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PEDAGOGICAL POWER

Higher Education's Role in Shaping Agricultural Approaches

A CAPSTONE SUMMARY PRESENTED IN PARTIAL
FULFILLMENT OF AN UNDERGRADUATE DEGREE IN
ENVIRONMENTAL STUDIES

LEWIS & CLARK COLLEGE
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My Journey with Education

Written by Emma Hay

When I was in elementary school, the only recognition given to environmentalism and climate change was on Earth Day. One day a year classrooms taught the importance of the three R's (Reduce, Reuse, Recycle), and made posters to put up on the classroom walls. In middle school, the three R's turned into small projects which brought these concepts into our homes. I was celebrated by my teachers for collecting plastic bottles and limiting my showers to five minutes. By the time high school rolled around, I was learning the basic science behind the greenhouse effect, the detriment of the Pacific garbage patch on sea life, and the realities of factory farm animals. At this point in my life I knew the three R's like the back of my hand, and I was applying what I learned from them into my own life. I considered myself a full-blown environmentalist, as I had already adopted a vegetarian lifestyle at the age of 13 and made the effort to recycle all of my plastics.

My junior year of high school, I was convinced that I knew the secret to changing the world. It was so simple, everyone just needed to

educate themselves and change their behaviour. I believed in the classic Deficit Model; assuming that if the whole world knew about the effects of conventional agriculture, they would embrace a vegan diet and inevitably the system would change. That same year I applied this thinking to my own life, making the decision to become a 'radical environmentalist' by adopting a vegan diet.

During my senior year, I gained the reputation of being a sustainability warrior, for I was the girl who worked on a homestead and helped a family friend convert her yard into a permaculture garden. I walked into my first undergraduate environmental studies course at Lewis & Clark College as a full-blown optimistic environmental activist, with my mind set on individual actions changing the world. I foresaw no reasons, if the realities of factory farming and agricultural systems were widely known by the public, as to why the system as a whole would not change. Education is the key. If demand changed, then why would supply not change with it?

Unsurprisingly, my time in higher education

heavily complicated my ideas for world change, and my life path was quickly challenged. For the first time in my life, I learned that the solutions to large issues, such as industrial agriculture and climate change, realistically could not and historically have not been found in individual behavior changes. It turned out that the three R's were not a sufficient solution to the world's issues.

"...if demand changed, then so too would supply"

My critical thinking and problem-solving abilities had been severely limited to the scope of my own actions and the actions of my community. Where in fact, the deciding factors for how and why commercial agricultural practices are dominant in the US, extend far beyond individual preference of certain foods. The key factors within this issue, encompass a much wider set of interwoven actors involving economics, politics, sociology, and the natural sciences.

Higher education opened my eyes to the realities of agriculture's effect on the environment, as well as complicated my ideas surrounding possible solutions. It brought me to realise the real need for a systemic change, not just individual eating habits. Higher education showed me my own naivety surrounding environmentalism and presupposed assumptions. I understand now that veganism and vegetarianism are by no means realistic and accessible options for every family and culture in the world. For such systemic issues such as conventional agriculture, larger action and enforcement is necessary. Behavior change is not enough on its own. Higher education changed my own behaviors, mindset, and the ways/scale in which I currently choose to involve myself in politics. In this way, my own experience with higher education brought me to view education as an institutional method for which to achieve larger change, for it tackles both small and large scales.

Similar to the foundational thinkers Dewey, Freire, and Labaree, many modern day and future perspectives on the role and responsibilities for higher education, more specifically environmental and/or agricultural education, see it as a useful tool for transformation. In the context of climate change and environmental issues, the pressure is put onto

universities to properly prepare future citizens to act within democratic processes to combat and mitigate effects (Scott 2010). In order for educational standards for universities to be transformative, it is often argued that they must derive from roots of social justice and environmental preservation, rather than that which promotes consumerism and corporate profiteering (Andrzejewski 2009). Many educators place the challenge onto education institutions to teach and critique sustainability, development and environmental issues, making the argument that education must adopt these topics in a formal way (Cullingford 2004).

Environmental education is also viewed as fundamentally interdisciplinary, as it encompasses aspects of the social, political, biological, moral and historical realms. It therefore has the specific duty to teach "responsible citizenship behavior", and cultivate generations of students who are motivated to find solutions, care for the environment and transform destructive systems in place (Burch 2018). In the context of agriculture, higher education can either adopt these topics as vocational tools and extension methods (Barrick 1993), or as institutions which scholars go to for solutions to issues surrounding the world's food and agricultural systems.

This being said, higher education is pointed towards as one of the first solutions when looking to fix any sort of larger or systemic issue. When addressing the altering of the US conventional agriculture system, we must be careful not to fall into the classic deficit model thinking that ignorance is the only thing that is a barrier for change, as I have in the past. Rather, we need to move forward towards a co-production of knowledge that fosters a dialogue for a more comprehensive truth, through continued listening and evolving.

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Conventional vs. Alternative

Written by Emma Hay

Since the industrial revolution in the early 19th century, the dominant food production systems in the US can be described in one word: exploitative. They are characterized by large-scale intensive monocultures, the application of high quantities of agrichemicals, as well as the maximization of land and labor productivity through technologies and mechanized systems. Conventional agriculture has been one of the driving contributors in regards to deforestation (Berry 2015), water pollution (Brundtland Commission 1987), methane and CO2 emissions (EPA 2015), and soil degradation (Carson 1962, Lal 2015). Since the 1960s with the publication of Rachel Carson's *Silent Spring* shedding additional light on these realities, alternative movements to this dominant system developed in the forms of organic, permaculture, regenerative agriculture, low-impact agriculture, and polycultures. These alternatives challenge conventional agricultural systems through advocating for a switch to food production which recognize the needs and importance of lower-input systems, soil health, climate change, seed/crop diversity and surrounding ecosystems (Edwards et al. 1990, Holmgren 2002).

Contemporary agriculture encompasses systems which fall under the category of conventional (such as monocropping and pesticide/herbicide use) and systems which fall under the alternative category (such as organic, biodynamic farming and regenerative). During the early 19th century alongside the Industrial Revolution, agriculture across the US adopted technological advancements which aided its transformation into today's conventional system (Cronon 1991). Conventional farming refers to systems which prioritize economic profit, political/commercial interest and productivity over crop quality, soil and environmental health. This method of agriculture is also known by other scholars and writers as industrial, intensive, commercial, large-scale, agri-business, an "exploiters' revolution" (Berry 2015) and/or "man's war against nature" (Carson 2002).

Although conventional agriculture in the US has been successful in producing massive quantities of food for the growing population

(the unequal distribution of said food is an entirely different story), it is loaded with a variety of other pressing externalities. The popular techniques and the constant drive for efficiency and profit, often create and perpetuate many adverse effects, such as greenhouse gas emissions, pollution of clean water sources through chemically contaminated runoff into lakes and rivers, as well as leaching of salts into groundwater and a rise in the water table ("Agricultural Land").

The United States Environmental Protection Agency noted that in 2017 the US alone emitted 6,457 million metric tons of CO2 equivalent (translating into 14,205.4 billion pounds). The agricultural sector is responsible for the release of 581,130,000 metric tons (9%) of these emissions into the atmosphere (EPA 2017). Additionally, heavily worked fields are subject to soil degradation, a loss of soil humus and porosity, becoming less retentive of water, as well as a greater dependence on pesticides, herbicides, and chemical fertilizers. Globally, 33% of Earth's land surface is considered to be degraded. This in fact reverses the capacity for soil to act as a carbon sink, and instead degraded soil releases carbon and methane into the atmosphere (Lal 2015).

If we are to look at agriculture as a means to either combat climate change and environmental degradation or at least as a system which does not heavily contribute to it, we must embrace alternatives to the conventional system. Modern alternative agriculture is a broader category which refers to any farming method that does not conform or utilize methods practiced in conventional systems. Some practices which fall into this category are biodynamic farming, organic, permaculture, low-impact agriculture, polyculture, hydroponics, aquaponics, aeroponics, regenerative agriculture, agroforestry, no-till farming, adaptive agriculture and urban agriculture. In these alternative systems, the driving question is no longer how quickly crops can produce, but rather it is a set of questions which aim to understand the land's carrying capacity and ability to dependably produce without diminishing the land or crops. Alternative agricultural practices

however, are not without their own hurdles. Some scholars critique certain methods' capability to meet population demands for food production, as well as its cost efficiency and subsequent material use.

"Globally, 33% of Earth's land surface is considered degraded"

As an example, for California's strawberry farmers who produce 88% of the US strawberries, growing in soil (rather than soilless systems like hydroponics) is extremely beneficial for the quality of the crop (Guthman 2018). However, this category of soil also houses many harmful diseases and insects which require methods of eradication. While farmers recognize the movement and consequences of agrichemicals (Carson 2002), the switch to alternative systems may threaten to put many of these farms out of business because of financial inability to build needed infrastructure. While the recent rise of indoor farming can reduce food miles (by limiting CO2 emissions) when located next to major cities, they are also materially intensive. Alternative systems are further complicated with potentially limited abilities to meet global demand, for they inevitably call for smaller-scale farms (Edwards 1990). Nevertheless, these alternatives are currently the only roadmap we have for achieving the ends of lower environmental impact within the US farm sector. We need not embrace them as is and blindly, but rather as a jumping off point while we reshape and critically examine costs and benefits.

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Pedagogy Taking Root: OSU Interviews

Written by Emma Hay

RTo understand the extent to which higher education and pedagogy influence larger systems, I spoke with a professor and two graduates from Oregon State University's College of Agricultural Science who currently work within the agricultural sector. I questioned the alumni on concepts learned in school, on courses of professors changed or enhanced their perspectives on agriculture, and career decisions post-college. I questioned the professor on his pedagogy style, and curricula choices.

The first interview was with an alumnus named Alder who works as a field representative for the seed trade company Weaver Seed of Oregon. Alder works directly with farmers, making recommendations for improving soil quality and seed harvests with organic techniques such as pushing cover crops to have something on the soil year-round as well as doing mycorrhizal injections into their soils. In the interview, he mentioned that before attending OSU, his idea of sustainability was limited to the context of technology.

It wasn't until taking soil science his sophomore year that his eyes opened to the role of agriculture in environmental degradation. He now sees sustainable agriculture as, "a planned out form of agriculture which looks at a systems approach and management for future use such as crop-rotation, soil enrichment and looking at fungi in soil". Alder specifically spoke of a soil science course taught by Professor Cassidy, as one that had a life altering effect on him in realizing the ability for agriculture to act as a way to promote sustainability ideas.

My second interview was with alumnus Mitch, who works as a greenhouse manager at a soil and fertilizer manufacturer called Aurora Innovations Inc. Mitch is in charge of quality control such as testing soils and fertilizers in the greenhouse,

and the research and development of new products. In the summer, he runs a no-charge CSA for all employees (commonly an acronym for community-supported agriculture) which instead of community-supported, is corporate-supported (through Aurora). In his CSA everything is organic, and he has recently implemented a full crop rotation.

"...as a class, soil science is comparable to other agricultural classes. However, Professor Cassidy is not."

The most important concepts learned within his agricultural courses were methods of using land in a way that improves it rather than depleting it such as crop rotation, tilling methods and reducing fertilizer input. Similar to Alder, Mitch also pointed directly at the soil science class with Professor Cassidy as a course which significantly changed him.

Before attending college, Mitch saw soil as nothing more than useless dirt, whereas now he sees soil as the foundation for absolutely everything and dedicated his life to it. When asked to elaborate on the importance of soil science and the role of this professor, Mitch responded, "as a class, soil science is comparable to other agricultural classes. However, Professor Cassidy is not comparable. He has great teaching methods, he makes it fun and hands on, and his enthusiasm rubs off on you". Mitch's answer struck me as particularly significant, as he indicated that the defining reason soil science was so impactful on this life path, was the instructor's pedagogy.

In light of this, I interviewed Professor Cassidy to further understand his teaching methods, course curricula, and embedded

ideals concerning agriculture. Cassidy obtained his graduate degree in soil science from OSU, and now serves as the senior instructor for soil science and sustainable/organic agriculture. During his time at OSU, he started the student-run farm on campus called OSU Organic Growers Club, for which he now acts as a faculty advisor.

He sees the ideal future of agriculture as a system which moves away from tillage and mega industry (conventional) to a "truly sustainable approach that is least harmful to soil and borrows from both conventional and organic methods, incorporating tech, machinery, info systems and genetics". In the classroom, Cassidy says that he always incorporates ideas from the UN SDGs into curricula, teaching about organic farming/gardening, food security, and scale. Within his position at the agricultural college, he considers himself an outlier in his ways of teaching. He views his role as a professor in higher education as a micro-influencer; providing information to students with the goal of igniting a sense of passion and excitement regarding soil.

Cassidy's teaching style is fairly untraditional and personal. He doesn't believe in strict rules, regulations or expectations, besides requiring students to follow what they are passionate about. He doesn't punish students for being late or put them into the mold of a 'good student', viewing his D earning students as some of his best. He emphasized that he too is still a student in the classroom and is constantly excited to be learning from them. These three interviews demonstrate the capacity for higher education, more specifically pedagogy and curricula, to alter student outlooks towards agriculture to embrace alternative approaches.

Professor Cassidy was the key actor that helped shape the careers, life paths, and ways of thinking for Alder and Mitch, and most likely many other current/former students. If we are to think about higher education as a way to change larger agricultural systems, we should focus our efforts on teachers. Good pedagogy is difference between passively taking a course in which students learn about agricultural issues and taking a course in which students are inspired to do something about them.

