

Observations on a Changing World

Robert L. Zimdahl¹

¹ Professor Emeritus, Colorado State University, Fort Collins, CO, USA 80524

E-mail: r.zimdahl@colostate.edu

Received: 3 May 2025

Published: 30 June 2025

This is not a report of scientific research. This is an opinion piece that explores the Earth, our science, the environment, education, values, and some of my thoughts on what we ought to do and our responsibilities in a changing world.

I have previously expressed my opinions on a wide range of topics relevant to science, agriculture, the environment, education and ethics ¹. We have not achieved a sustainable society, and certainly not a sustainable agriculture. Students and others involved in agriculture do not question the sustainability of our food systems or our way of life. They ought to.

In this piece, I pose several questions regarding the moral justifications and ethics of agriculture, as concerns about the widespread human impacts and environmental harm associated with agriculture are increasingly being felt, along with public fears about technology and food quality standards.

Agriculture is an essential human activity, and it is also the largest human interaction with the environment. There is an agricultural moral code: *do unto others*. That code, we often assume, was based on the Bible, but it probably had its origins in the mutual help ethics of early agriculture long before Christianity emerged. Much of modern morality originated from the imperatives of early farming life among our ancestors.

Modern industrial agriculture is highly dependent on external inputs (e.g. pesticides, fertiliser, petroleum energy). This modern, capital and energy-intensive agriculture produces an abundance of food, but it is not sustainable. Many are concerned about

how those things affect them, their children, grandchildren, other creatures, and the environment.

Those who study and try to understand agriculture are as concerned as you and your friends may be about agriculture's use of water for irrigation (70% of global freshwater), growth-promoting antibiotics for animals (+- 70% of U.S. antibiotic use), confined animal feeding operations (CAFOs), inhumane treatment of animals and migrant labour, the role of agribusiness, the nutrition provided by food. We are often overwhelmed because the problems are big and remote. We want to do something, but have only a few ideas about what to do and how to do it. We are not alone.

¹ Zimdahl, R. L. (2018). Agriculture's moral dilemmas and the need for agroecology. *Agronomy*, 8(7),116. (<http://www.mdpi.com/2073-4395/8/7/116/http>).

Zimdahl, R. L. (2022). *Agriculture's Ethical Horizon*, 3rd Edition. Elsevier, Inc., San Diego, CA. p. 318.

Zimdahl, R. L. (2017). Ethics, Agriculture, and the Environment. Proceedings of the 26th Asian-Pacific Weed Science Society Conference, 19-22 September, Kyoto, Japan. p. 72.

Zimdahl, R. L. and Holtzer, T.O. (2018). Ethics in Agriculture: Where Are We and Where Should We Be Going. *Journal of Agricultural and Environmental Ethics*, 31(6): 751- 753.

Agriculture's problems have been developing for a long time, and solving them will take a considerable amount of time. Agriculture, a vital human activity, is the most widespread form of human interaction with the environment. Human activity has dramatically changed the Earth (e.g. global warming, CO₂ emissions and environmental destruction). Humans have negatively affected and often destroyed habitats on which the natural world and we depend.

We are the only creatures who do not have to adapt to the Earth's environment. We modify it to meet our wants and needs. There is too little discussion about whether or not we will and, if so, how we can change our ways to restore and protect the Earth - the only planet we have. It is up to us.

A major contribution to the success of developed country agriculture is the unchallenged ability to externalise the costs of harmful environmental actions. We live in a post-industrial, information-age society. We are also highly dependent on the seemingly endless supply of food produced by agriculture in developed countries.

No one will ever live in a post-agricultural society. However, there is an appalling lack of knowledge globally about how our food is grown, where it is grown, and who grows it. Concerns grow, and problems persist, although the grocery store is always stocked with all that stuff.

Myth

Prometheus, a Titan, stole fire from the gods and gave its power to man. The gift of fire gave man the power to become toolmaker, explorer, and food grower. It enabled what Jared Diamond (1999) called "The worst mistake in the history of the human race" - the adoption of settled agriculture.

Prometheus' brother, Epimetheus, married the beautiful Pandora, who accepted a box as a gift from the gods. Pandora's curiosity and disobedience led her to open the box. Once opened, all the evils and miseries of the world escaped and tormented humankind forever. Only *hope* remained in the box.

Hope is what drives us to find solutions for our agricultural, economic, social, and political problems. It is interesting that Prometheus, forward-looking, life-giving, creative, courageous, and Pandora, beautiful, enticing, and persuasive, yet whose curiosity loosed a thousand plagues, are part of the same myth that affects our societies and agriculture.

The Promethean/Pandora myth originated in a pre-literate society. It should be regarded as a public dream (Campbell, 1973, p 12). Dreams are often dismissed as false - after all, they are not literally

true. They are just myths derived from the richest strata of the human spirit.

They are not simply imagined or false cultural stories of historical events. They express timeless truths of people's daily existence and appeal to and express enduring ideas about deep, commonly held emotions (love, future, friends, children).

The myth helps us think about agriculture's ethical dilemmas and values. It encourages thought about who we are, where we have come from, and what we have or have not done. It stimulates forward-looking, creative, courageous thought. For most of modern history, the Western world has enjoyed the Promethean power of energy (fire) and science. It has enabled human evolution from makers of simple tools to developers of sophisticated instruments and machines, and from explorers to conquerors.

The power of science enabled us to abandon hunting and gathering for food and transformed the developed world's agriculture from subsistence to abundance and surplus for some. We learned new ways to grow food differently and more efficiently. We enjoyed and benefited from our power, but often ignored the harm it caused. Pandora's and our unchecked curiosity has led to wonderful and potentially dangerous consequences.

In many ways, agricultural scientists have met the challenge of addressing important questions and framing them in a way that leads to manageable tasks and technology that improve food production. For all its wonders and undeniable benefits, agricultural science and its associated technology have a disquieting aura of fallibility. The gift of fire allowed us to dominate, but in spite of our immense power, we have not achieved dominion or control over the natural world (Kirschenmann, 2010).

The Earth is finite. A child born this decade can expect to become an adult when almost half of the world's forests will be gone, and 1/5 of the world's present plant, animal and bird species will be extinct. Since 1970, approximately 60% of animals, including birds and fish, have disappeared. We do not even know what some of them were or how many are disappearing each year.

The UN Food and Agriculture Organisation (FAO, 2022) estimates that as much as 40% of world crop production is lost to pests every year (valued at U.S. \$220 billion). In early 2025, the Earth had 8.2 billion people, growing at a rate of 0.85% per year. The human population is projected to peak at 10.3 billion in the mid-2080s and then slowly decline.

Global warming will soon pass a tipping point, after which nearly all outcomes will be detrimental to humans. Those who demand absolute proof of human-caused environmental and, therefore,

agricultural problems simply don't or refuse to understand the scientific evidence of environmental degradation's effects on agriculture. The environment suffers, while legislators seem to be much more concerned about getting re-elected than solving the obvious problems. *We have not achieved a sustainable society or a sustainable agriculture.*

World agriculture produces 17% more calories per person today than it did 30 years ago, despite a 70% increase in population. There is enough food produced to feed all. Still, approximately 835 million people are hungry every day due to unsustainable agricultural practices, unequal food distribution, government inaction, inadequate infrastructure for shipment and receipt, insufficient funding, food waste during storage, and food discarded by consumers (World Food Programme, 2025). We have dramatically changed the world, probably past its carrying capacity.

Do we value the environment and farms enough to protect and save them? Can we acknowledge the need for and create a regenerative system of agricultural food production, recognise the interdependence of everyone in the world, and the importance of the natural environment (Baggini, 2025, p. 55). It demands questioning our assumptions and developing a sustainable agricultural system where crop yields are increased without adverse environmental effects and without more land (Baggini, p. 65).

Farmers are bound to the land. Good farmers are true husbandmen who strive to obtain the most favourable conditions for their crops. Many food growers and others have lost their connection to the land and the values it creates. Good farmers and ranchers strive to produce the highest, most profitable levels of crops and animals they can, in full recognition that they do not have dominion over the land. Nature knows best. Good farmers protect and cherish the land.

The specifics of sustainable and regenerative agriculture need not be a system all farmers must adopt - Montana is different from Texas, New Jersey is different from Virginia, and Australia is different from Africa. The different systems involve value judgments. However, I am aware that many people do not spend much time thinking about their values. Therefore, it isn't easy to have a conversation about values if one cannot define what is valued and why some things are and others are not.

We have lost what some call our moral fibre. I am not sure our educational system includes a discussion of whether there should be self-imposed or collectively imposed limits on abusing the Earth. Similarly, we lack a desirable tolerance of other cultures and a love of learning, which are essential

to a good life. We lack the wisdom to know what to do and, more importantly, to know why we ought to do some agricultural things and not harm the environment on which agriculture depends.

* * *

The purpose of this short essay is to ask all involved in agriculture and other disciplines to consider how we can change our ways so we can begin to restore the Earth and save the only planet we have for our grandchildren and all others. To begin, we must reconsider our assumptions and their ethical basis.

Most professions, indeed, most people, do not want their assumptions about life and their profession questioned or examined. They want to use their basic assumptions. Review and inevitable questioning make us uncomfortable or angry.

For example, the cost of one U.S. ballistic missile-capable nuclear submarine is at least \$9 billion. It may be as high as \$15 billion. It's easy to say, 'It's not my problem!' If it is not, who will decide what is important and how your tax money will be spent? It is some of your tax money that will pay. Is a nuclear submarine really the best way to ensure our collective future? If not, what is the best way?

A farmer might struggle with buying new equipment that eliminates the need to plough. Another farmer might struggle with whether or not to buy a nearby farm and expand his or her sustainable farming system. These are complex personal, economic, and future-oriented questions. They are ethical and value-based questions that help us discuss and negotiate problems.

The agricultural system that contributed to these problems accepts credit but resists accepting blame for its negative effects, and this is part of the tragedy. It is an example of the agricultural mindset and justifies Mayer and Mayer's (1974) conclusion that the system is unsustainable. Their second claim is that the integration and isolation of agriculture within the university and society have led to what they call '*The Island Empire*.' Agriculture is a vast, wealthy, powerful intellectual and institutional island.

The Land-Grant system created Colleges of agriculture and allowed agriculture to remain isolated within the university and from mainstream American life. Mayer and Mayer accuse agricultural colleges of being separated from the university, from the mainstream of scientific thought, and from national discussions about social policy. Agriculture does not ask for and only reluctantly receives outside criticism. Those who practice agriculture must move off their island.

There are ethical principles (see Rachels, 2007) that are not universally or absolutely applicable to

guide discussions on what is the right thing to do. *Questions are inevitable.* Most people don't spend time thinking about their values and find it difficult to discuss their own values and those of others. Many farm people have values and live by them. In urban areas, the transmission of values appears to have shifted from the family to the omnipresent social networks. It is not working well.

James Rachels, in *The Elements of Moral Philosophy* (2007), acknowledges that while ethical principles can provide a helpful framework, they are not universally or absolutely applicable to guide all moral discussions. Moral judgments and practices vary across cultures, suggesting that there is no single set of ethical principles that holds true for all people, at all times, and in all places.

There is also no single book or social media network that will tell you what you ought to do. We must think about and struggle with such decisions. The educational system appears to prepare young people for jobs and careers in an economy that is designed to expand without limits. Boulding (1966) said, "*Anyone who believes exponential growth can go on forever in a finite world is either a madman or an economist*".

Students are prepared for their role in extending human dominion over the natural world, which, in my view, is precisely what we *should not do*. A related assumption is that the dominant values in many societies are not found in religious institutions (see Stewart, 2025, for an alternative view), educational institutions, or social institutions; however, economic institutions do dominate.

Having been involved in education throughout my career, I've come to believe that good education should comfort the afflicted and afflict the comfortable. This article asks hard questions. It may encourage thoughts about what one ought to do.

Final Comments

The question and challenge for educational institutions is not only how to plan for the future, which, of course, is unknown; it is also how to adapt to the unknown. It is about preparing students for life, with all its vicissitudes and mutability.

Our assumptions need to be discussed and questioned. It's okay if one ends with the same opinions and assumptions after they have been examined. If they were never examined, never debated, and never questioned, education would be incomplete. Education should foster wonder, gratitude, and ecological competence.

Those engaged in agriculture and environmental studies possess a definite, yet unexamined, moral

confidence or certainty about the correctness of their actions. The origin of that confidence needs to be questioned about its validity. The basis of moral confidence is not obvious to those who possess it nor to the public. In fact, the moral confidence that pervades agriculture is potentially harmful because it is unexamined.

It is necessary for those engaged in science to analyse what aspects of their science and society inhibit or limit their progress. All should strive to nourish and strengthen the beneficial aspects and change those that are not. To achieve this, we must be confident in studying ourselves and our institutions and also be dedicated to the task of revising the goals of both.

Literature Cited

- Baggini, J. (2025). *How The World Eats: A Global Food Philosophy*. Pegasus Books Ltd.. New York. p. 464.
- Boulding, K. E. (1966). The Economics of the Coming Spaceship Earth. pp. 3-14 In: H. Jarrett (Ed.) *Environmental Quality in a Growing Economy: Essays from the sixth resources for the future forum*. Johns Hopkins University Press. Baltimore, MD.
- Campbell, J. (1973). *Myths to Live By*. Bantam Books. pp. 287.
- Diamond, J. (1999). The Worst Mistake in the History of the Human Race. *Discover*. 8(5) (May, 1987):. pp. 64-66.
- Kirschenmann, F. (2012). From commodities to communities. *Leopold Letters*, 24 (1), 5.
- Mayer, A. and Mayer, J. (1974). Agriculture, the Island Empire. *Daedalus*, 103: 83-95.
- Rachels, J. (2007). *The Elements of Moral Philosophy*, 8th Edition. Rachels, S. (Ed.), McGraw Hill Publishers, p. 222.
- Stewart, K. (2025). Money, Lies, and God - Inside the movement to destroy American democracy. Bloomsbury Publishing. New York. pp. 338.
- UNFAO (2022). FAO's Plant Production and Protection Division - NSP Booklet. pp.18. Rome (<https://doi.org/10.4060/cc2447en>).
- World Food Programme (2025). *Global Outlook*. wfp.globaloutlook@wfp.com. Rome, Italy.
- Zimdahl, R. L. (2020). *On Living - Observations on a Changing World*. Sigma Books. pp. 63.