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Gaia contributions to agroecology by James Lovelock (1919-2022)

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In writing about the history of agroecology we too often ignore the valuable contributions of British scientist James Lovelock who recently died on his 103rd birthday. A prolific inventor and influential theorist, Lovelock is best known for the *Gaia* hypothesis first proposed during his innovative work in the 1960s with NASA. He suggested that ‘the biosphere has a regulatory effect on the Earth’s environment that acts to sustain life’ as written in *Gaia: A New Look at Life on Earth* (Lovelock 1979). Lovelock further proposed that humans have strongly impacted the planet’s capacity to maintain this vast, living, selfregulating system.

Similar to our thinking in agroecology, Lovelock proposed that all things are connected, that there are cycles and feedback mechanisms, and that these multiple interactions serve to provide a certain stability to the global ecosystem. He further speculated that we threaten to interrupt the delicate balance with management of industrial

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agroecosystems designed to extract the maximum amount of production and profit, while ignoring the costs to the environment.

In his work with NASA, Lovelock's creativity with instruments allowed the search and potential measurement of conditions on Mars that would be conducive to life. His writings and speeches promoted a rich discussion of the interactions among biology, chemistry, climate, and how these were essential for understanding how life survives on our own planet.

When we think about our evolving thinking in agroecology, it is clear that we embrace Lovelock's insistence on multidisciplinary thinking that blends the science of climate and the biophysical environment with impacts of economic, social, and other political decisions. It is apparent that a balance among these is essential. When there is a dominating impact of a single species on the course of development, we run a great risk by ignoring his thesis that 'all things are connected' and that our fragile earth ecosystem can be easily upset by viewing everything through an anthropomorphic lens.

To be sure, Lovelock's ideas have been controversial, as he extended them to promotion of nuclear power and other technologies seen by many environmentalists as anathema to the future of the planet. Yet we must credit Lovelock for stimulating debate and his interpretation of science as essential to understanding the world, yet recognized as an evolving process rather than a method of reaching any ultimate truth about answers to complex challenges.

Similar to the evolution of agroecology from a *marriage of agriculture and ecology* to *the ecology of food systems*, we are learning through discussion and study that complex systems and their design and implementation within any specific economic and political situation need to be carefully evaluated. There are limits to what we can extract from the environment, just as there are biophysical limits to how many people can sustainably survive on the planet.

Have we already reached a 'tipping point' from which retreat is difficult? Can we find appropriate technologies that are consistent with the resource limitations we face in the near future? Is it rational to continue to assume that 'human cleverness' and new inventions can always overcome challenges of scarce resources? How do our current forms of governance help or hinder our capacity for continued, long-term survival as a species? How do equity, fairness, and justice form

essential parts of our interconnected world? Just as agroecology, regenerative agriculture, and other sustainable approaches are seen as solutions to many of these challenges, should the *Gaia* hypothesis become larger in our thinking about how systems are designed and how they may or may not be capable of self-regulation?

James Lovelock provided a foundation for asking and probing solutions to these questions. Further study of his philosophy blended with current thinking about our design of systems that will be sustainable for the indefinite future could be a fruitful challenge for teachers and researchers who are helping to develop the next generations of leaders and scientists. Dr. Lovelock's life and research will be long remembered as a valuable step in this direction.

Reference

Lovelock, J. 1979. *Gaia: a new look at life on earth*. Oxford, UK: Oxford University Press.