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The systems approach to agriculture that the UN has adopted to feed a future of 9 billion.

Agroecology: A Systems Approach

How scientists propose that we feed the future... and solve a host of other problems at the same time.

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Do you care about gender equality? Human rights? Food security? Closing the pay gap? Nutrition? Climate change? The global economy? Biodiversity? Cultural heritage? Water availability? Ending world hunger?

Whether or not you answered yes to any of the above, this article is for you.

Agroecology is a little-known field of science that is trying very hard to solve these problems (and more) through farming. Before we get into

how it's doing that, let me first give you a little bit of background information.

“Agro” is derived from latin, and means soil or land. “Ecology”, of course, is the scientific discipline that deals with organisms’ relationships with one another and their physical surroundings. So it involves agriculture, but rather than the emphasis on human systems—“culture”—it emphasises *all* living organisms that interact with the land, including but not limited to, humans.

<https://medium.com/@louchalmer/agroecology-b6f4c656cbfe>

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Agroecology is deeply rooted in systems theory, the idea that many constituent parts make up a greater whole. If one piece is damaged or broken, then the whole system suffers. If a piece is manipulated or moved, then it will affect other parts in the system. Thus, while it is important to form an understanding of each of the parts, a more holistic understanding is required for true mastery of the system.

Systems can work on multiple scales. When we talk about agroecological systems, we might be referring to something on a micro-scale, such as a plant—it's microclimate, growth cycle, interaction with soil and soil microorganisms, readiness for harvest etc—or something on a meso-scale, such as the global economy. Each smaller system feeds into the larger systems that it inhabits and vice versa.

Every action, at every scale, has an impact on the systems that it interacts with, both large and small, via feedback loops.

Systems are also in a constant state of flux—they may reach steady states where they appear to be in equilibrium but sooner or later, their state will change, producing new outcomes as they evolve.

Understanding systems requires a mental leap for many of us. Classical science has long been dominated by the reductionist paradigm, the idea that phenomena must be separated and simplified in order to understand action and reaction. These ideas have pervaded into general society to the point where we're barely aware of its influence. In agriculture, its influence has been most apparent in the rise of the productivity approach, chasing revenue through ever-increasing production while the more subtle components of agricultural systems are neglected. In economics, the idea of an "externality" comes from reductivism. In medicine, our doctors treat symptoms, not the component of the system that caused the initial disturbance. We think of mitigating environmental issues as taking direct, specific actions. The introduction of cane toads

to Australia, for example—no one foresaw the devastation to ecosystems far beyond the one they were introduced into that would come as a result of their spread.

It's not that the reductionist paradigm hasn't led us towards unique and important discoveries. Our knowledge of the constituent parts of the human mind and body, for example, would be nowhere near what they are today without it. Systems thinking, however, allows us to calculate and predict what consequences may arise in other parts of a system when we take a particular action, enabling us to a) avoid unintended consequences and b) create multiple desirable impacts through minimum effort.

The modern agroecological movement rose in part as a form of resistance to the reductionist approach that underpinned the Green Revolution of the 1970s, with origins in Mexico. At the time, a complex interplay was being developed within agricultural systems that utilised both indigenous landholders' knowledge and technological advancements of western science. The resulting agro-ecosystems and the benefit that they brought to ecological systems, as well as an array of positive socio-economic outcomes were documented by local researchers. Since then, the movement has spread slowly across the globe but has not pervaded the mainstream scientific literature until much more recently.

In 2014, the United Nations Food and Agriculture Organisation (FAO) held a conference in Rome to discuss agroecology and came to the conclusion that it holds enormous potential not only to mitigate many of the world's environmental and socio-economic issues, but to take us on a more sustainable development path more generally.

Agroecology is also the specific strategy that the FAO has chosen to pursue to feed our future generations.

It makes sense when you think about it—agriculture is one of the pillars of society. The

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widespread establishment of sedentary human settlements coincided with the rise of cropping and animal husbandry 10 000 years ago. Agriculture is thus rooted deep in our culture. It also uses 40% of Earth's land, three-quarters of fresh water and provides employment and income to almost half of the world's labour force and food and fibre for all. Though we may be disconnected from agriculture in many ways, it remains of the utmost importance to us.

There is no way to definitively describe what an agroecological system looks like—**each one is unique due to the specific environmental, social, cultural and economic circumstances that govern its potential**. Thus a more intuitive, reflexive approach is required, rather than the prescriptive one commonly undertaken in today's industrial productivist paradigm. The emphasis is on creating self-perpetuating feedback loops that contribute to healthy, resilient, functioning agro-ecosystems through a bottom-up approach i.e. beginning at the farm level.

For the most part, this is enabled through smallholders, though examples of larger landholders partaking in farming practices rooted in agroecological principles are now emerging. Commercial output is a product of agricultural systems, but it is not the only recognised desirable product. Externalities do not exist; they are recognised as problems that arise as a consequence of actions taken at the local or wider level, which the system itself must find a solution to. The relationship between environmental and socio-cultural factors and an agricultural system's ability to be commercially viable *long-term* is not underemphasised.

Scientists recognise that the implementation of agro-ecosystems is no simple matter; it requires a complexification and diversification of agricultural systems, facilitated by inter-cultural relationships. Planning, management, communication and coordination at local and global scales—and everywhere in between—

must be achieved. An honest dialogue between producers and consumers must be undertaken. There must be a willingness on the behalf of the farmer to engage in innovative farming practices to make the most effective use of resources. And, there must also be *a willingness on the behalf of the consumer to support them in that*.

There are several examples where tremendous feats have been achieved through smart, original agro-ecosystem design.

In Brazil, the [Zero Hunger](#) program eradicated extreme poverty from dangerous levels at 17.5% between 2003 and 2013. It did this through the implementation of specific, tailored regional policy and development instruments. One of them placed a stipulation that all school meals must be comprised of at least 30% produce from family farmers, with organic farmers receiving a 30% price surplus. This might sound drastic but the program's results were profound. As well as creating a market for smallholder farmers, the direct buying and selling relationship reduced transaction and transportation costs, bringing the price of food down whilst incentivising farmers to produce a wider array of foods to meet the demand of school kitchens, while farming families also enjoyed the nutritional benefits of more diverse diets. It stimulated the formation of new forms of farmer organisations to collate and distribute produce whilst ensuring traceability, quality and fair pricing. And the Brazilian government established the Ministry of Agrarian Development, which instigated the National Agroecology Plan, placing an emphasis on regional development and facilitating training in agroecology.

Globally, women make up 43% of the global agricultural labour force. Yet many of those women remain oppressed, unrecognised and unrewarded for their contribution to the global food economy. Case studies from India, however, show how agroecology is enabling gender equality, where some of the world's most oppressed women are "[gaining access to land](#),"

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[acquiring food autonomy, and turning into leaders...](#)” Perhaps most importantly, though, is the role that agroecology is playing in challenging traditional male/female roles, providing a catalyst for the societal shift that is needed for further female empowerment and lasting change.

The creation of [bio-districts in Italy](#) is facilitating relationships between farmers, local inhabitants, tourism operators, associations and government in order to collaboratively plan and manage local resources sustainably through agroecological methods. Cilento, Italy’s first bio-region, was established in 2009. Participating farmers have already seen a shortening of the value chain— 75% of participating farmers’ sales were direct in 2016, leading to greater profitability coupled with lower food prices, strong and loyal relationships between producer and consumer. Moreover, the program has had the added effect of inspiring more farmers to diversify their production and shift to organic farming practices. The experience of belonging to a network has its own inherent social value and provides a support system that is sorely lacking in many rural communities. The program’s broad reach has also provided a link between different bio-regions, which has been essential for tourism growth to the regions. Meanwhile, community members who share similar values are now linked and are able to act in unison to solve problems at multiple levels and scales, whilst also accessing knowledge and resources from the various stakeholders taking part in the program. In 2016, there were 27 bio-districts in Italy, another 18 in the process of being established, while a further 10 had been established in countries across Europe and Africa, showing promise of a more widespread adoption.

These are just a few examples of many where agroecology is enjoying favourable outcomes across a range of issues.

But what does any of it have to do with you? If you eat food (and I’m assuming you do) then

you’re already part of at least one agricultural system, perhaps multiple. That means that you are one of the many small, but no less important, components of a greater whole. As such, you wield enormous power to affect change at a wider level on a day-to-day basis.

Perhaps you’re aware of this and you’ve already taken matters into your own hands. If not, let me assure you, it isn’t difficult. The first step is to decide to care enough to.