

September 4, 2020

By AltaSea

If you're part of the AltaSea family, these words have meaning to you and the various ways you have engaged this summer with AltaSea's live chats, webinars, programs, and much more.

Artwork submitted by Project Blue student: Avantika V., 3rd grade, Seaside Elementary School

If these words have you scratching your head, we hope that will change as Project Blue Presents: The Blue Hour, a fundraising, drive-in experience focusing on LA as the global capital of Blue Economy and Education. Taking place next to the USS Iowa on October 10, 2020 in San Pedro, CA, The Blue Hour encompasses much of what makes Project Blue significant and celebrates the partnerships that help define AltaSea.

Unique times call for unique measures, and there is a dedicated group working behind the scenes to craft and create a memorable experience for all guests. In keeping with AltaSea's mission of a more sustainable world, The Blue Hour will also be powered by Toyota's cutting edge, fuel cell electric vehicle technology, brought to you by Energy Independence Now (EIN). The Blue Hour will feature curated film segments exploring the Wonders, Dangers, and Solutions found at sea. The Blue Hour will have footage of the Great Barrier Reef Marine Park filmed by the Schmidt Ocean Institute making its "big screen" debut. The Blue Hour will display art from the students who have contributed to Project Blue. The Blue Hour will host a series of strategic announcements from AltaSea. The Blue Hour will debut a pivotal section of Peter Sellars' production of Mozart's Idomeneo. And The Blue Hour will end with a one-night only commissioned art installation projected over the USS IOWA by artists Mason Rothschild and Annie Sperling in collaboration with world renowned artist, Refik Anadol.

The Blue Hour will also honor those who have really made an impact on education and our oceans. Dr. Bob Ballard, founder of Ocean Exploration Trust, will receive the AltaSea Ocean Explorer Award.

Dr. Robert Ballard in front of E/V Nautilus exterior photographed in San Pedro, CA on May 8, 2019.

In fact, Dr. Ballard's video contribution to Project Blue discussing his passion and reasons for becoming an explorer has been shared and used to inspire 1,400 LA Unified school children!

In addition, AltaSea will honor Dawn Wright, Chief Scientist of Esri, with the AltaSea Ocean Innovation Award.

Dawn has made an impact in the way the ocean is seen, as she has worked with Geographic Information System technology and created the first models for ocean mapping. Guests will even get a glimpse of that ocean mapping as the artist installation will use some of Esri's data. With Project Blue focusing on children and education, AltaSea will be announcing the recipient of our NextGen Award in the near future.

Whether you have read a blog on Here's the Blue Deal, asked a question on a live chat, or watched your child learn from our online tutorials, Project Blue is the hub for these resources. Funds raised by The Blue Hour will go towards making Project Blue an even larger success as we enter the fall and winter.

AltaSea prides itself on paving the way for innovation and education. So come join us for an evening that paves a new way for experiences and celebrates our commitment to education and the ocean! We hope to see you there!

Ocean Environment

Ocean Energy

May 29, 2020

By Maya Henry

When you think of energy, your mind might jump to a picture of a lab or scientists working with chemicals. Maybe, and, let's be honest, you have absolutely no clue what to think. Energy is something we use in our day to day life constantly. From the first time we flip on our lights in the morning to when we finish using our electric tooth-brush at night, energy, for many of us, has become nothing more than a subconscious "thing."

Regardless of what you think of, when you think of energy, I'm almost positive the image of a roaring ocean doesn't come to mind.

Why is that?

Though many claim it is not true, our world is battling an ever-present energy shortage that is a direct consequence of overpopulation and overconsumption of energy. Non-renewable energy resources such as coal and oil are being mined and drilled at unfathomable and unsustainable rates, so much so, that Ecotricity predicts in just 53 years, the world could be out of oil and coal. Forever.

This idea poses a question that desperately needs an answer: what is our world to do once we are without the two largest and most popular energy providers? An energy-less US, much less world, simply isn't conceivable, but without coal and oil, what do we turn to?

This is when that image of the vast sea comes into play.

Though rarely used for such purposes, the ocean actually produces two types of energy (mechanical energy from waves and tides, and thermal energy from the Sun's heat) at ridiculously high rates and could solve this energy crisis in a flash.

Think about it: roughly 71% of the world is covered in ocean, and even with rising sea levels, until the Big Crunch occurs and the Earth implodes, the oceans are here to stay. Thus, ocean energy is a reliable and renewable resource. Additionally, while coal and oil deposits can be found in only select locations throughout the world leading to some countries advancing and thus, prospering, more than other countries, the five oceans touch every continent. If ocean energy was used, the energy privilege certain nations hold would be eliminated as would any conflict that results from that privilege.

The process of extracting energy from the ocean also releases no greenhouse gasses and is entirely green. Compare that to the process of using coal as energy, which includes extracting coal from fossil fuels and disturbing the sediment around it. This process releases tons and tons of dangerous emissions that are harmful to humans and the environment.

The cherry on top? A single meter of a wave can hold up to 100 kilowatts of energy that can be sold (raising economies), used (providing energy to the world and helping stop the energy crisis), and saved (creating a "rainy day" fund for future generations). If these benefits are from one portion of one wave in one ocean, imagine the amount of energy and revenue that could be produced if all oceans were used for energy production.

To put the product of one meter of a wave in perspective: a whole pound of coal is needed to produce a single kilowatt of energy. That energy comes from fossil fuels, whereas turning one meter of a wave into energy produces no emissions.

So, really, why has the whole world not jumped on the ocean-energy bandwagon yet?

Well, nothing is perfect, including this energy alternative. While ocean energy is sustainable, renewable, powerful, and environmentally conscious, it, unfortunately, is a relatively new idea and is only possible through new technology. The youthful stage of the equipment needed makes it more expensive. The truth of the matter is many governments would rather kill the Earth and leave an energy-deprived world for future generations than spend large amounts of money on new ideas.

At the end of the day, we can solve the energy crisis, aid the battle against climate change, and power the planet by harnessing the ocean's infinite energy, but not without a fight. Until the world is devoid of those who prioritize their pocketbooks over the planet they live on, it is vital to continue to learn about ocean energy and combat for it to be harnessed on a larger scale.

The ocean has saved us so many times; we now must campaign for it to save us again.

Sources

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Maya Henry *is in the 8th grade*

5 Ways the Ocean Can Save the Planet

June 8, 2020

By AltaSea

Less than a year ago, the United Nations Intergovernmental Panel on Climate Change communicated to policy makers that the health of the ocean was suffering from global warming. But the ocean, is not a victim, and it does not benefit humans to view it that way. Doing so makes us less empowered to correct the situation according to The High Level Panel for A Sustainable Ocean Economy (HLP), a group of science and policy experts.

The HLP concluded that the ocean is the solution to climate change, having the ability to reduce both global warming and the rise in global temperature due to the release of excess carbon compounds (greenhouse gases) that trap warm air near the Earth's surface. The Paris Climate Agreement warned that temperatures should not increase by more than 1.5 degrees Celsius, above pre-industrial (before 1850 – 1900) levels. Temperatures above this level would disrupt natural and human systems.

But how can the ocean combat this issue? Organizations, like AltaSea at the Port of Los Angeles, are the answer. The HLP highlighted five ways that people working together can harness the ocean to save the planet.

The Ocean Provides Renewable Energy

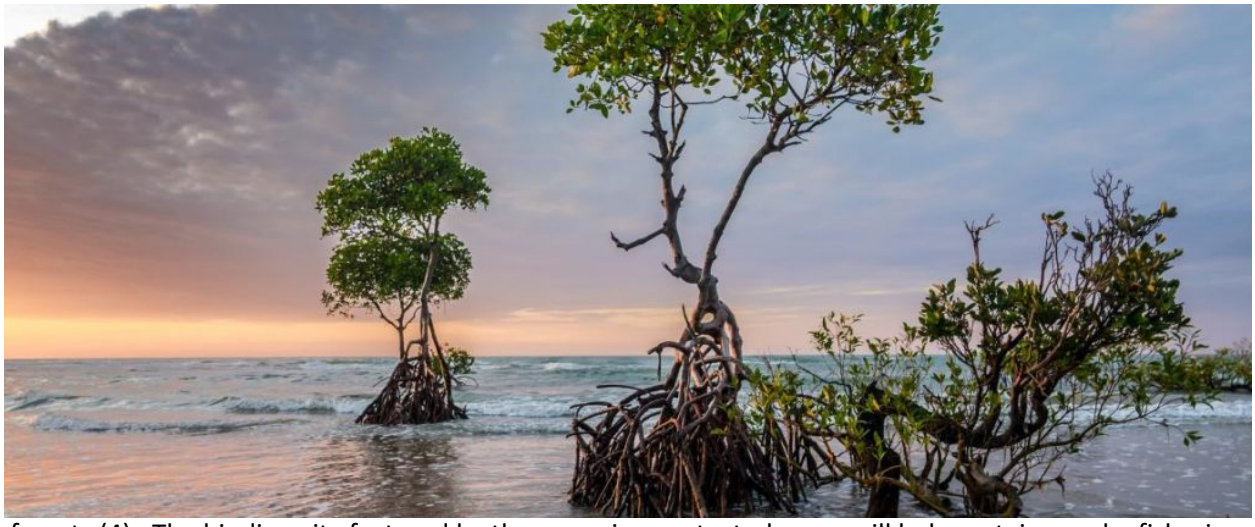
Rather than drilling for oil, a non-renewable energy source that spills deadly carbon into the environment, the ocean provides wind and tides for energy. Research and development of these resources show that they can provide energy for everything from technology to transportation. Moreover, wind and tides are not burned when they generate electricity, and don't release carbon-based gases that raise global temperatures.

Reduce Carbon Emissions of Ocean Vessels

Ninety percent of world trade is carried by ocean-going vessels that release over 3% of global carbon emissions. The Port of Los Angeles has been described as the "busiest container port in the Western Hemisphere" providing AltaSea the opportunity to study the use of alternative fuels and the possibility of hybrid vessels with reduced carbon emissions.

Coastal and Marine Habitats Absorb Greenhouse Gases

Designing, creating, and maintaining areas of the ocean and coastal ecosystem, called Blue-carbon ecosystems, will help lower carbon emissions. Blue-carbon ecosystems absorb carbon dioxide crucial to their survival, and they absorb far greater levels of planetary carbon dioxide emissions than land-based



forests (4). The biodiversity fostered by these marine protected areas will help sustain nearby fisheries and aquaculture, areas where fish and aquatic plants are grown for food.

Fisheries and Aquaculture Reduces Gas Emissions

Increasing use of ocean fisheries and aquaculture for the human food supply will tremendously lower carbon emissions for several reasons. Cows grown for beef and other ruminant livestock contribute close to 6% of global carbon emissions from human activities. Cows are high carbon animals but supplementing their diet with seaweed has shown to significantly lower these emissions, lowering their carbon footprint. While controlling climate change, fisheries and aquaculture simultaneously increase food security and, due to the metabolic benefits of a fish-based diet, lower rates of heart disease, our nation's number one killer.

Oceans May Be Used to Store Carbon Emissions

As carbon levels exceed the ability of aquatic and terrestrial plants to store it, carbon compounds in the ocean create acidic conditions, killing important wildlife. The HLP has proposed that research and testing, combined with international participation of multiple governing bodies, must determine new ways of storing carbon so that it does not acidify the ocean.

The ability to use the ocean provides solutions. AltaSea is uniquely poised as a platform for the interplay of education, scientific research, and business development required to make that happen, thereby establishing a Blue Economy on which our local community can thrive and a mechanism by which climate change can be solved.

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Are Cows causing Climate Change? How the Ocean Can Help.

June 19, 2020

By AltaSea

The temperature of the planet is on the rise. As scientists look for ways to prevent global warming, and some oil companies scramble to develop renewable energy sources, like wind technology, fingers are increasingly pointed towards other factors that contribute to global warming, one of which is the cow.

We love cows, but they pose environmental issues

Cow manure and burps send methane, a harmful greenhouse gas, into the air. Cows harbor Archaebacteria in their stomachs, which allow them to digest plant material, but Archaebacteria make methane in the process. Methane traps the sun's energy, raising the temperature near the earth's surface, a situation that could have dire consequences for the planet and our survival. This issue has prompted legislation requiring the immediate reduction of methane emissions.

How the ocean can help

Given our consumption of meat and milk, scientists at the University of California, Davis, including Ermeas Kebreab and Frank Mitloehner, have made significant progress in making cows a more efficient source of these dietary products, therefore requiring fewer cows to support the demand. Fewer cows means lower methane emissions.

Researchers have also devised ways to isolate and quantify methane emissions from cow burps. By placing the cow's head into a chamber while it's eating and burping, scientists can test how different foods affect the amount of methane emitted. With these systems, Kebreab's research showed that a nutritious, subtropical, red algae seaweed called Asparagopsis, reduces methane emissions from cows by more than 50%. Cows like it too, and it doesn't change the taste of the meat produced.

Many issues need to be solved

How can we make enough red algae seaweed to feed all the cows? Experiments in the laboratory of Jennifer Smith, a marine biologist at the Scripps Institution of Oceanography of the University of California, San Diego, have focused on understanding the life cycle, biology, and growth requirements of Asparagopsis.

It is likely, however, that growing Asparagopsis on a large scale that can supplement livestock will need to happen in the ocean. That may be a good thing because seaweed in its native environment simultaneously cleans up carbon, reducing the ocean's acidity by storing carbon, rather than releasing it.

However, other questions remain unanswered. If seaweed is mass-produced in the ocean, how do is it get shipped to farms so that cows can eat it? Will the shipping vehicles emit more greenhouse gases than the cows themselves?

Are cows really all the problem?

The issue of agricultural carbon emissions is a complex one that dives deeper into land use, the cow's lifespan, and the climate in which cattle are raised. But while fingers are increasingly pointed at the cow as a cause of global warming, agricultural scientists have good reason to point their fingers back to big oil.

Furthermore, cattle and other ruminant livestock contribute only about 6% of global carbon emissions from human (anthropogenic) activities. Indeed, the Intergovernmental Panel on Climate Change reported "carbon dioxide emissions from fossil fuel combustion and industrial processes contributed about 78% of the total greenhouse gas emissions release from 1970 – 2010.

There are many factors contributing to climate change. While some have less of an impact than others, we need to do everything possible to combat this challenge for a better earth.

Too Big To Fail?

July 1, 2020

By AltaSea

The ocean plays a major role in the survival of our planet for well-known reasons, such as the ability to slow global warming by trapping harmful carbon compounds or the ability to release vast quantities of oxygen. But if the ocean fails, our health will be affected in direct and indirect ways. Regardless of whether we live near or far from the beach, we interact with the ocean individually on a daily basis.

Most people eat a variety of seafood ranging from fish to shellfish to seaweed. For example, wakame is a popular seaweed, sometimes called a sea vegetable, used in seaweed salads; agar contains a polysaccharide used to make gelatin; and emulsifiers from seaweed are used to give foods, such as ice cream, a rich creamy texture.

We also drink water from the ocean. While the majority of our drinking water comes from the ocean through the water cycle (by natural processes of evaporation followed by condensation into our lakes, streams and other freshwater sources), people are increasingly bypassing the cycle by removing salt directly from ocean water to make drinking water. This man-made process, called desalination, is costly, but it works.

Healthy biomolecules originate in the ocean. For centuries, global cultures have used red, brown, and green seaweeds as sources of medicinal products, vitamins, and iron. The more we explore ocean organisms, the more scientists are discovering new unicellular and multicellular species that produce unique metabolites that may combat infection, cancer, and other diseases.

In other words, with a multitude of health-related resources derived from the ocean, the ocean is too big to fail. Yet it can. Various types of pollutants threaten its survival – and ours.

For example, if the ocean is destabilized due to warm temperatures, chemical runoff, or oil spills, the normal growth of seaweed can spin out of control. This growth is more commonly known as a “harmful algal bloom,” or HAB.

Why are HABs harmful? Seaweed, otherwise known as algae, in their normal growth state produce secondary metabolites. But some of these chemicals can be toxic, and when they're released from the algae in high quantities, the toxins become hazardous to human health.

Toxins can get into seafood species, affecting the food we eat, and toxins can become airborne, causing various types of respiratory distress. Toxins can also cause marine mammals and other organisms to suffer, further destabilizing the aquatic ecosystem.

Government control of seafood consumption during HABs actually protects us from eating fish that is contaminated. Additionally, people should know not to fish on their own or swim in waters that appear sludgy from green, brown or red algae, as those are indicators of a harmful algal bloom.

The good news is that while studying harmful algal blooms, researchers funded by the National Institutes of Environmental Health Sciences, found that some of the toxins produced, when administered in smaller, specifically defined concentrations, can serve as treatments for diseases such as cystic fibrosis. This study suggests that further research on the ocean, exploring its species biodiversity and molecular heterogeneity, will result in the discovery of as-yet unknown products that support human health and reduce disease.

Many Hues of Blue

July 17, 2020

By AltaSea

One of the chief ways a healthy ocean can help mitigate the effects of climate change is through its ability to trap carbon, a process often referred to as “carbon sequestration.”

Carbon trapped in ocean stores is referred to as “blue carbon”. Scientists are interested in increasing and developing those stores and creating the potential for stockpiling additional blue carbon. Carbon sequestration is important to our global environment because it reduces the release of carbon into our atmosphere, where carbon is known to contribute to the rising of global temperatures. Further, blue carbon ecosystems have been reported to absorb greater levels of planetary carbon dioxide emissions than land-based forests.

What is carbon and how does it contribute to increased global temperatures?

Carbon is a naturally occurring element that, when strung together, provides the backbone structure for all of earth’s living organisms. Long carbon chains are broken down to provide animals with energy and then animals release the carbon into the environment as carbon dioxide. Carbon dioxide is therefore a typical component of air.

However, the burning of fossil fuels, auto emissions, and other human-controlled activities release excess carbon into the atmosphere, where it traps heat near the earth’s surface, raising the temperature of the earth, a phenomenon known as global warming. In 2016, the Paris Climate Agreement warned that to avoid the impact of climate change, we must limit the rise in temperatures to not more than 1.5 degrees Celsius, the pre-industrial level (i.e. the level prior to 1850-1900).

How does the ocean trap carbon?

A chief way the ocean traps carbon is when plants carry out photosynthesis. In this process, light energy is used to convert gaseous carbon dioxide into solid carbohydrate plant matter. These carbohydrates either remain in the plant or are transferred to animals when animals eat the plants. Animals could exhale this carbon dioxide, as mentioned above, or the carbon could

become a structural feature of the animal and is then prevented from escaping into the atmosphere.

Where is carbon stored in the ocean?

There is carbon in ocean water, but when we talk about *sequestered* carbon, we are not talking about carbon that is dissolved in the ocean water; water carbon will simply contribute to the formation of an acid, lowering the pH of the ocean and harming ocean life. Unfortunately, much carbon is dissolved in ocean waters as a result of acid rain, and this rain is one aspect of pollution that needs to be controlled in order to maintain a healthy ocean.

Sequestered carbon, on the other hand, is stored inside living plants as well as in dead and decaying plant, animal, and microscopic debris. It is also stored in rocks and particulate matter. This debris is found in a more permanent state in deep ocean sediments in the benthic zone, the area near and including the ocean floor.

What are the best donors of blue carbon?

Scientists investigate the best donors of blue carbon because those will help us learn to store carbon more effectively. As scientific investigations continue, it is increasingly clear that a diversity of species and processes play a role in the sequestration of blue carbon. There are, in a sense, many hues of blue. Here we explore just a few.

We have mentioned the benthic zone, the sites where sediments accumulate. It is hoped that carbon will end up in this zone because carbon is most effectively sequestered in the ocean floor. Additionally, there are donor ecological sites and species of plant and animal life that contribute to these sediments.

For example, it has been found that coastal wetlands contain seagrasses, tidal marshes, and mangroves that are rich in carbon. Therefore, many areas of the ocean shoreline have become a focus for maintenance and restoration. More recently, a great deal of interest has focused on the role of macroalgae in carbon sequestration.

The role of macroalgae as a blue carbon donor.

Microalgae are primarily kelp and other seaweeds, a diverse group that includes brown, red and green algae, as well as cyanophytes, also known as blue-green algae or cyanobacteria. Macroalgae are the newest species to be considered as major contributors to blue carbon. These species were previously thought to be restricted to rocky shores where there is not much sedimentation. Scientists have shown, however, that macroalgal carbon material is actually exported from coastal ecosystems to sedimentary sites in the deep ocean, where it comprises a significant subset of sequestered carbon.

Illumination of the macroalgal contribution to blue carbon has prompted heightened research on their growth conditions and distribution. For example, studies are underway to promote macroalgal aquaculture and farming conditions. It has also been found that some macroalgal species have greater carbon storage potential than others, depending on the thickness of their leaf-like structures, or thalli (3,4).

As scientist continue to explore blue carbon and share their findings with policy makers, such findings, if heeded, will build a healthier ocean that provides greater service to humanity and the protection of our planet.

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Deep Ocean Studies Unlock Hidden Secrets

July 31, 2020

By AltaSea

In spite of social distancing and quarantining requirements of the 2020 COVID-19 pandemic, scientists from Geoscience Australia, the University of Sydney, and the Queensland Museum, led by Dr. Robin Beaman of James Cook University, have succeeded in conducting unprecedented coral reef mapping and gathering vital environmental data from the depths of the Queensland Plateau off the western coast of Australia.

With an area close to 300,000 square kilometers, this region is one of the world's largest continental margin plateaus and is known to contain a large variety of reef systems, including more than 30 coral atolls. What's unique here is that prior to this recent research endeavor, the Queensland plateau had never been explored beyond 800 meters in depth.

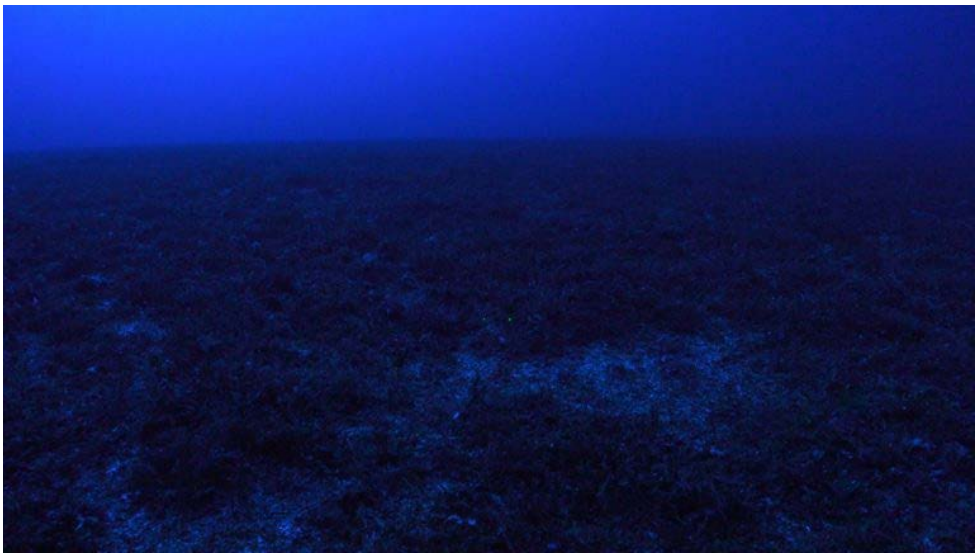


Photo credit: Schmidt Ocean Institute

Deep Ocean Research Capability

A significant factor in the ability of these investigators to go deep has been the Schmidt Ocean Institute and the contribution of their ocean vessel, Falkor. The goal of the Schmidt Ocean Institute, founded by former Google chairman, Eric Schmidt, and his wife Wendy Schmidt, is to

support deep sea projects by providing technologically innovative resources, such as the Falkor and its remotely operated vehicle (ROV), SuBastian.

SuBastian is capable of seabed sampling and photographing deep waters and abyssal reef structures that lie at ocean depths greater than 4500 meters (The below screenshot is from one of their videos studying the Bremer Canyon off the western coast of Australia).

Screenshot from depth of 2820 meters from video of Bremer Canyon

Studies of Bremer Canyon and western coastal sites in early 2020 revealed previously unseen deep sea coral gardens and numerous ecosystems supported by deep sea cliffs. Due to their positioning on the southwest coast of Australia, where they are closely connected with the currents of Antarctica, these ecosystems help our understanding of ocean acidification and the impacts of global warming.

The Queensland Plateau

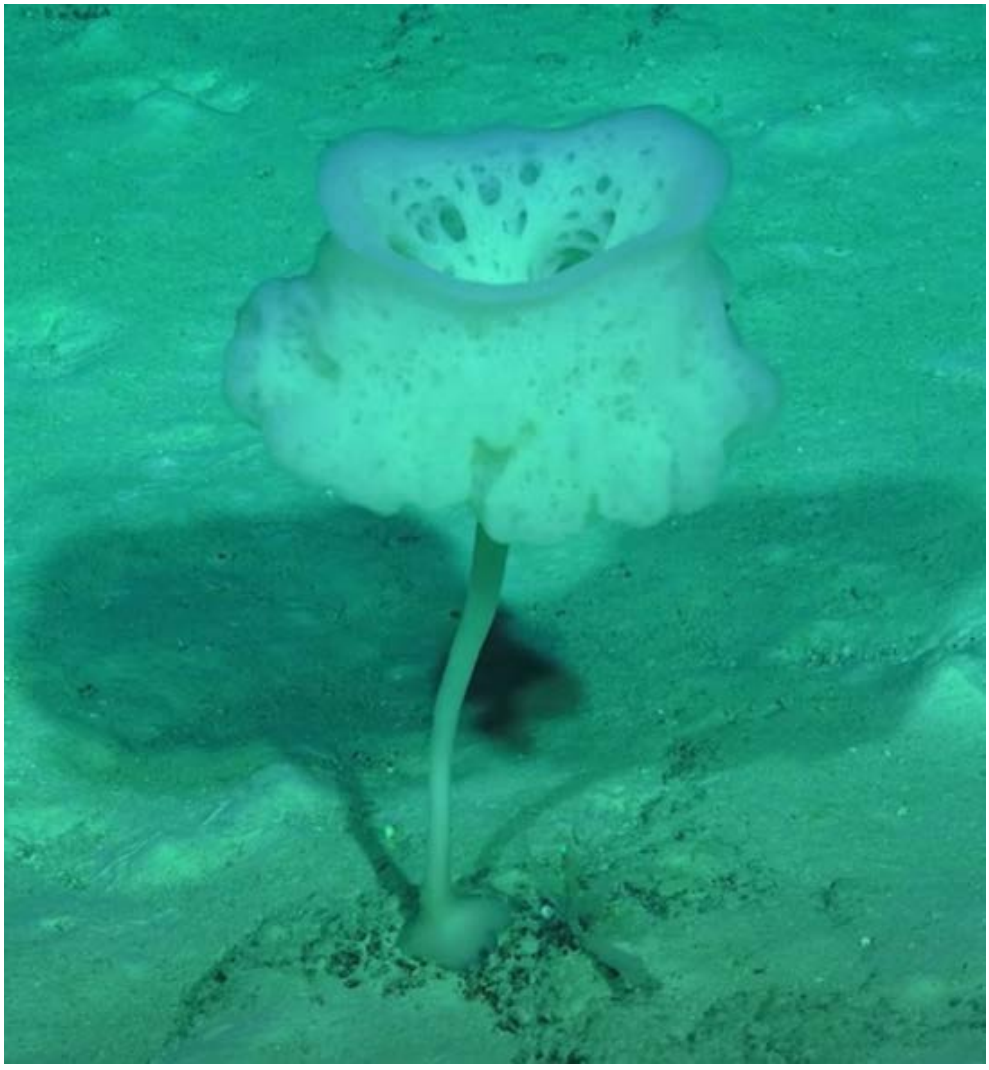
During the more recent 2020 expedition at the Queensland Plateau, the team of scientists led by Robin Beaman (whose research efforts extend from studying the carbonate sediments of green alga to undersea landslides and canyons), received images, video, and data from *Falkor* directly onto their home computers

Dr. Beaman reported to the New York Times that he was toggling between doing household chores and watching the world of unknown creatures in the Coral Sea, when, in addition to finding ten new ocean species, he noticed the presence of the mollusk Nautilus.

Photo credit: Schmidt Ocean Institute

The Nautilus is a known marine mollusk, but its discovery in The Coral Sea is significant because it's a living fossil, meaning it hasn't evolved much over the last 500 million years. Therefore, it provides clues as to how life and the earth's ecosystems have adapted and evolved. Further, the Nautilus is close to being an endangered species. Its survival in this area suggests that efforts to protect the Coral Sea Marine Park may be working to protect the preservation of wildlife.

As the expedition progressed, video footage from SuBastian was posted for public viewing.



Stalk Sponge

Among many new species uncovered, one interesting finding is this unknown stalk sponge that is possibly carnivorous. So much data has been collected from this footage that it will take many months, possibly years, of research to fully comprehend what has been found in this Queensland Plateau expedition.

Seabed Mapping of Queensland Plateau

Seabed mapping data has been collected from greater ocean depths of the Queensland Plateau than ever before. In conjunction with GeoScience Australia, this data has been made accessible through the AusSeabed Marine Data Portal, a technological tool that allows collaboration, investigation, and public distribution of this information.

Due to this collaborative effort with the Schmidt Ocean Institute, this data was collected and distributed at an extremely rapid pace, allowing it to inform immediate future expeditions taking place during summer 2020.

Comprehensive mapping of reefs from their deepest locations to their shallowest depths, allows scientists to understand how deep sea reef structures evolved, as well as to determine policy to protect and sustain the reefs.

Seabed mapping, in general, provides a gateway for scientists to increase their knowledge of geologic events, such as periods of climate change that have occurred during evolution, and that may inform our understanding of trends. Ultimately, this information helps us coordinate future responses to the current climate change situation.

Sustainability

Creating the Best 'New Normal' by Investing in Sustainability

May 1, 2020

By Meredith Brooks

As the COVID-19 pandemic continues to impact lives and economies across the globe, normal life as we know it has –at least for the moment– shifted to a period of uncertainty for many people and industries. Many media outlets have shared articles contending that we are amidst an experiment in a new way of living. Some of the shifts in behavior will certainly be short term, but we have an unprecedented opportunity to permanently adopt others for the betterment of our society and planet.

One of the greatest shifts on display is the direct impact that we can have on our natural world. From climate change to wildlife, we are seeing undeniable demonstrations of human impacts (and lack thereof) on the environment. With more people working from home than any time in recent history, there are fewer cars on the road and planes in the sky. There is some remarkable evidence that natural systems are rebounding with the decrease in human outdoor activities. Satellites have detected less pollution in the air, people can see fish and wildlife in the canals of Venice for the first time in decades, and turtles are successfully nesting on crowd-free beaches in Central America. Recent surveys found that fish and native algae populations in the often-overcrowded Hanauma Bay and other reefs across the Hawaiian Islands are increasing. The long-term impacts of these short-term changes have yet to be understood, but either way, nature is indeed demonstrating the influence that humans have on all other living things. While it may not be realistic to make the type of sweeping changes necessary to have these immediate results become permanent, some modicum of changes to our collective behaviors to increase sustainability can lead to significant changes down the road.

With Climate Change looming as a serious potential global disaster, focusing on sustainability can help to improve human and environmental health as well as the health and stability of both the economy and food supply. Current concerns over the status of the global economy and all that it encompasses are valid. The pandemic has unearthed cracks in fragile systems of order

across the world, from healthcare to food security. The World Trade Organization projects that trade may fall up to 32% in 2020 as supply chains and other economic activities are disrupted due to the pandemic. Few industries and communities are immune to the impacts. In many areas, food insecurity and poverty are growing, and there are serious concerns that the economic fallout from this pandemic will push a half billion people into poverty. In other areas, farmers are destroying perishable crops they can no longer sell. Outbreaks are limiting the capabilities of some large terrestrial protein plants in the U.S., and agriculture labor shortages are having an impact. The impacts of the pandemic will be far-reaching and long-term. While we are limited in the physical actions we can take at the moment, this situation is creating an opportunity for us to consider the best way to build and rebuild moving forward to ensure our future food, economic, and environmental security.

The Blue Economy, which encompasses the sustainable use of ocean resources for economic growth, improved livelihoods and jobs, and ocean ecosystem health, is an ideal system for our global society to invest in. With sectors ranging from transportation and coastal resilience to fisheries and aquaculture, the emerging Blue Economy thrives on sustainable technologies to support the food system and create jobs, markets, and opportunities for people around the world. For example, aquaculture can utilize coastal resources to produce more food, reduce America's $12B seafood trade deficit, and help restore ecosystems. From coastal and ocean mariculture to IMTA farming of bivalves and algae, including carbon-sequestering kelp, aquaculture is just one facet of a Blue Economy that can sustainably mitigate the impacts of our changing climate and address other global issues.

One beneficial impact of these times is that many people are reconnecting or connecting with nature for the first time as they search for opportunities to 'escape.' This connection to nature will help lay the foundation that is necessary to enact a sea change to create a more sustainable and secure society. Hopefully, as we emerge from this season, we can all consider strengthening our food, economic, and environmental security by investing in the Blue Economy, as well as commercial and consumer buy-in to reduce waste and make mindful choices. In the EU, leaders are leading the way by calling for post-pandemic recovery plans to include the continent's "green transition," and, the European Commission is pressing forward with its Renewed Sustainable Finance Strategy. It has been said that if we work together in this dark moment, it could be our finest hour. Partnership during times like these can instill in us a greater appreciation for the ability of the government, private and public sectors to tackle the world's most serious problems together.

Meredith Brooks works with AltaSea on Strategic Grants and Special Projects

AltaSea Advances UN Sustainability Development Goals

May 22, 2020

By AltaSea

With unprecedented speed the COVID-19 crisis has pushed humanity to focus on our future. In a matter of weeks, people everywhere have altered nearly every aspect of their daily lives. Now, as the world slowly begins the long way back to a new normal from the virus's impacts, we have a unique opportunity to redefine global systems to be environmentally sustainable and economically fair. In addition, climate change still exerts immense pressure on our planet, and threatens all life on earth, unless swift action is taken. Building the "new normal" will necessitate broad changes to many sectors. Dedication to the United Nations Sustainable Development Goals for 2030 will become more critical than ever. AltaSea is proud to support these goals in our programs and strategic partnerships.

Governments and stakeholders of the twenty-first century must undertake significant changes in policies and investments in order to ensure that the planet remains prosperous, peaceful, and livable. AltaSea's mission aligns with all seventeen of the UN's Sustainable Development Goals. In addition, our signature projects directly support the UN's goals of:

quality education;

affordable and clean energy;

decent work and economic growth;

climate action;

life on land and below water; and

collaborative partnerships.

Quality Education

The UN estimates that more than half of the world's children do not meet academic proficiency standards. At a time when students across LA and our country have had their education disrupted by school closures, extracurricular science-based education is more essential than ever. AltaSea's goal is to inspire students to engage in Ocean STEM education and look to the emerging blue economy for good paying jobs in fields such as marine technology, underwater robotics, and sustainable aquaculture. In the past AltaSea has offered internships, workshops, and in- and after-school programs. Launched in response to the pandemic, AltaSea's Project Blue digitally connects students with marine experts, encourages students to engage with the marine world, and helps inform the public though creative, educational media. In this way, AltaSea's Project Blue programming is directly in line with the United Nations' development goal of ensuring quality education and promoting lifelong learning opportunities for all.

Affordable and Clean Energy

As more of the world gains access to the electrical grid and, in the process, carbon emissions increase, it is vital that we transition toward renewable energy. With state-of-the art facilities, AltaSea's physical campus will be a net-positive energy producer. This facility design is a small part of AltaSea's much broader commitment to researching alternative energy solutions. Our Center of Innovation will house three business clusters, one of which will be focused on Ocean Energy, including kinetic wave energy and algal fuel technologies. As a result of this research and commercialization of viable technologies, nations will be able to design energy systems that are long-lasting and have low carbon impact.

Decent Work and Economic Growth

The UN made it clear that inclusive and sustainable economic growth will drive social progress and generate other Sustainable Development Goals. AltaSea understands that a healthy ocean is critical for growing the global economy in a way that benefits all people. Ocean-based industries such as tourism, marine transportation, and shipping currently generate approximately $1.5 trillion in revenue globally, with projected gross income expected to double to $3 trillion by 2023 alone. As ocean-based industry expands in Los Angeles County, over the next five years, marine jobs are expected to employ more than 126,000 Angelinos and generate more than 200 billion dollars for the local economy. In line with the UN's development milestone of decent work and economic growth, AltaSea plays a key role in "promoting ocean excellence" in our efforts to facilitate job generation in high-growth, well-paid industries. By collaborating with local leaders and government agencies such as the Los Angeles County Economic Development Corporation, AltaSea is strengthening investment in blue jobs.

Climate Action

Climate change is occurring faster than anticipated with effects already being felt worldwide, and is the single largest challenge to global development. In this context, the ocean offers valuable, underutilized opportunities for reducing carbon emissions. The United Nations Intergovernmental Panel on Climate Change has identified five promising innovation target sites for combating climate change. These include: shipping and transport; protection and restoration of coastal ecosystems; seabed carbon storage; renewable energy; and marine food sourcing. Scientists estimate that implementing changes in these areas could account for up to twenty-one percent of the carbon emissions reductions required to meet the UN Paris Climate Accords' goal of capping warming to 1.5 degrees Celsius by 2050. AltaSea is committed to further researching these five key areas in hopes of helping to develop holistic strategies to understand, use, and conserve the marine environment.

Life on Land and Below Water

The world's oceans drive the global systems that make the planet habitable for humankind. Understanding and mitigating the impacts of pollution, acidification, and rising temperatures are essential to promoting sustainability. AltaSea's mission and its activities serve a sustainable ocean with the understanding that life on land cannot continue without life below water. At

present, marine scientists partnering with AltaSea are conducting breakthrough research and discovering important solutions in the fields of aquaculture and blue technology. AltaSea's Sustainable Aquaculture Cluster exemplifies the co-benefits marine innovation can also provide. In addition to preserving delicate marine ecologies and reducing global carbon emissions, sustainable aquafarms will also help combat global hunger by providing a much needed protein source. Technologies like these make vital marine conservation measures easier and more attractive both to governments and their business counterparts.

Collaborative Partnership

The UN asserts that transnational and trans-industry collaboration will be essential in order to meet global challenges of human and environmental sustainability. AltaSea's business model and core values are based on a dedication to public-private partnerships and collaborations as a multi-tenant nonprofit. At this time, we are in partnership with over 25 universities and colleges as well as over 15 businesses and corporations and dozens of educational nonprofits. We invite business leaders, educators, and scientific experts to collaborate in research and programs that harness the power of the ocean to sustain future generations. It is this collaborative model that makes us both unique and successful.

Conclusion

As a nonprofit dedicated to ocean health and the expansion of the ocean economy, AltaSea seeks to uphold the United Nations' goals for sustainable development. By joining the best and brightest in exploration, science, business, and education, we deliver hopeful solutions to some of the biggest issues facing the planet today. Our collaborative efforts have helped us lead the world in creating technologies and systems that contribute to the vision for a healthier, more sustainable "new normal."

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COVID-related Changes in Human Activity is not Moving the Needle on Climate Change.

June 26, 2020

By Michaela Johnson

Climate change has been a hot topic over the past decade. Many scientific groups and activists have made projections for climate change in the future. One of these projections is that by 2030 the global temperature will increase by 1.5 degrees Celsius. Over the past decade, we have been unable to halt or decrease the Earth's increasing temperature, even with a strong group of climate change activists. With Covid-19 affecting human activity, the world has perceived a short-term change in what looks to be a step in the "right" direction. What people are actually witnessing is a reduction in pollution, not a decrease in greenhouse gas emissions.

The world has viewed remarkable images of blue skies over Beijing's once grey and gloomy skies; and Venice, Italy has seen a resurgence of wildlife into the canals of the city. As a society, we can attribute the blue skies and clear water to the current lack of pollution that humanity normally produces. Wherever you live, whether it be in the city or the country, by the ocean or the mountains, you have observed a lack of societal movement. The question we ask ourselves is: Does the lack of driving cars, reduction in plane trips, and other COVID-related changes in human activity impact the rate of climate change?

The blunt answer is NO! The Environmental Defense Fund (EDF) has estimated that vehicles cause one-third of air pollution in the U.S., and transportation alone contributes to 28% of greenhouse gas emissions. Cars contribute to a higher percentage of air pollution in cities, like Los Angeles, than the total emissions of greenhouse gasses. As it is very important to decrease the amount of greenhouse gasses emitted into the atmosphere each year, the pause on human activity during the pandemic has not tipped the scales enough to change the predictions of the future. We may have halted greenhouse gasses emitted by vehicles, but we have not halted the other causes of greenhouse gas emissions: industrial, electricity, agriculture, and commercial and residential. In fact, electricity and industry emit the majority of greenhouse gas emissions after transportation.

The pandemic has opened my eyes to the real notion that there are five different pillars to climate change and greenhouse gas emissions: agriculture, commercial and residential, industry, electricity and transportation. For there to be a deviation in global climate change, there must be significant actions done in each pillar. Yes, during the pandemic there have been less people traveling, but the other pillars have not decreased in emissions. One pillar that people do not pay attention to because of its small percentage is agriculture. There has been a major surplus of perishable foods that have turned to food waste, between 30 and 40 percent. Food waste is just one example of a problem that the world can work towards fixing.

Another pillar is electricity use. At first, I thought that there would be less electricity used during the pandemic because there are less people in big office buildings or facilities that may require a lot of electricity. But, after thinking about it more and referencing back to my environmental science courses, I remembered that these buildings require electricity through the night to sustain the building. This fact means that most buildings have continued

to use the same amount of electricity than before the pandemic, even if only one employee is working; that is in addition to the countless amount of employees that are now working from home, using energy that previously would not have been used.

As a society, we cannot think that doing nothing is actually doing something.

It takes action and commitment from the entire world in order to move the needle on the projections and path of climate change.

Now let's work together, in all aspects, to reduce greenhouse gas emissions and slowly alter the growth of global climate change.

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Opinion: The rise of the ‘Giant Ocean States’

July 10, 2020

By Dr. Greg Stone and Dr. T. Suka Mangisi

Scientists believe life began in the ocean. It now acts as the bloodstream for the planet; global flows of saltwater moving in currents — north and south, cold and warm — mixing nutrients and turning the sun’s energy into food while ensuring our climate remains hospitable to all life. There is evidence that Homo sapiens may have lived a coastal life in places like Mossel Bay, South Africa for over 100,000 years, getting a steady supply of brain-enhancing proteins, safety from land predators, and perhaps a coastal highway for our ultimate migration out of Africa.

On the eve of the UN Decade of Ocean Science for Sustainable Development, it is fitting to celebrate not only the central importance of the ocean to all humanity, but also the rise of “Giant Ocean States,” countries composed mostly of ocean, and which lay claim as traditional custodians and holders of traditional knowledge of the vast expanse for economic, social, and environmental livelihood.

Having occupied and used all the land on earth, humanity must turn its attention back to the ocean and carefully orient much of our future opportunity there. This profound paradigm shift means that stewardship and ownership of the ocean is more important now than in all human history.

Throughout much of our civilization, the ocean is where humanity has taken too much of what it wanted, and threw away much of what it didn’t. Most wild fish stocks are depleted, and there may be more plastic in the ocean than fish by 2050.

Yet, we remain a century behind in our exploitation of the ocean when compared to the same on land. Many fear our mistakes on land will be repeated underwater. But we believe that an opportunity exists to take the lessons learned from terrestrial exploitation and get it right as we increasingly look to the massive oceanic resource to usher in the so-called fourth industrial revolution.

Humanity's fate is inextricably tied to the oceans, and now "small" countries that control vast regions of the sea — which have historically had less influence on the world stage — are waking up to their power.

Countries like Antigua and Barbuda, Fiji, Kiribati, Jamaica, Nauru, and Tuvalu, are known for their turquoise waters, white sands, and vibrant coral reefs. For their citizens, however, life can be far from picture-perfect.

Thirty-eight countries were formally recognized as Small Island Developing States, or SIDS, in 1992 by the United Nations because they share similar challenges, including limited resources, remoteness, susceptibility to natural disasters, excessive dependence on international trade and aid, and fragile environments.

To combat economic disparities between richer and poorer nations and to better protect our oceans from exploitation, the global community developed the most important international agreement yet, the United Nations Convention on the Law of the Sea, or UNCLOS. This agreement oversaw an enormous expansion of national sovereignty through the creation of oceanic exclusive economic zones, commonly referred to as EEZs, allowing countries to claim territorial rights for fishing, shipping, pollution and mineral activities within their allocated zones.

Thanks to this "constitution of the ocean", small islands hit the jackpot. UNCLOS dictates that all coastal states own the ocean area stretching 200 miles out to sea from any point of land visible at low tide. But island states are now able to extend their borders in every direction, generating enormous new territory, even if they are small. For example, the Republic of Kiribati has 33 islands with a total land area of 810 km2, but its new EEZ increased its sovereign territory by 4,320%, to over 3.5 million km2 — a large planetary footprint.

Approximately 61% of the ocean remains outside individual country zones. Referred to as the "high seas", this area belongs to everyone on Earth. To ensure this concept's legal recognition, UNCLOS adopted the "Common Heritage of Mankind," as a practical organizing principle. Since

the ocean is home to valuable critical minerals, this wealth belongs to everyone. This innovative way of thinking is designed to share the economic value generated in this area with all humankind, especially with the Global South.

This principle has long been known; only now does it have real implications. The offshore recovery of ocean minerals is now technologically feasible, and the demand for these minerals — according to the World Bank — is set to increase by 500% by 2050 as the world transitions away from fossil fuels and toward renewable energy and electric transport.

Sourcing these minerals on land is highly destructive and has left legacies of environmental degradation and habitat loss in many Pacific communities – to say nothing of the incidence of child labor in wider mineral supply chains. Furthermore, the impact of falling ore grades cannot be ignored, leaving us to dig deeper for lower-quality minerals. Sitting unattached on the deep-ocean floor, polymetallic nodules offer a lower-impact alternative which ocean-faring nations are best placed to carefully develop.

For the first time in history, a major extractive industry can be planned for sustainability, and profits shared equitably on principle — not according to political power or capital.

As we look to the future, and orient ourselves more towards the ocean, those countries most in need of basic opportunity will have a better chance through the rise of Giant Ocean States and the implementation of the Common Heritage principle.

As a result of the pandemic and the subsequent slower pace of negotiations in a virtual environment, the International Seabed Authority (ISA) and its member states will likely finalize its mining code in 2021. No extraction can proceed until this has been codified, and after states' Environmental Impact Statements, which are the result of three years of rigorous research and mandatory for the conferral of a mining license, have been approved. Each application will be weighed on merit and if activities are deemed likely to cause "serious harm", no mining will take place. All things considered, the earliest realistic date that nodule collection may begin is 2023.

Once agreed, this would represent the first extractive industry overseen by the UN and lead to the creation of a monetary fund to be shared by over 100 low- and middle-income countries. Given that this represents their only likely industrialization opportunity for the foreseeable future, Pacific states are very active participants in this process, and are committed to getting it right and to ensuring that past legacies of mining on land are not repeated.

For small island developing states, the responsible development of their marine resources presents a once-in-a-lifetime opportunity to diversify economies, making a self-determined development path possible. As the impacts of climate change deepen, this is now inevitable. It falls to us to ensure that it proceeds in the most equitable and sustainable way possible, so that the benefits of our common heritage accrue to all citizens for generations to come.

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History

Forgotten History: Submarines in Los Angeles Harbor

August 7, 2020

By Geraldine Knatz, Ph.D.

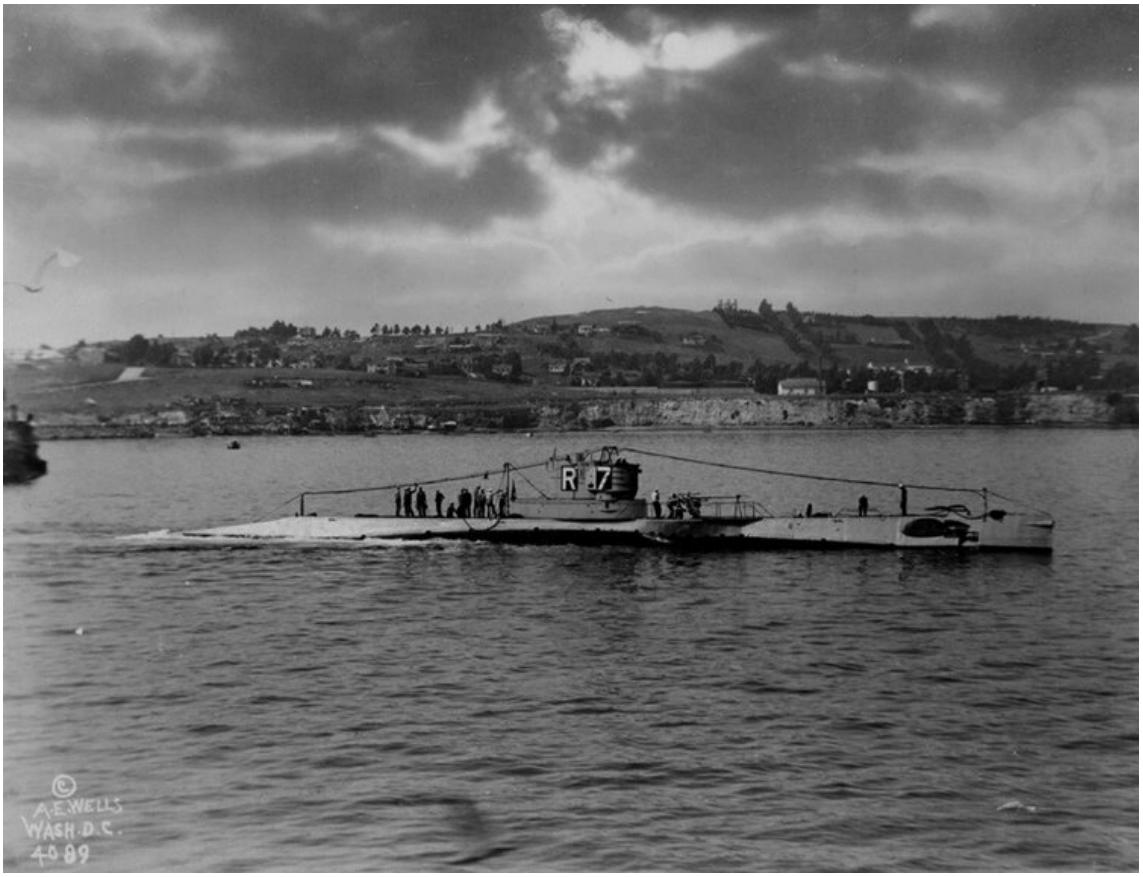

Figure 1: USS R-7 Submarine, launched in 1919, on maneuvers with Palos Verdes Hills in the background.

After construction of the San Pedro breakwater was completed in 1912, Los Angeles outer harbor was used to support U.S. naval operations. As early as 1913, submarines would berth along the San Pedro waterfront. But it was not until 1914 that the Harbor Commission allowed the Navy the use of City Dock No. 1 and part of its transit sheds as a temporary base for submarines. Once the Navy got onsite, however, they expanded to take over much of the pier, transit sheds, including space inside Warehouse No. 1. In some ways, it was a blessing in disguise. With the advent of World War I, ship owners who normally would have brought cargos to Los Angeles were tempted by lucrative offers to shift their vessels to the East Coast trade where the demand was greater. The City of Los Angeles has built its first municipal pier, City Dock No. 1, to handle all the anticipated trade coming through the Panama Canal. But the pier and its Warehouse No. 1 sat empty. With little activity, the city was keen to support the U. S Navy and its continued operations during World War I. Ultimately the Naval facilities on the City Dock No. 1 included not only the submarine base but a submarine training school, a reserve facility, a hospital, barracks, a YMCA and a post office.

Figure 2. City Dock No. 1 in 1917 when operation of the submarine base was at its peak.

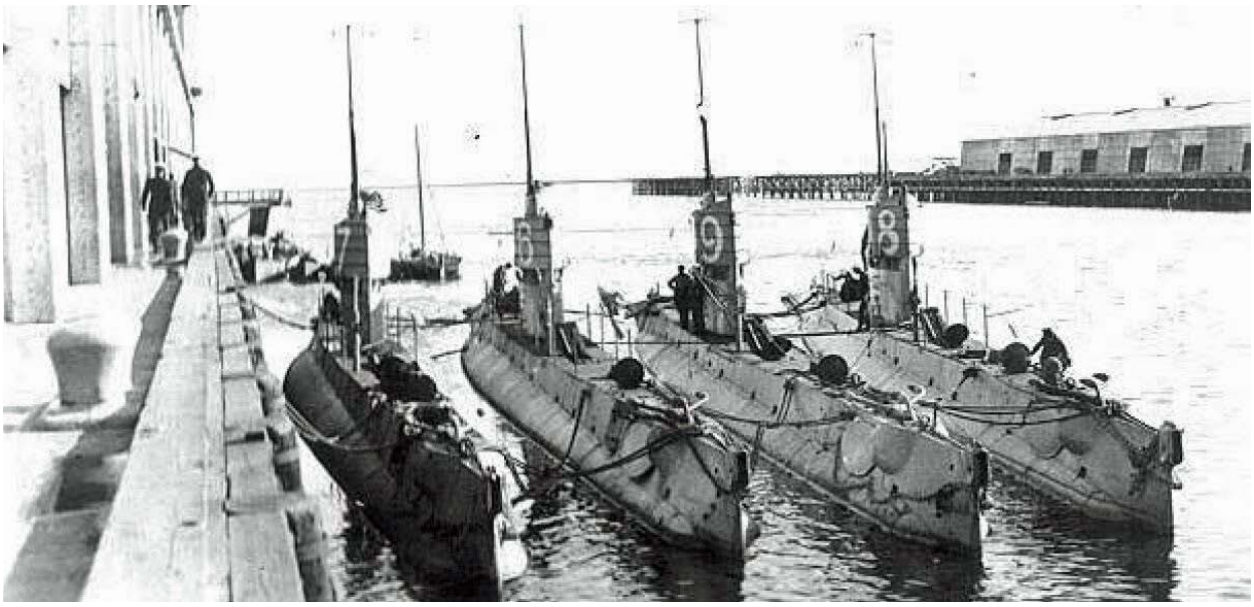

Figure 3. Four H-class submarines were launched from the Bremerton, WA shipyard in 1918 and assigned to the base at San Pedro.

Other cities did their best to try and lure the submarine base out of San Pedro to their own harbors. By November 1918, when World War I ended, only four hundred men were left of the 1400 that were there the year before. The facilities were turned back to anxious harbor officials hoping for a post-war boom in traffic. Los Angeles officials and businesses wanted to keep the base permanently in Los Angeles and the Los Angeles City Council approved use of 146 acres of submerged land for the Navy to construct a permanent base closer to Cabrillo Beach. But Los Angeles had little clout on the key Congressional committees at that time. The base was moved to San Diego and the submarine training school went to New London (Groton), Connecticut. The last mention of the San Pedro base in official naval orders was 1929.

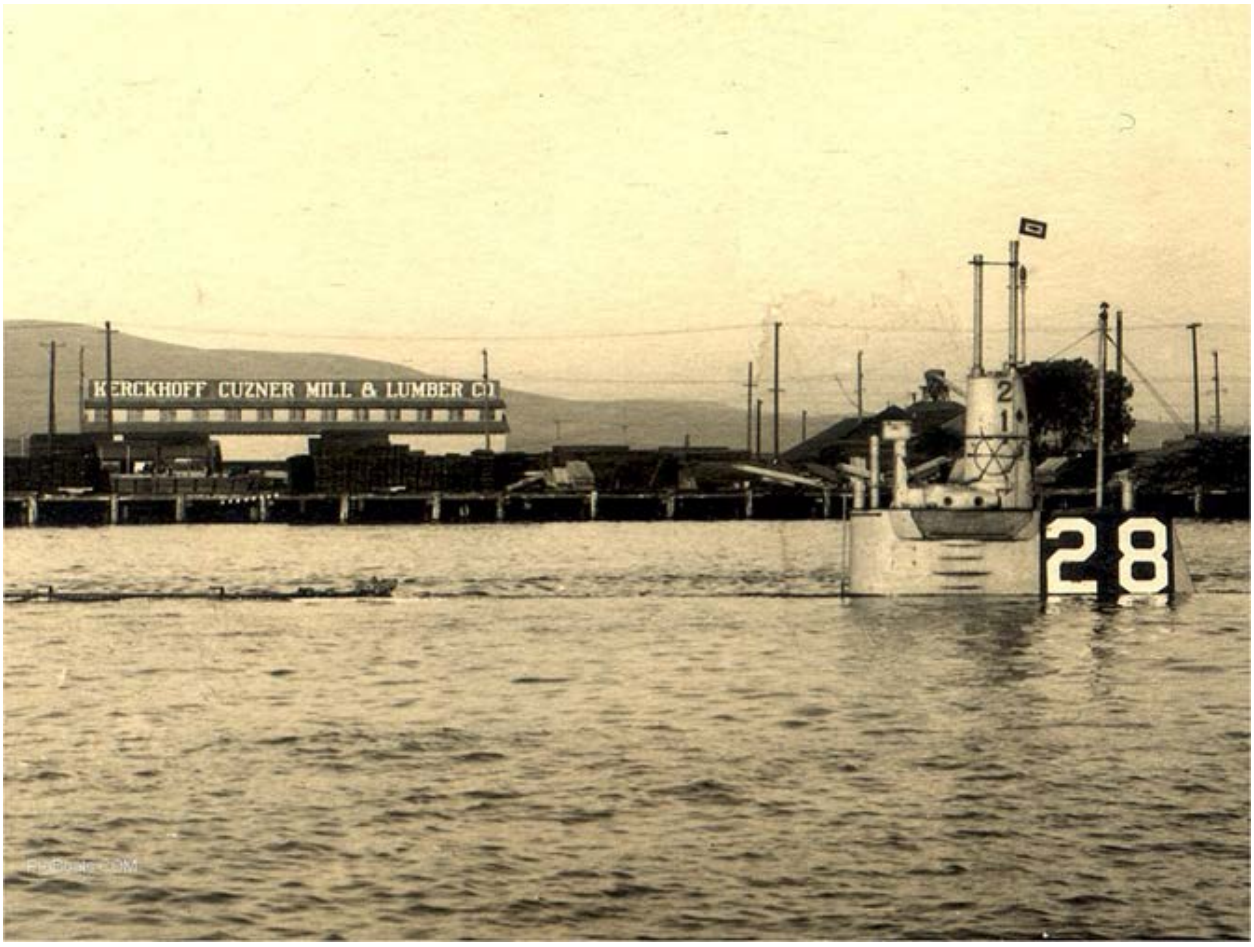

Figure 4. USS H-1 submarine conducting a static dive near the West Basin in the Port of Los Angeles. The H-1 left San Pedro in October 1917 for World War I service and was lost in 1920 on her return to San Pedro. The Kerckhoff-Cuzner Mill and Lumber Company is in the background.

The image of a submarine popping up in the waters of the Port during WWI and the use of the outer harbor by the U.S. Naval fleet was a signal to harbor area residents that Los Angeles Harbor would continue to play a strategic role in military conflicts. Despite the loss of the submarine base, the military presence in Los Angeles Harbor would remain.

For more stories about the history of the Port of Los Angeles, see Geraldine Knatz's new book, *Port of Los Angeles, Conflict, Commerce and the Fight for Control*.

Geraldine Knatz

With years of research and more than 200 maps and images, Geraldine Knatz shapes an insightful story of the Port of Los Angeles, from its early entrepreneurs to the city's business and political leadership, and the inevitable conflicts that arose between them. Knatz digs into the back stories of the key players in a hardcore, well-documented piece of storytelling at its best. Port of Los Angeles matches a topic—the history of Los Angeles Harbor—with someone of unquestionable authority to tackle the subject. Knatz worked nearly four decades at the Ports of Los Angeles and Long Beach, her last eight years as Executive Director at Los Angeles. In this remarkable book, her expertise shows. Port of Los Angeles reads like a script for another Chinatown, only this time it's about saltwater and controlling the waterfront, not drinking water and controlling the land. Knatz takes readers on a journey that will educate and inspire, and fills these pages with real-life intrigue, masterminds, and politics extraordinaire. Port of Los Angeles will leave the world's maritime aficionados spellbound and historians in awe. A must-read for anyone who treasures the history of Los Angeles.

"The Port of Los Angeles made this city. This very well might be "The Study" of what made modern Los Angeles." —William Deverell, Director, Huntington-USC Institute on California and the West

The Bench on the San Pedro Waterfront; Elio Amar's Last Laugh

August 28, 2020

By Geraldine Knatz, Ph.D.

If you have driven along the San Pedro waterfront or walked along the waterfront promenade you have passed this bench. I passed it myself hundreds of time before I discovered the story of the family that left their name on our waterfront. Edouard Amar, one of the pioneer builders of San Pedro, immigrated to San Pedro in 1871. He was a sheepherder and at one time grazed 50,000 sheep on the hills of Palos Verdes and developed the north side of Sixth and Centre Streets in San Pedro. His son, Elio, followed in his hoof steps, running a cattle operation on Catalina Island. Father and son were also in the real estate business and developed the north side of Sixth and Centre Streets in San Pedro as well as built many of the town's bungalows.

In 1933, Los Angeles Mayor Shaw appointed Elio to the Los Angeles Harbor Commission. Many historians consider Shaw the most corrupt mayor in Los Angeles history although a number of accusations against him were never substantiated. Shaw made enemies of liberals and leftists who opposed Los Angeles Police Department actions to support business and suppress labor actions. Shaw would be ousted by a disparate alliance of reformers including some business members, religious leaders like Reverend Robert Shuler, conservatives and liberals who had one common goal: reform the Los Angeles Police Department. Reformers were quick to point out members of the Shaw administration they believed had links to the underworld. But no one within Shaw's administration had been convicted of a crime.

Eloi Amar and the Pinto, 1915, Courtesy of the Catalina Island Museum

It was District Attorney Burton E. Fitts who gave the reformers the ammunition they needed. Fitt's "racket squad" raided a building owned by Eloi Amar at 1027 Pacific Avenue, precisely at the time Amar was in the building placing a bet. The squad arrested the 4 operators of the gambling hall and one patron- Amar. What a lucky break for the racket squad, landing one of Shaw's appointees in the raid!

Amar was puzzled by his arrest. No other patrons were arrested. "I am entirely innocent," he stated. "I positively will not resign. I have absolutely nothing to hide."

Shaw supported Amar but accepted his resignation as President of the Harbor Commission after Shaw was found guilty based on evidence of his awareness that gambling was occurring in a building he owned and rented to bookmaker Nick Capelle.

Elio Amar at the time of his trial in 1938

Amar's sentence was suspended and he was put on probation. But he was not down for long. A little more than a year after he was convicted, Amar was back on top again as the General Manager of the Long Beach Harbor Department. He had the respect of the maritime community, which obviously attributed politics to his removal from the Port of Los Angeles. At that time oil money was flowing into the coffers of the Port of Long Beach at a rate of $300, 000 per month giving Amar the opportunity to build what he called "the best goddamned harbor in the country." His treatment by Los Angeles undoubtedly influenced his actions running the Port of Long Beach. Amar set about shifting business from Los Angeles to Long Beach Harbor. Part of his strategy was to take prospective customers around Los Angeles Harbor in his motor boat, pointing out piers that he believed "might fall into the sea at any moment." Amar served in the top post at the Port of Long Beach for 18 years until his retirement in 1958.

Eloi Amar, left, as General Manager of the Port of Long Beach confers with his harbor commission. Commissioner W. R. "Frosty" Martin is seated at the desk. Photo courtesy of Port of Long Beach.

When the City of Los Angeles tore down the old harbor waterfront, the Public Works department fabricated the cornerstone of the Amar building into a bench. Elio would have relished knowing that his family name forever graces the shore of the Port of Los Angeles Main Channel.

Shaw holds the distinction of being the only mayor in Los Angeles ever to be recalled.

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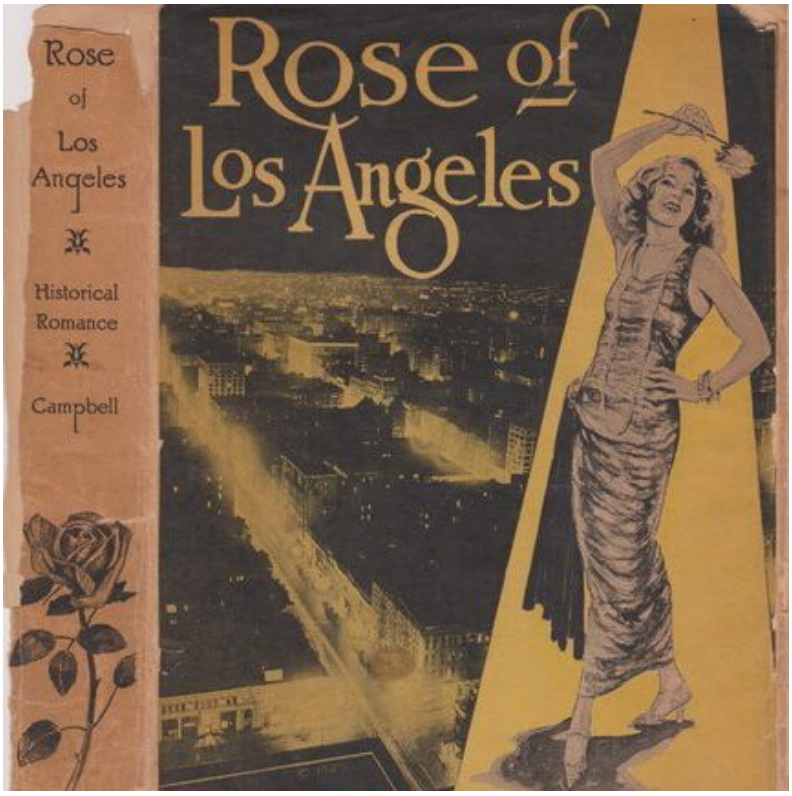
Who was the Rose of Los Angeles?

August 21, 2020

By Geraldine Knatz, Ph.D.



In 1924 newspaper man John B. T. Campbell began publishing a serialized novel in the Los Angeles Herald called *the Rose of Los Angeles*. It's a love story set against the backdrop of the 1890's Free Harbor Fight, the battle over whether funding to create the Port of Los Angeles would go to San Pedro or Santa Monica. Collis P. Huntington, one of the most powerful men in western railroading, led the forces to locate the harbor around his million dollar wharf constructed in Santa Monica. Senator Stephen M. White championed the cause of San Pedro. Both men, along with other real figures in Los Angeles history stride though the pages of this story. But the heroine of the story is the beautiful Rose, who lives on a ranch overlooking Santa Monica Bay. This is the story of how the beauty of one woman and her love for Lieutenant John Morgan, swung the sentiment of Los Angeles as its citizenry debated the fate of the harbor. Lieutenant Morgan came to Los Angeles to conduct a government survey of the two possible harbor locations. During the course of his survey work in San Pedro Bay, Morgan falls from his boat and the currents sweep him east toward Long Beach.

The Southern Pacific railroad tried to convince Congress that Santa Monica, where it controlled the waterfront, was a better place to invest in building a port. San Pedro, the railroad argued,

was subject to siltation from westerly currents and their federal dollars would be wasted. This was a bold-faced lie! Morgan's own dunking in the bay had convinced him that the currents moved east and the worry about silting in the harbor was unfounded. He testified to that fact before Congress. The novel has a happy ending: San Pedro gets its harbor breakwater and John Morgan gets the girl.

The Rose of Los Angeles serial was so popular that it was published in book form in 1924, not because of its value in recounting the history of the Free Harbor Fight, but because Angeleno's were obsessed with discovering the true identity of Rose. More than 2000 letters flooded the newspaper office seeking clues or suggesting Rose's identity. Some letter-writers were convinced they were the inspiration for Rose!

Rose was a fictional character. The character of John Morgan, however, was based on the tragic story of Seaman Alexander Flood who fell overboard when conducting the actual U.S. Coast and Geodetic Survey on harbor currents. Flood was wearing one-piece waders which filled with water. His body was discovered three miles east of where he fell. Flood's death was actually used to disprove the claim by the Southern Pacific Railroad about the harbor currents in San Pedro. His death was the ultimate public service.

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