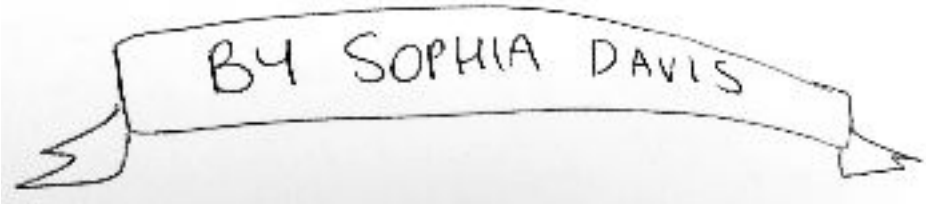
An Essay



English 210

Professor Andaluz

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Sophia Davis

Professor Andaluz

English 210

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Issues In Sustainability

In order for the human race to become truly sustainable, it's crucial for people in the field of sustainability to not only communicate more effectively with each other, but to open up communication with traditional 'outsiders' to the field such as big businesses. More collaboration outside of the traditional smaller echo chambers of sustainability is crucial in our quest to fulfill the Sustainable Development Goals. Before we go into examples that illustrate why collaboration is crucial, it's important to understand what these Sustainable Development Goals are.

Many people in the field of sustainability interact with the Sustainable Development Goals regularly, however the layman audience may not be as familiar with them. In January 2016, the United Nations officially transitioned from the previous "Millennium Development Goals" to the seventeen Sustainable Development Goals. The purpose of these new goals, as stated by the United Nations Development Programme (UNDP) website, were to "end poverty, protect the planet, and ensure prosperity for all". The seventeen goals range from ending hunger and achieving gender equality to adopting renewable energy and providing quality education to developing regions of the world. They make up the UN's 2030 Agenda for Sustainable Development, meaning that most of the goals' targets should hopefully be reached within the next fourteen years (UNDP, 2016). My argument is that we must put more effort into the final goal, Developing Partnerships for the Goals, in order to truly reach those targets by 2030.

You see, sustainability has a problem; we aren't engaging everyone in the conversation. Many people still 'reject' sustainability, on the grounds of green lifestyles being too expensive, lack of knowledge on the subject, or, sometimes, a refusal to believe that humans really are hurting the planet. It's important to empathize with people on both sides of the debate so that we can ultimately make sustainability a goal for every individual. We have to ask hard questions. For example: While many of us have been switching to clean energy, what is happening in the small towns that used to rely on coal for their local economy?

Within sustainability, itself, there are some smaller problems that must be addressed and there are ethical questions to be asked. For example: If a sustainable solution kills wildlife, is it still eco-friendly? If the rewards outweigh the consequences, should that be enough to give it that label? Also, as we are still in the early years of sustainable technologies catching on, would it threaten the growing field of renewable energy to point out the problems and limitations of the technology? I would argue that now is the time to point out those small problems and improve upon them, as I'll explain in the following sections. The interesting thing about these small problems is that they all happen to be related to each other and to the larger issue of sustainability lacking enough diverse partnerships. People may say "Don't sweat the small stuff", but it's important to pay attention when all the small problems follow a common theme.

Unintended Effects Of Sustainable Solutions

We live in an amazing time for sustainability. We have a lot of new ways to produce clean energy and to help prevent further degeneration of the environment. We have the technology to come up with all sorts of creative, effective solutions to world problems.

However, some of these solutions for environmental issues have spawned environmental problems of their own. There are usually pitfalls for any solution to a problem, but we often try to avoid solutions that contribute to problems within the realm of the ones they're meant to solve. Some of the environmental problems we are facing from 'sustainable solutions' include birds being fried by solar panels or killed by wind turbines, wind turbines being erected on cultural sites, and the global warming emissions related to the manufacturing of the technology. The interesting thing about these problems and the following case studies is that, although they are all very different, they share one common theme and a common solution.

Case Studies: Birds and Solar Farms

Our avian friends are unfortunately some of the main victims of renewable technologies gone wrong. Birds and insects often mistake solar farms for bodies of water and, as the birds dive down to catch insects or land in the "lake", the consequences can be disastrous. With regular solar farms, birds often collide with the panels and end up permanently wounded. With concentrated[1] solar farms, the result is even more horrifying. These types of solar farms are known to sometimes 'fry' the birds as they're flying by. There's even a name for birds that have their feathers ignite mid-air, "streamers" (Upton, 2014). The numbers of "streamers" may be trivial compared to overall bird populations, however quantity isn't the main concern. The location of the farms and which birds are being fried are more pressing matters.

[1] These are thermal energy plants. Basically, instead of burning coal or oil, these types of plants use concentrated sun energy to drive your typical steam engines or turbines (SEIA, 2014). As you can imagine, the air around those panels gets extremely hot.

As one may imagine, a desert is a very useful location for a solar farm. However they too have fragile ecosystems and their share of endangered creatures, which makes a dangerous combination. Back in 2013, officials from the National Fish and Wildlife Forensics Laboratory were investigating bird fatalities from three desert solar panel plants in California and they found a dead Yuma clapper rail. The Yuma clapper rail is a rare endangered bird; there's less than 1000 of them expected to still exist in their natural habitats. This single dead clapper rail ended up being a call to action for many wildlife conservationists. It even inspired a legal action challenging a number of planned solar farms in California and Arizona (Upton 2014). Unfortunately, this isn't the only example of how building solar farms in badly planned locations may result in disastrous consequences for wildlife.

The most unfortunate case is when you combine a concentrated solar plant and a bird migration route. The Ivanpah Solar Plant, located in the Mojave Desert, kills about 6,000 birds a year. While the company behind the plant has been trying its best to get the situation under control, their efforts have been mostly ineffective. At Ivanpah, avian deaths are mostly streamers and birds colliding with the shiny solar towers, but those are by far not the only problems. The more unanticipated wildlife fatalities at this plant are related to coyotes trapping roadrunners up against the fence and eating dozens of them at a time. Those fences, themselves, were erected to prevent threatened desert tortoises from wandering onto the property (Sahagun, 2016). You may ask yourself at this point, why choose a location with so much surrounding wildlife for a concentrated solar plant? Well, it gets worse.

This solar plant wasn't built in a fairly typical part of the Mojave desert. The region, a 'nearly pristine' portion of the Mojave desert, is actually a refuge for birds migrating along the Pacific Flyway. While the Ivanpah plant was originally highly anticipated and looked at

with pride by many supporters, plenty of environmentalists were critical of the location decision from day one. It's now described as a 'bird sink' and the company has been criticized by wildlife experts like Garry George, the renewable energy project director for Audubon California, who claims that the plant "continues to operate as though there's an endless supply of birds to burn." (Sahagun, 2016). This is a cautionary tale, a warning to step back and consider the context of where we place any renewable technology. However, there's another lesson to learn that's shared by both the Ivanpah plant and Yuma clapper rail stories.

Would there have been such disastrous effects if the company behind the Ivanpah plant had taken the environmentalists' concerns into consideration? If the three California solar plants had originally consulted wildlife experts to make sure their businesses wouldn't negatively affect the surrounding ecosystems, would they have ended up under investigation? Most importantly, would there have been the tragic death of a Yuma clapper rail at the hands of technology that was supposed to benefit all inhabitants of the planet? If these two stories aren't enough to convince our global sustainability community that the movement is lacking in interdisciplinary collaboration, we could also point to yet another bird-killer. You see, despite all that's been said about solar, it doesn't hold the title for the worst renewable technology for birds. The biggest and most well known offender is actually wind power yet, as we'll see, not everyone seems to want to do much about it.

Case Study: Birds, Wind Turbines, & Insulting Your Allies

Wind turbines, having massive blades and being located at altitudes frequented by many varieties of birds, have become infamous for killing birds. One of the biggest concerns is for wind turbines located in endangered bird habitats, and some endangered birds have

already unfortunately become victim to the turbines. This is awful, but in order to understand the most pressing problem we must take a look at it through the lens of environmentalists on the other side of the argument.

Is the amount of birds dying from renewable energies really significant compared to the positive impacts these technologies have on the environment? A writer for Treehugger, Michael Graham Richard, argues that renewable energy sources like solar panels and wind turbines help reduce the effects of climate change that would ultimately decimate large numbers of bird species anyways. In his article, “Wind turbines kill around 300,000 birds annually, house cats around 3,000,000,000”, he comes to the conclusion that bird lovers shouldn’t attack clean energy and that they should fight against the ‘real enemies’ (Richard, 2014). While his argument definitely holds water, there is a bigger picture to consider.

It’s not a bad thing to point out the flaws and failures within a system. In fact, it’s a crucial part of the innovation process and it helps ensure that we can continue to create better and more efficient technologies in the future. No solution is foolproof, and simply pointing out the flaws isn’t going to usher us back to the dark ages of little to no clean energy production. Mr. Richard’s article, unfortunately, is part of the more enormous issue facing sustainability today. It’s an excellent example of what not to do. In his article, he paints “bird lovers” as a sort of misguided sustainability subculture that, like a delusional Don Quixote, has decided to attack the windmills. In doing so, he has alienated an important audience and ally in solving this problem. This isn’t the only example of how the industry may adamantly ignore critics due to a flawed notion that criticism threatens the entire field. Unfortunately, the effects of that belief can build resentment and backlash within communities.

Case Study: Wind Turbines Versus Cultural Conservation?

As we've seen before, sometimes the biggest issue isn't within the technologies themselves, but with where we decide to place them. A short documentary titled "Arcadia" tells the story of a family in Scotland that makes their living off of falconry. They have a hunting estate up in the hills and the land around them is as much a part of their heritage as it is their bread and butter. However, as part of a renewable energy initiative in Scotland, there's a project to erect wind turbines on those same hills. As we know, wind turbines aren't exactly great for birds, and the small community around that area is concerned about the turbines disrupting their way of life (Arcadia). Scotland is well known for having both a lot of hills and a lot of turbines and, as I watched the film, I couldn't help but wonder why the turbines must be built on such beautiful land in the middle of nowhere.

The people in this community practice a simple way of life and they are somewhat 'invisible' to parts of the outside world. In an effort to make their voices heard, the film shows the process of them erecting a homemade 'windmill' made of logs, grasses, and other kindling. The final scenes show the entire community gathering to light the windmill on fire, sending a powerful message to the outside world that had ignored them in the past (Arcadia). What is troubling is that the sustainability community, which had historically been the underdog, is now being painted as a community that's unwilling to compromise with or address the concerns of the communities their projects are affecting. This only results in backlash or resentment from within those communities, which is dangerous for the entire movement. Those of us in sustainability must be able to better serve the local communities; we must listen to people's stories and address their concerns even if we disagree with them.

However, as we'll discuss next, we also have to better serve our overall global community in addition to better serving the local communities.

Important Issue: The Life-Cycle Of Renewable Energy Technologies

On a local scale and when placed in optimal locations, renewable technologies can be a huge game changer for a community. They are a huge step in making a community self-sufficient, they reduce the community's carbon footprint, and they often provide a sense of pride or a morale boost to the community. It's important to serve our local communities, however it's also important to take a good look at the overall global community and, well, ask more hard questions. Don't worry, this issue is a little more positive than the previous ones; we're looking at the future right now. Our current problem is that there are still global warming emissions associated with certain aspects of the renewable technologies' life cycles.

You see, even though technologies like PV panels and wind turbines don't produce global warming emissions while they're in operation, there are other stages in their existence related to producing global warming emissions. These stages include the transportation of materials for building them, the manufacturing process, the transportation of the machines themselves, the installation and maintenance processes, and processes associated with decommissioning and dismantlement (Union of Concerned Scientists, 2013). All in all, these technologies still don't produce nearly the same quantity of emissions as coal or oil, however this is still something to address moving forward. Long term, this negatively affects our global community because it often means that we're still using fossil fuels in one place in order to be able to use renewable energy in another place.

	Life-Cycle Global Warming Emissions (Pounds of Carbon Dioxide Per Kilowatt Hour)

Wind Power	0.02-0.04 lbs of CO2 E/kWh
PV Solar Systems	0.07-0.18 lbs of CO2 E/kWh
Concentrated Solar	0.08-0.2 lbs of CO2 E/kWh
Natural Gas	0.6-2 lbs of CO2 E/kWh
Coal	1.4-3.6 lbs of CO2 E/kWh

If you're curious, I created a table of each energy source's global warming emissions using numbers provided by the Union of Concerned Scientists[2].

While it's unlikely that we'll be able to phase out all of the emissions associated with those processes anytime soon, that's not a bad long term goal. The obvious solution to this issue would be to use renewable energy in the manufacturing process and in all of the other associated processes. It would mean using our fossil fuels as an initial launching board to manufacture enough of the technology so that we are able propel ourselves into eventually making the process close to 100% clean. However, there is still a problem with this solution. There are so many moving pieces involved and it's difficult to hold everyone accountable. How in the world would an individual organization or business be able to monitor all of the processes throughout the entire lifecycle? Without strong partnerships between organizations representing many different disciplines, this is one dream that probably won't come to fruition. There's also the issue of how to make the entire endeavor cost effective and how to convince all the parties involved that it's worthwhile. This is one of the many places where the sustainability movement meets economics.

Workers Being 'Left Behind'

Unlike the other unintended consequences, this is an economic rather than environmental issue. As we have been progressing in renewable energy, how have workers in the coal industry been affected? It turns out that green energy creates lots of jobs, but

[2] In Works Cited, "Environmental Impacts of Solar Power" & "Environmental Impacts of Wind Power".

not jobs for everyone that has been displaced by it. It's important to make sure that we are helping coal miners and their communities keep up with the 'green transition'. We must make sure they receive the proper training and resources to be able to land jobs within the clean energy sector instead. The reason for this is that, if we decide not to listen to the voices of these communities, we are just bullies that are confiscating their jobs. Furthermore, by taking away people's jobs, their sources of income for their family, we are potentially creating powerful backlash that could threaten the overall goal of saving the planet (Labor Network For Sustainability). We also forget that there are people dealing with coal and oil for a living in almost every little local community. Even in our local community here in Hawaii, we will be displacing some workers by adopting more renewable energies.

Local Connection

All of these issues relate to local issues. Here in Hawaii, we have the potential to be a center for sustainable energy. There's a plan in place to make our islands powered off of 100% renewable energy by 2045 (Governor of the State Of Hawaii, 2015). When you take a look at our plethora of renewable resources, even the die-hard cynics have to admit that it's hard to find a better place to attempt this. However, we also have fragile native bird ecosystems here and our marine ecosystems are also less than stable. It's essential for us to create viable, efficient systems that aren't threats to our native wildlife. Furthermore, we have precious cultural sites that must be conserved, so we must also be mindful of that when choosing locations. Finally, we must consider any potential effects on the local economy. If you look around in Hawaii, we have plenty of solar, wind, and even wave energy production in action; most people however don't realize that, without sufficient planning and

partnerships, we are more at risk of creating unintended consequences for our local community.

The Solution

We know that all of the problems from the previous section share a common theme of not having partnerships with diverse groups of people. Each individual problem has multiple proposed solutions, but most of them don't address that common theme. Therefore, the larger big-picture solution is to stop excluding people; we must make sustainability a more inclusive field overall. When creating projects, we should collaborate more with businesses, professionals in sustainability, people involved in cultural preservation, communities, workers unions, and anyone else that can help anticipate any potential long term problems. We shouldn't make sustainability a 'clique' for only tree huggers and scientists; that's less productive and more prone to failures. We must get everyone involved and make it a mission for all citizens. We must make sustainability an open discussion as well, making people too scared to bring up problems with the current systems hurts innovation long-term. Finally, don't demonize anyone, convert them. Perhaps not everyone can be 'saved' but, if you make a compelling argument and bring valuable things to the table, your opponent can become your ally.

How can we see this in action? Well, for proposed solar plants and wind farms, the companies behind them should have panels of wildlife experts help decide where the structures should go and what measures should be taken to protect the wildlife in the area. For proposed projects that may be built on culturally sensitive land, the people in charge of the projects should take it upon themselves to get to know the area and the local people that are going to be affected by the project. If necessary, they should be able to

compromise or change locations if it appears that the project will be harmful towards the community. When it comes to reducing global warming emissions, this is where partnerships get interesting. Eventually, renewable technology companies should create partnerships with eco friendly, 'net zero' factories for manufacturing and other such businesses for other legs of the renewable technologies' journey. How would they be able to find such businesses? Perhaps the key to this is hosting more conferences that allow small green businesses and companies in green manufacturing to network. Finally, for getting coal workers onto the clean energy bandwagon, we can take cues from the POWER initiative.

This was one individual solution that greatly related to and supported the large solution of diverse partnerships. The Partnerships for Opportunity and Workforce and Economic Revitalization (POWER) initiative is a collaborative effort between several federal agencies and the overall goal of the initiative is to help displaced coal workers transition to clean energy jobs. One of the initiative's goals is to diversify economies and avoid putting people in the same situation where there's only one industry to go into. Next, they want to create jobs in existing and new industries. Tangent to that goal, the initiative also wants to attract new sources of investment to create those jobs. All three of those goals require solid partnerships. However, it's the final goal that is probably the most important. This goal is to provide workforce and skills training to workers, which includes work based learning opportunities. This program is supposed to provide people with 'industry-recognized' credentials that will hopefully allow them to get a good quality job in the future. The program is for all workers that are being impacted by the decline in the coal industry, from coal miners to people involved in coal transportation (Sustainable Business, 2015). This is a huge deal, not necessarily because it has worked or hasn't worked yet but because it shows the marginalized workers that clean energy isn't their enemy and those of us involved in

sustainability are making an effort to make sure nobody goes hungry. This is, in a way, a positive case study showing that sustainable partnerships can make a difference in people's lives and can be beneficial to all parties involved.

Tying It All Up

Despite all of the problems within the field, sustainability is still a strong movement filled with people that truly believe we can save the world. Sustainability has experienced an incredible amount of growth over only the past decade. Who could have predicted ten years ago that we'd be where we are now with sustainable technologies? With all these case studies, I've aimed to show that the fairly young industry is still making mistakes and learning from them. Unfortunately, nobody can afford to make all of the mistakes, so collaboration between real experts from different disciplines is key for avoiding many destructive and preventable errors.

I mentioned earlier that this collaboration is crucial for fulfilling the Sustainable Development Goals. That's true for many reasons, one being that sustainability is an individual responsibility in addition to a collective responsibility. We can achieve those goals in a timely manner if we can be open to criticism about the systems in place, if we can create partnerships that are able to identify problems within the projects beforehand, and if we can make sustainability a mission for every individual by not immediately alienating people that see the issues differently.

Sustainability is partially about making the world a better place for future generations. If we can set a good example by being collaborative rather than exclusive right now, one could only imagine the amount of growth the field will see in the future. With that

said, here's to making the world a better place for future generations, marginalized workers, and innocent birds everywhere.

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[3] *(Font had to be changed because italics don't work well in the previous font - they don't show up in the PDF version)*

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