



# The Global Food System

A brief guide to the conflicting logics of food

*Do unto those downstream as you  
would have those upstream do unto you.*

— WENDELL BERRY

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## 1. INTRODUCTION

Causality, according to Wittgenstein, is the ultimate superstition. While he probably wasn't thinking about the global food system when he said that, he might as well have been. The story of the modern global food system is the story of unintended consequences. It's the story of a causal logic run amok. It's the familiar story of how we're all intimately connected without quite grasping just how intimately. It's the deeply disturbing story of a system characterized by historic injustice that continues to produce injustice today. It's a story that goes to the throbbing, bleeding heart of sustainability. Finally, it's the world changing story of what we do when faced with the reality of such a narrative. It can be called, without being hyperbolic, the mother of all systemic problems.

I've been struggling, as part of my work, to figure out exactly how and why the global food system is unsustainable and to get my head around the logic of the system. This is easier said than done.

Two of my colleagues at the Sustainable Food Lab, Hal Hamilton and Don Seville, have articulated the dilemma as follows:

*"Nobody intends for their decisions to result in a system that is unsustainable overall. Decisions are made by individuals trying to do the best job possible within their context. Some must please a boss or increase shareholder*

*value. Cost cutting is frequently necessary in order to compete successfully. All of these decisions are usually rational within the context of the decision-maker, but the net result of all these decisions includes problems ranging from soil erosion to low quality nutrition.”*

This pamphlet attempts to explain how the global food system works. It does so by outlining what can be thought of as multiple “logics” that operate as part of the food system. Unfortunately these wants operate somewhat independently from our desires, wants or even beliefs. They constitute, to borrow a phrase from Jacques Ellul, “a completely independent technical morality” that we have to factor into our strategic responses.

The intended audience for this pamphlet is anyone thinking strategically about food systems. It attempts to paint a crude yet complete picture of a system that we rely on for our existence every single day.

Originally consisting of three long-form essays, the intention of this piece is to create a primer which enables the reader to grasp how a system as complex as global food works. When I first started working in this space in 2004, as part of the Sustainable Food Lab, my search for a succinct summary was laughed at by old food hands. So I tried to write one.

I have updated the original essays but the conclusions drawn when I penned the originals still stand.

## 2. THE MULTIPLE & CONFLICTING LOGICS OF FOOD

It's clear that many thousands of decisions are made everyday about food and agriculture that, in aggregate, give rise to the global food system. Each of these decisions is obviously part of a particular culture, paradigm and worldview. Each of these decisions is also congruent with a very particular logic, a way of reasoning out a decision about food. As Hal and Don point out, none of them are per se illogical or irrational. They each have their logic. The word "logic" is a precise description of the chain of reasoning that drives decisions.

The Indian activist and biologist Vandana Shiva explains that "even though the complex socio-ecological phenomena of the food system may well have been conceived in technological deterministic frameworks of single cause single-effect they cannot be understood by this logic. [my italics]" Rather "the best one can strive for is contextual causation, in which indicators and suggestions are made of how the creation of certain contexts creates overwhelming conditions for certain processes to be unleashed." Or to put it another way, when dealing with complex, systemic problems causal analysis only works in hindsight. If we're interested in insight, that is, innovation and foresight then we must start with the specific cases and build "contextual causation" from specific socio-historical cases.

In trying to grasp the food system, my initial rather simple-minded mistake was to assume that just because a single system existed there must also be a single universal logic to

go with it, and all I had to do in order to understand food was to grasp that logic. Through a grindingly painful process I came to realize that there actually isn't a single over-riding logic but rather there are multiple, conflicting and sometimes faulty logics which together produce the incredibly complex global food system. (Like most *a-ha's* I wondered why someone hadn't simply told me this at the start.) What's more, many of these logics are profoundly disconnected from each other. So for example, the logic that gives rise to the decisions of an urban consumer are a universe away from the logic of a small farmer living twenty miles away. The only connection between them is the supply chain, which is hard to discern. It's self-evident that the logic of the same urban consumer is disconnected from that of a small farmer living five thousand miles away, even though a piece of fruit picked by the farmer on Monday may well be eaten by the consumer on Tuesday. In other instances, where logics do somehow meet, more often than not the engagement is violent with logics seeking to exploit, de-legitimize or even destroy the other.

As is obvious, the process of globalization is pushing these logics up against each other in a way which means, like it or not, they're going to engage. Marx described such engagements as akin to "a train crashing into a wheelbarrow" and while this perhaps describes the trajectory of the current system it also describes a possible future that we could avoid. The question of how we can avert the "wheelbarrow" scenario is one that I carry with me through this ongoing reconnaissance of the global food system.

### 3. THE STATE OF THE SYSTEM

James Ridgeway, in his recent study on the control of global resources, "It's Not For Sale," makes the point that "Perhaps the single most important problem for American foreign policy since the building of the railroads and the opening of prairie agriculture in the middle of the nineteenth century has been how to dispose of farm surplus, notably grain."

The Sustainability Institute in a study on the long term effects of corn prices put their finger on the dynamic emerging from the Second World War.

*[It] unfolds as follows: In the struggle to maintain income in the face of falling prices, producers attempt to maximize their yield. They do this by adopting any new, yield boosting technology as long as the anticipated income gain from yield increases is greater than the cost of the new technology. Technology suppliers carefully price new technologies so that, most of the time, new technologies will pass this cost-benefit test and be purchased. While higher yields can potentially increase individual incomes, the net effect of many producers making the same decision is higher overall production, which tends to decrease price and therefore reduce incomes.*

*This story [of corn farming] is typical of commodity agriculture. Farmers have increased their yields and lowered their per-unit costs for many decades, but this productivity has been won at the cost of higher taxes for*



*citizens in Europe and the United States (to pay for subsidies and other programs), a decreasing standard of living for farmers and rural communities, and the degradation of the rural landscape. Yet because the underlying dynamics are not clearly understood, well-intended but nevertheless ineffective solutions are applied over and over again.*

Currently, the globalised food system is deeply stratified. At least as far as consumers and producers are concerned the West has an over-abundance of food whereas the South is characterised by a scarcity of food. (When I say ‘food’ I mean what gets sold in retail stores or otherwise consumed by people; when I say ‘produce’ or ‘crop’ I mean the raw product that farmers produce.)

This means that in the West retailers are in fierce competition for consumer dollars; in effect a constant mission-impossible to try and deliver more for less. The bulk of food retailers are large, public multi-nationals and must demonstrate year-on-year growth in order to keep their share prices up.

Retail sales of food covers a relatively small range of food stuffs. This includes fresh produce such as dairy and meat, as well as fruits and vegetables — of which relatively limited varieties are sold. (For example of maybe 2,500 varieties of apple available in England, supermarkets will sell, at most, a dozen.) Then there are the many thousands of processed products sold in supermarkets which mainly consist of processed commodities such as sugar, salt, corn, corn syrup and soya.

The over-abundance of commodities translates into producers being constantly squeezed on price. New Internationalist reports how, “In 2000, [British] supermarket giant Tesco introduced international ‘reverse’ auctions for its suppliers all over the world. They were asked to bid against each other until Tesco got the lowest price...”

The best way to bring the price of produce (fresh & commodity) down is through mono-cropping, volume production and large scale processing. Large monoculture farms can deliver produce for cheaper. They can leverage scale. Small or even medium size farms (ranging in size from 50-2000 acres) cannot deliver single crop volume at the price that large farms can. This is not simply because of yield but also because of complex systems of credit and subsidies that benefit large commodity farms.

The dominance of market logic means that small and medium farms have been steadily going out of business in the last fifty years and being replaced by large farms, many of which are owned by corporations. The closure of small and medium farms, which contributes to the decline of rural culture, is one major factor influencing the growth of urban populations.

Whilst farmers are abandoning their farms, rural populations are joining urban communities and increasing the demand for food while simultaneously decreasing production and self-sufficiency in food. The remaining farms, in response to this increased demand for food, are increasing food production.

In doing so, they're flooding urban communities with food, decreasing the cost of food and dramatically heating up competition for the same consumer dollar. The solution? That consumer dollar can be won through simultaneously decreasing the cost of produce while somehow adding value; that is, processing the produce and turning it into food.

Into this situation comes the middle-man, or what's become the multi-billion dollar industry of food processing. The food processor buys produce from farmers, processes it in various ways and then sells it on for a mark-up. An over-abundance of produce generally means that the producer is losing out on price (and trying to gain on volume) and the food processor can go to whomever is offering the most competitive price. The function of the food processor is to somehow translate this general over-abundance of produce into a profit. Enter branding. Enter packaging. Enter frozen dinners. Enter pre-cooked gourmet meals. Enter hundreds of breakfast cereals. Food processing companies include some of the largest corporations in the world, such as Nestle, Unilever, Kellogg's and General Mills. Increasingly, supermarket chains are joining the ranks of food processors by producing their own, cheaper, in-house versions of the most popular products.

The relationship between producer and food, processor and consumer forms the DNA of the global food supply chain.

To summarise, the basic cycle of the food system in the West, set up over the last fifty years, looks something like this: the system is characterized by slow, steady increases in demand

for food; producers respond by over-producing which in turn results in an overabundance of crops; food processors buy crops, integrating and consolidating in order to pass on the lowest price to consumers; more and more crops are being grown in megafarms driving more small farms out of business; the price of food in retail stores is falling; small producers are steadily going out of business; there is an overall increase in urban populations which drives on-going and steady increases in the demand for food. This is the dominant logic of the food system and it drives patterns in the global food system.

As one critic put it, "most farmers are becoming producers of raw materials for a giant food manufacturing system. They are really not in any sense producing food anymore."

#### 4. THE ROAD FROM GREEN REVOLUTION TO FATAL HARVEST

There are so many criticisms around the current global food system that for a while I started wondering if in fact it had already collapsed and I was studying a post-apocalyptic food system.

The difficulty with data around the food system is a little like data around climate change, only much more fragmented and fast-moving. If a group of scientists make a claim, it's fairly easy to find a Bjorn Lomborg-type claiming *it ain't so, you're just fear-mongering*. Discerning the truth of what's going on with the global food system at the numbers and science level requires a lot of time and energy. There is contradictory information and all of it cannot be right. At the end of the day it boils down to epistemology and axiomatic truths and a choice needs to be made as to what we are willing to accept as legitimate data.

In trying to discern patterns in the mass of data it seemed to me that there are two broad schools of dueling, wheeling thought with a host of lesser and emerging schools emanating from them. The first is the modern Green Revolution. The second, simultaneously representing an older form of agrarian logic and a response to the Green Revolution, can be dubbed (perhaps unfairly) the Fatal Harvest School. The Green Revolution took hold and changed the face of agriculture through the 1960's and 1970's, although its origins lie in the early twentieth century. Until the 19th century food

production grew by expanding cultivated land area. If you wanted to grow more food then you had no choice but to put more land under cultivation. A key technological advance — synthetic ammonia — changed this age-old truism.

The modern fertilizer industry came into being in 1909, with the synthesis of ammonia by Fritz Haber. This discovery had little agricultural impact at first; during the two world wars production of ammonia was diverted to munitions instead of farming. Following the end of the Second World War, however, the ammonia industry turned to producing ammonia for the rapidly growing fertilizer industry, contributing to dramatically increasing crop yields. Norman Borlaug, known as the “father of Green Revolution”, in his survey, “The Green Revolution: Its Origins and Contributions to World Agriculture” (*Borlaug, 2003*) explains that change in hard cold numbers: “US maize cultivation led the modernization process. In 1940, US farmers produced 56 million tons of maize on roughly 31 million hectares, with an average yield of 1.8 t/ha. In 2000 US farmers produced 252 million tons of maize on roughly 29 million hectares, with an average yield of 8.6 t/ha.”

The Green Revolution coupled developments in fertilizer synthesis with the breeding of more robust and fast growing seed varieties. Borlaug won the Nobel Prize in 1970 for his work in the development of rust-resistant (disease resistant) semi-dwarf wheat and rice varieties with radically improved yields.

“The new short wheat varieties, which drew on the Japanese

Norin wheat germplasm, were much more efficient than their tall predecessor varieties in converting sunlight and nutrients into grain production. Furthermore their superior plant architecture provided resistance against lodging (falling over) in heavy winds and under improved conditions of soil fertility and moisture.” (*Borlaug, 2003*).

Throughout the '60s and '70s these varieties of wheat (known as Mexican dwarf wheat) and rice spread far and wide, particularly in countries suffering from acute food shortages such as India and Pakistan, and later China. Radical (and controversial) changes were made in national agriculture policy in these countries in order to adapt to the regime specified by the scientists who had developed these new wheat varieties. “Within 10 years, wheat and rice production had increased by 50 percent.” (*Borlaug, 2003*) To very crudely summarize, the Green Revolution was and is a revolution in generating more yield from the same patch of land using hybrid seeds, pesticides and fertilizers. It's a Revolution because it has changed the face of agriculture and is squarely responsible for the current dominant food-production regime. It's a movement that yokes itself strongly to science and technology and claims that there is no way of feeding the growing world population other than through the further deployment of a science-based agriculture. The shift to GMOS can be seen as a new chapter in the story of the Green Revolution — an attempt to further increase yields.

Those who subscribe to the Fatal Harvest School cannot be neatly packaged. It consists of a rag-tag bunch of farmers

and activists who claim to represent an older, more gentle and contextually sensitive agrarian logic. They believe that industrial agriculture (as the prime product of the Green Revolution) is inherently destructive: its farming practices (such as the use of fertilizers, pesticides and GMOS) are a serious threat to the environment and to people's health; its practices of monoculture, single crop farming and single minded focus on yield-based agriculture is a threat to biodiversity and pays little attention to local context; the business practices of industrial agriculture are monopolistic and a threat to all subsistence affecting both small and medium-size farmers alike. In short, the Fatal Harvest school lays the blame for each and every problem in the global food system squarely at the feet of industrial agriculture. The criticisms of the Fatal Harvest School, familiar to many of us, are as follows:

1. Health: The food industry is killing us. In the West there are diseases of over-nutrition, ranging from coronary heart disease through to diabetes. The Center for Disease Control in Atlanta cites food related illnesses as the second largest cause of death in the USA. Food corporations are bracing themselves for "obesity" suits much in the same way that tobacco companies were targeted. In the developing world there are the diseases of malnutrition, such as Vitamin A and iodine deficiencies, as well as the stark fact that 40 million people die of hunger a year.
2. Environmental: Industrialised agriculture is the key cause of environmental degradation today. Mono-

cropping is leading to a massive loss of biodiversity (see George Monbiot's excellent article "Fallen Fruit" for one case). It's putting massive amounts of pesticides and herbicides into the air and into water. It's causing a "food bubble" through rapidly depleting non-renewable water aquifers which once run dry will cause a collapse in key grain commodities. It's pushing fish stocks to extinction (in Canada and Europe).

3. Cultural: Modern agriculture is destroying rural and indigenous farming cultures. We're heading towards a "walmartisation" of food, where the death of small and medium farmers, rural culture and indigenous farming practices means that millions of peasants are left vulnerable to displacement, loss of livelihoods and famine resulting in a monoculture of food and the loss of valuable agricultural practices.
4. Economic: Agribusiness is forming an oligopoly out to control the entire food chain. Through a process of rapid consolidation the food business is leading us towards a food monopoly where a handful of Western corporations will control every aspect of food. From what I can tell, the Fatal Harvest School is winning the public battle for hearts and minds. In the UK it was largely responsible for shaping public attitudes to GMOS — which were clearly rejected by the public at large. It's responsible for the mass-mobilization of farmers from the South, through the subsequently anti-globalisation movement and organizations such as Via Campesina.

In turn, the Green Revolutionaries — that is, the scientists, agronomists and multinationals who are the target of so much ire — throw up their hands in exasperation at the “irrationality” of the Fatal Harvest School. Their rebuttal can be boiled down to a few key points. The first is that given population growth figures we cannot afford, at social, financial and environmental levels, to turn over enough land to feed everyone through less intensive forms of organic farming. Jason Clay, in his excellent and monumental work “*World Agriculture and the Environment*” puts it bluntly:

*...the Earth is currently home to over 6 billion people. Supporting them all by low intensity cropping — depending solely on recycling organic matter and using crop rotation with legumes — would require doubling or tripling the area currently cultivated. This land would have to come from somewhere — and would most likely mean the elimination of most if not all tropical rainforests and the conversion of a large part of tropical and subtropical grasslands too.*

Clay’s rather dead-pan conclusion is that “these are hardly acceptable alternatives.” Non organic methods of farming, in other words, provide more bang for buck. Furthermore because industrial agriculture uses comparatively less land this means that less of the environment is disturbed and cleared away to meet farming needs. This argument hinges on the claim that industrial agriculture yields more per acre than organic agriculture, that we have no choice but to feed

the growing population and that the masses want a standard of living equal to those in the West. The Green Revolutionaries think of themselves as the pragmatists in this particular game; they are responding to undeniable trends. The trouble with this, of course, is that they have designed an agricultural logic that profits from destructive and undeniable trends. They leave themselves open to broadsides of criticism in that it’s no longer possible to discern if they are simply responding to destructive trends or actively causing these trends.

The Fatal Harvest School on the other hand is arguing that some sort of fundamental change in human behaviour needs to be made. Ideally, population growth figures need to be controlled otherwise industrial agriculture will chew up the planet. Behaviour change, however, can take place in two places: the West and the developing world. In the West this behaviour change looks like a change in consumption patterns thereby reducing stress on the environment. In the developing world this change looks like, at best, a change in reproductive patterns (if not more). Personally, I find it disturbing that so few people have any faith that behaviour change can take place in the West. At the moment the burden is therefore placed squarely on the developing world. What’s more, the way Green Revolutionary logic is playing out against Fatal Harvest logic currently means that the world will see an increasingly stratified global food regime, with the rich being able to afford organic food and the poor having to rely on GMOS.

Having said that there are precedents for behaviour change in

both the West and the developing world. Smoking is currently declining in the West, largely due to years of campaigning and health education. Given the likelihood of obesity taking the place of smoking as the number one killer it's also possible that the issue of over-eating may be effectively addressed in the same way, through massive public health campaigns. (Of course tobacco companies responded to the decline of business in the West by focussing efforts in the developing world.) As we've reported before, it looks like global population figures will level off at around the 9 billion mark, which is far from the dire predictions of 20 billion or so that were being made in the 70's. Planning around such levelling-off should, at least in theory, mean that it's much easier to make a case for a particular, more environmentally-friendly food logic other than one designed for runaway population growth.

The conundrum posed by these dueling logics boils down to a single, highly complex question, the answer to which is far from clear. Given the vast surplus of food, at least in the West, does the world really need more food?

## 5. SOUTHERN VIEWS OF NORTHERN LOGIC

We've all heard the story of the little girl who didn't know that her hamburgers came from the nice cows in the field. My own version of this story occurred in our backyard in Bombay. It couldn't have been more than a few months after we had emigrated from London. I was seven. It was Eid-ul-Adha, a Muslim festival where an animal is ritually slaughtered to mark the Prophet Abraham's willingness to sacrifice his son. In London you simply paid the butcher to do the job for you - nice and clean. In Bombay it seemed a little different. You go and buy the animal and tether it in your yard (in our case of our nice modern Bombay beach house). On Eid the butcher comes to your house to sort it all out right there and then. I watched the slaughter from a safe distance, more than a little revolted at the visceral mess, not to mention the loss of my pet goat. After it had all been cleaned up I was passing by the butcher, with what was probably a dark look on my face. He looked up at me, grinned, threw something and yelled "catch!". I caught the proffered object, and opened my fist...to discover...an eyeball.

The point of this rather gruesome story is to stress how different things are in the South. Food isn't the antiseptic business that it's become in the North. It's visceral and direct, which makes food much more of a sensual experience. However, the food system in the South is slowly being re-molded. Agricultural policy developed on the basis of Northern lessons is changing the face of Southern food systems and agriculture. The consequences of this re-molding are clear



to see — given what we know of industrial agriculture in the North. It's leading to many of the problems identified by the Fatal Harvest School. We can no longer, however, think of these problems as unintended consequences. Coupled to these now known consequences are policies which are having somewhat more unique effects in the South.

The surplus of food in Europe and North America has the consequence that it's detrimental to Western economic interests to have Southern countries producing food surplus to their needs. This becomes a fine line because a lack of food surplus means that any crop failure (due to a failure of rains or other reasons) has the potential to rapidly become a disaster because there are no buffers to protect populations. A vast array of mechanisms have been deployed to ensure that the South does not over-produce and flood Northern markets with cheap food and agricultural produce. The effect of these mechanisms has been to make Southern farming increasingly unviable from an economic perspective.

Trade barriers and tariffs ensure Southern countries cannot afford to sell in the West. Farm subsidies in the OECD countries total some \$300 billion annually. A fifth of the European Union's total budget goes to farm subsidies. (See *KickASS* for more). They have two basic impacts. The first is to ensure that global commodity prices for agricultural products remain high, even as prices overall slowly drop over time. In percentage terms, Westerners spend perhaps 11% of their family budget on food, whereas Africans spend between 40-75%. The second is to ensure that North American and

European commodity farmers can undercut all other sellers on the global market. To illustrate, if the cost of production per unit of cotton is \$1.00 in the USA and \$0.50 in Bangladesh, farm subsidies mean that the US farmer can sell product for \$0.40 and still make a profit. The Bangladeshi farmer, on the other hand, might as well just burn his crop, because putting it on the market would increase supply and further depress the price. (It was the refusal of the G8 to agree on the timing of the ending of agricultural subsidies and tariffs that caused the collapse of the WTO Summit in Cancun.) For decades North America and Europe have used surplus crop as "food aid" — often on the condition that recipient countries open their markets to Western products. Markets once open can be used to "dump" surplus. All these mechanisms, coupled with more direct tariffs — which are simply a tax on products from a certain region — further depress the market for local products, exacerbating the decline of local farming and agriculture. Although there's broad agreement across the political spectrum that Western farm subsidies need to end (with the odd exception), this is not happening as fast as many would like. With the collapse of the Cancun talks, in 2002 the Bush administration pushed for the introduction of the new Farm Bill, which largely kept intact the US system of subsidies. (The WTO has recently upheld a ruling that US cotton subsidies are illegal, that is, "trade distorting".) The EU is tinkering with its own mammoth system called Common Agriculture Policy (CAP), but as far as the needs of the developing world are concerned there's a lot of talk but not a whole lot is changing fast. Beyond the crippling effects of subsidies and trade policy, historical shifts in culture play

a large (but mostly unacknowledged) role in weakening people's ability to remain healthy and well fed. These are trends, in large part unintended consequences, caused by the global shift from subsistence to commodity agriculture. Cultural shifts, such as the slow, steady decline of rural culture, means that communities are becoming less and less resilient when it comes to food. In the next section, I'll explain how.

## 6. THE THINNING OF RURAL CULTURE

The destruction of rural culture needs to be seen for what it is, that is, a serious loss of capacity. The shift from rural to urban, as it's currently proceeding, signifies a loss of food producing capacity that means more and more people (who once knew how to produce food) are becoming increasingly dependent on industrial agriculture, with its myriad problems, for their food. It represents a steady homogenization of the many farming cultures developed over the centuries in response to local conditions. Skills and knowledge built up over generations are being lost almost overnight. It means that communities as well as the global food system are both becoming less resilient to shock and to change.

All healthy cultures, be they urban or rural, can be thought of as being 'strengthened' or 'thickened' by the amount of choices available to them. The 'thicker' a culture, the more resilient it will be to catastrophe and dramatic change. The 'thinner' a culture the more brittle it will be. In a "thick" culture if your crop fails or some disaster strikes you always have a handful of choices left open to you. While they may well be unpleasant choices, they ensure that you or your family won't starve. In contrast, declining cultures can be thought of as 'thin' with choices. If the crop fails or you lose your job there are no other choices left within your culture. The final choice becomes to leave your culture and, for example, move to an urban culture (or more extreme, you kill yourself).

I came across a stark example of thinning rural culture while

traveling through rural Sao Paulo State in Brazil. As part of a Sustainable Food Lab team we were visiting a highly successful sugar cane conglomerate. Over the years they had leveraged thousands of hectares of sugar-cane plantations into a diversified group of family owned companies with a turnover of over \$120 million. They also ran an industrial power plant which generated electricity from ethanol produced by sugar cane. They sold this electricity back to the national grid and since it was produced using renewable sources they even managed to sell carbon credits to the Swedes. They were rocking and rolling. We all agreed it was deeply impressive.

Driving to a research farm run by the conglomerate, one of my colleagues pointed out how strange it was that the countryside around the farm was totally devoid of people — it was a “desert of green.” Today, 87% of Brazil is urban. Gesturing to the endless, empty fields of sugar-cane, she pointed out that if that was an example of sustainable agriculture then it clearly signaled the death of rural culture. This agriculture did not require peasants and farmers, it required a handful of industrial workers. The sugar-cane factory, over the decades, had ensured that they were the only existing culture for miles. What’s more the factory was converting all their sugar-cane harvesting from manual labour to mechanised labour (for some bizarre-sounding legal reason) and in the process would let go of some 2,500 sugar-cane cutters. These sugar-cane cutters will make a transition from the “thin” culture of the conglomerate to the non-existent rural culture of the land around the factory. They have no choice but to leave

their homes and go looking for another culture. What’s more, with the end of rural culture around sugar cane production also come diseases that result from the lack of local food practices. An example from India illustrates this.

## 7. DEVELOPMENT IS WHITE SUGAR

Claude Alvares, a Goan farmer and activist, provides a telling story which gives us some insight into how the coming of Western agricultural logic and the commoditization of food actually produces malnutrition. He writes:

*India produces different forms of sugar. The most important of these are white sugar and gur [a form of molasses]. According to the official opinion, the processes used for the extraction and production of white sugar are superior to those that lead to gur. Not only is the extractive efficiency of large mills higher, the product (white sugar) stores well. It can be transported and hoarded, and otherwise abused for reasons of state. The attendant pollution wreaked by sugar mills is acknowledged but is considered a small price to pay for the benefits of progress.*

*Gur, on the other hand, is mostly manufactured in open furnaces, using agricultural waste, timber or bagasse. The extraction of sugar cane juice is not as high as in the big industry process. The final product also does not keep well beyond a certain period...And of course hoarding and speculation in gur is less easy. (Sachs, 2009)*

The contrast between the two products is quite stark, both in terms of production as well as nutritional value. Sugar has no nutritional value, it simply provides empty calories that modern diets do not need. “Gur, on the other hand, is a food. It contains not merely sugar, but iron and important

vitamins and minerals.” Alvares goes on to describe how the Indian government implemented policies forcing sugar cane growers to sell their product to refined sugar factories only and not to local gur manufacturers.

As you can imagine, policies such as the those described here contributed to the decimation of the indigenous gur industry in India. A large number of Indian children suffer from micronutrient deficiencies which cause life-long physical and cognitive disabilities. Malnutrition is, of course, not ascribed to Indian government lending policies around sugar cane production in the 1950's — because nutritionists generally do not spend a lot of time researching agricultural history or declining indigenous food practices. However, it's clear that these and similar transitions to a commodity-based food system have caused dramatic shifts in the health and well-being of Indians. The transition from gur to white sugar is particularly sobering because while a significant percentage of the Indian population suffer from micronutrient deficiencies (including some 100 million children), the large and growing middle class (300 million) suffers from diseases related to the over-consumption of white sugar, such as diabetes and coronary heart disease.

This story gives us an extremely critical insight into the nature of the global food system. It's clear that industrial agriculture is not a system focused on producing food — rather, it's a system that, given a choice, is more concerned with producing commodities. Commodities typically require the intervention of a processor before they can be eaten.

The industrial agriculture complex is built on this fact. Non-industrial food systems, on the other hand, are more concerned with producing food — something that does not require an intermediary processor to sit between the farmer and the consumer. (Note that food that doesn't require an intermediary processor before it can be eaten can still act like a commodity - for example bananas.)

The measure for determining success within the industrial system is efficiency and not health or nutrition. Dealing in commodities, as opposed to food, means that the system is optimized for the growing, transporting, processing and selling of commodities. The sugar cane factory in rural Sao Paulo can now be contextualised. The cane factory was not created in a vacuum, rather it took the place of what was once a rural culture that at bare minimum produced food as opposed to commodities.

The 'final choice' of moving from rural to urban is seen by many pro-globalization advocates as an example of a positive trend. Jeffrey Sachs in a recent paper writes, “The second [positive trend] is the increasing proportion of the world's population that lives in urban areas. We have not yet figured out how to make our urban environments as comfortable as they need to be, especially in the poor mega-cities. But there are tremendous advantages in providing basic services, infrastructure, access to health, education, sanitation, water, technology and science to an increasingly urbanized world.”

There are many problems with Sachs' perspective. While

acknowledging that there are still one or two teething problems for most people who live in mega-cities (many of which require major work before they start to feel “comfortable”), he neglects to factor in that “Residents of slums constitute a staggering 78.2 per cent of the urban population of the least developed countries and fully a third of the global urban population.” (Davis, 2004). The UN “estimates that there were at least 921 million slum-dwellers in 2001.” Sachs’ “positive trend”, which could well see “two billion slum dwellers by 2030 or 2040” when seen from another angle appears, as Davis marvels - “a monstrous, almost incomprehensible prospect.”

Sachs, when discussing the ease with which services can be provided in urban centres, is also more concerned with efficiencies than with health or nutrition. He belongs to a wide school of thought that takes for granted that rural cultures will continue to thin as if this were an act of nature that must be adapted to rather than one that results from man-made actions. He blithely, and in my opinion somewhat callously, ignores the inherent violence of this trend in many countries, as well as the dangers of slum life relative to rural life. Finally, while it may make life easier for those responsible for delivering the services he describes, he doesn’t ask if urban migration is what people want — given a choice.

While it’s certainly true that the young often make a relatively painless choice (to them, not their parents) not to live and work on the farm but to head for the city, it’s also true that a great deal of migration to urban areas is the result of

people having no other choice. It’s a trauma. It’s a deep loss. A union worker in Brazil gave me the merest hint of this as he explained, “The machine pushed us to the city. I remember when my father left the farm he was crying. Nobody died of cancer, young people have never been in touch with this healthy life.”

As we were debriefing our travels in rural Brazil, one of my colleagues made the point that what we seem to need is a shift from agricultural policy to food policy. Fortunately there are signs that such thinking is emerging in the West, in no small part because of industrial agriculture’s failure in Africa.

## 8. THE CASE FOR SOUTHERN LEAPFROGGING

Africa looms large in any discussions on food and agriculture. In the worlds of development and of modern agriculture, Africa seems to defy all logic and all efforts to be 'helped'. While the Green Revolution produced dramatic yield increases in countries like India, it failed dramatically in Africa. The productivity of African agriculture, according to Western measures, has not, over the decades, demonstrated any significant increase. Africa (specifically sub-Saharan Africa) is a continent characterized by widespread malnutrition (although overall figures and trends are worse in India) as well as hunger and poverty. Yet for all the doom and gloom, the failure of industrial agriculture, not just in Africa but in the developing world (the tropics, the South), means that there is space here for the development of niches that don't suffer the burdens of industrial agriculture. There is room for Southern agriculture to leapfrog past the limitations and problems of industrial agriculture to agricultural logics more suited to the peculiarities and stark realities of here and now. How might this happen?

Richard Manning, in his paradigm shaking book, "Against the Grain: How Agriculture Has Hijacked Civilization" argues that the difference between the developed and the developing world is simple. Industrial agriculture is largely an "endeavor of the temperate climates," which include what he calls the "neo-Europes" (i.e., Australia and so on) as well as Japan. Industrial agriculture does not work in the tropics — barring some "expensively maintained plantations for sugar, banana



and coffee.” Manning argues that “...the absence of industrial agriculture in the tropics provides real opportunity. It offers a chance to do good work out of sight — under the radar of — mainline agriculture. This is more than a theoretical advantage.”

The problem of Southern agriculture and food is generally divided into two simultaneous equations. First, what do Southern farms need in order to feed their communities and to generate a surplus? This is a much broader question than that of yields and productivity. Secondly, if Southern countries managed to achieve food security do they have any markets to trade with?

One answer to the first question as given by modern agronomists such as the Norman Borlaugs of the world, superstar economists such as Jeffrey Sachs and superstar academics such as David Landes (“The Wealth and Poverty of Nations”) is that the Southern countries, and in particular African countries, are climatically unsuited to agriculture. The answer proscribed to this geographical injustice is better and more modern technology, that is, more inputs such as pesticides, fertilizers and commercial seed. (This is one reason why GMOs, as just one example in a long line, are being touted as a cutting-edge solution to tropical food problems.)

By way of questioning this prescription of more modern agri-science (what he calls “high modernist agriculture”), James C Scott, in his brilliant “Seeing Like A State: How

Large Scale Schemes to Improve the Human Condition Have Failed” takes up the question of “why a model of modern, scientific agriculture that has apparently been successful in the temperate, industrializing West has so often foundered in the Third World.” He points out that, “In spite of these indifferent results the model has been pressed by colonial modernizers, independent states, and international agencies. In Africa, where the results have been particularly sobering, an agronomist with great experience has claimed that ‘one of the most crucial lessons of the past fifty years or so of ecological research focused on African agriculture is that the ‘dramatic modernization’ option has a track record so poor that a return to slower and more incremental approaches must be now given serious and sustained attention.”

Scott’s basic and most serious critique is that modern agronomic science is characterized by “an inability to recognize or incorporate knowledge created outside its paradigm — [which] sharply limited its utility to many cultivators.”

The key instance of this is how “modern agricultural research commonly proceeds as if yields, per unit of scarce inputs, were the central concern of the farmer. The assumption is enormously convenient...the generic, homologous, uniform commodities thus derived created the possibility both of quantitative comparisons between the yield of different cultivation techniques and of aggregate statistics” (This is in fact exactly where Sachs starts his thinking about agriculture). As we have seen from the example of white

sugar and gur this is “simply not a plausible assumption about any crop unless it is purely a commodity for sale in the market.”

This begs the question of what exactly lies outside of the paradigm of modern agriculture? What are we not seeing? Plenty, as it turns out.

Scott offers an example from Sierra Leone (taken from Richards’ “Indigenous Agricultural Revolution”), which contrasts sharply with a yield-based approach and gives us a taste for the many considerations that are taken into account when distinguishing one variety of rice from another:

*A phrase like ‘it cooks badly’ is often taken as a catch-all for a range of properties connected with storage, preparation and consumption and goes well beyond subjective questions of ‘taste’. Is the variety concerned well-adapted to local food processing techniques? Is it readily peeled, milled and pounded? How much water and fuel does it require in cooking? How long does it keep, prior to cooking and once cooked? Mende women claim that improved swamp rices are much less palatable than the harder ‘upland’ rices when served up a second time. With the right kind of rice, it is possible to cut down the number of times it is necessary to cook during busy periods on the farm. Since cooking sometimes takes 3-4 hours per day (including the time taken to husk rice, prepare a fire and collect water) this is factor of no small importance when labour is short.*

Beyond the many characteristics of a grain, there are multiple uses that the rest of the plant can be put to. Scott comments that “its various parts from various stages of growth may come in handy as twine, vegetable dyes, medicinal poultices, green to eat raw or to cook, packaging material, bedding, or items for ritual or decorative purposes.” Thus to simply focus on the yield of seeds per hectare of land to dismiss the reality and complexity of local production and consumption.

Scott is providing evidence that demonstrates it isn’t that the tropics are unsuited to agriculture but rather they are unsuited to an alien agricultural logic, that is, industrial agriculture. Industrial agriculture doesn’t work in the developing world, particularly Africa, because it’s mainly concerned with a very small number of commodities, primarily wheat, rice, maize and sugar — all of which are much better suited to temperate climates. These products are processed, then sold to industries which take them, mix them in various combinations, package and then retail them through vast supermarkets. Almost all of industrial agricultural efforts, from research to marketing, are focused on these few commodities traveling along a supply chain as finely engineered as a Swiss watch to process only these products.

Local food systems in the developing world (particularly rural) are more concerned with figuring out for themselves how a plant can be used in a myriad of ways than with how to produce a product that can travel well down the industrial-agricultural supply chain. The plant is thus not treated as

a commodity - it's treated as a food. It's not processed and sent off, coming back to communities in bags. Its usage is direct, diversified and deeply local. Furthermore, in stark contrast to industrial agriculture, healthy local food systems deal with hundreds of species, not simply with four or five commodities. This is true in the developed as well as developing world. Take a walk through any farmer's market, say for example, New York's Union Square Greenmarket, and you'll see hundreds of species — many that most of us won't recognise.

Due to the fact that the backbone of local food systems is much more than a handful of commodities means that there is vast scope for systematic research aimed at strengthening local cultures - both biological and otherwise. The opportunity to develop this very localized field — in effect a “geographical niche” — is what both Scott and Manning are pointing out. Manning gives us an example, a beautiful example of agri-leapfrogging, which indicates the type of research that could take place:

*The agronomist Chris Mundt was part of a group that decided to test a simple idea in Asia. It is generally understood that companion planting (or intercropping) of various species causes the phenomenon of overyielding, in which each plant produces more than it would if grown alone. However, with the row cropping and mechanical harvest of monoculture, this is not a practical system of agriculture on any sort of scale, so fertilizer substitutes for intercropping. Mundt, however, tried to obtain overyielding*

*by planting together not different crops, but different varieties of rice, which could be uniformly harvested by machine. It worked spectacularly. This sort of research will not come out of a corporation, simply because the results don't require anyone to buy something. A farmer buys as much seed as usual, probably less fertilizer. The solution is simple, elegant, and cheap — but for suppliers, unprofitable.*

If the focus of tropical food systems shifts from commodity production to the development of robust local food systems (including markets), then the question of needing overseas markets for surplus commodity also shifts. The problem of surplus commodities, which have been one of the biggest factors in the shaping of industrial agriculture, becomes less of an issue. It doesn't necessarily go away but it certainly softens somewhat and loses the bright, shining urgency that it has now. Manning leaves us with the following question- “What can be done with small-scale, labor-intensive, tropical, subsistence agriculture by working on perishable, orphan, or forgotten crops that are eaten by the people who grow them or sold, unprocessed, in direct markets in a nearby village or town?”

## 9. THE NEED FOR BETTER OPTICS

We can choose to respond to Manning's question in a variety of ways. One is to dismiss it as ridiculous and foolish, a return to an unviable past; that is, we can choose the precooked meal given to us by industrial agriculture. Another is to shrug and say it's possible but not a high priority right now. Lastly, we can try and meet it with an openness and a hospitality, to treat it as an interesting avenue for research, for thinking and for experimentation which could result in a more flexible and robust food system than we have now. This necessarily means widening our vision, trying to see what we perhaps have not been able to see wearing the synoptic lens of industrial-agriculture.

The shift that's needed can be illustrated simply. Economists base policy decisions on arguments such as this: "As many as 45 of the world's 49 least developed countries (LDCs) are net importers of food and 33 are net importers of agricultural products, according to the economists Alberto Valdes and Alex McCalla. The removal of tariffs and subsidies would hurt, rather than help, these countries, because such a move would raise the prices they pay for their imports." (*Agricultural Liberalization and the Developing Countries: Debunking the Fallacies*, 2017).

These two lines are the basis for an argument over billions of dollars of subsidies. In a single stroke the complexity of almost fifty countries, doubtless comprising a few billion people, is reduced to an abstraction. We can tell nothing

from the figures or the statement (or for that matter the accompanying argument) about the food habits of the people the economist is referring to, nevermind being able to discern regional differences or urban-rural differences. We can tell nothing about the nutritional status or distribution of calories within these countries. We have no idea who actually consumes imported food and we have no idea what the food sources for the poorest people in these countries are. The list of what we cannot know, but would be useful to know, from such reductions is endless. As a statement it gives us a good example of the granularity of data that macroeconomists routinely base decisions on — decisions that effect many millions of very un-abstract, very specific and very real people.

The need for better optics is urgent because without being able to see better, we risk continuing to mistake deeper underlying order for chaos and randomness. We risk destroying a multiplicity of agricultural logics that provide cultural and biological diversity which in turn are a function of the robustness and health of agricultural systems. Currently, industrial-agriculture is not quite operating on the premise of a blank slate but it comes damned close. It sees what it can recognize and runs over what it cannot, without any acknowledgement of its own limitations. If industrial agriculture were a motorist it (he?) would have ploughed down half a dozen kids trying to cross the road, not to mention countless trees and plants, in a single-minded somewhat idiotic quest to get from A to B. Such blindness is not simply disingenuous but it is fundamentally bad science. It certainly cannot be indulged.

The challenge of developing better optics, that is, being able to factor in finer and finer layers of data into our models and policies is immense. I don't mean simply collecting more data, I'm talking about the quality of the human act of perception — I'm talking about seeing. This is particularly hard for existing institutions, especially global institutions operating outside of any specific geographical context — which are constructed around what Scott calls “synoptic” vision. They function on the basis of blanket generalizations and abstractions that place millions of people into a relatively small number of manageable categories. Current policies simply cannot be fine tuned or tweaked to take into account a diversity of local agricultural logics and food contexts. There is no way for them to handle the richness of data that a local understanding would require. Once again, it's a question of epistemologies. A deeper and wider overhaul is required. Both the natural and social sciences need to develop more ethnocentric lenses. Its practitioners need to start operating more like good anthropologists — by taking the time to build long-term relationships with and within the geography of concern, in order to better see what is actually going on. This is a daunting challenge but promising efforts to move in this direction have been reported before, see for example the Danish professor Bent Flyvberg's work, or for that matter James C. Scott, who runs the Agrarian Studies Programme at Yale.

Widening our vision means taking into account the flood of messages that are pouring out of the developed world, as well as Africa and the South. If we start tuning in through the

noise and confusion of multiple conflicting logics, using our peripheral vision so to speak, all these flickering messages seem to be leading us somewhat inexorably towards a single, clear message: we need to re-generate local food systems.

## 10. EXTINCTION BLUES

The broad story this essay tells about terrestrial human activity is coming true for the oceans. For centuries our oceans have been part of a global food system. That may be about to change.

The challenges of terrestrial agriculture are sovereign challenges. Land always falls within the boundaries of a nation-state. Even as agriculture is increasingly globalized, the question of how to respond to global dynamics sits within the purview of either national, or in some cases, supra-national entities (such as the EU) - even though global commodity prices are still determined by the markets.

The high seas, that is, anything beyond 200 nautical miles from shore (mean low-water mark), are largely ungoverned spaces. This means that while they are technically regulated, in practice these are zones where enforcement is, to put it mildly, difficult. Although treaty law, such as the convention of the high seas as well as other multilateral treaties, technically apply to the ocean, these are insufficient protections. Our oceans are too vast, international law too weak and the rewards too high for this frontier to remain free of dangerous human interference.

The most dramatic example of the impact we have had is on marine ecosystems, and can be seen in our fisheries. Starting with the collapse of the Grand Bank Newfoundland

cod fisheries we have seen dramatic collapses and declines in global fish stocks. While the data floods in, the debate still rages. It is likely that the coupled trends of increasing global demand and declining stocks means ocean fish will be largely eliminated from global diets in the next twenty to thirty years.

The oceans are increasingly viewed by policy makers as a virgin “blue economy” that can be exploited to drive economic growth. Protein is just one commodity we are turning to the oceans for. We are now seeing moves towards opening up the deep seas for deep-sea mining — extracting petrocarbons and minerals. Historically these stocks have been too technically difficult to get to. This is rapidly changing, opening up previously inaccessible stocks. This is true with the melting of the Arctic as well. Certain countries are now trying to gain access to fish stocks there that have never been fished because they were protected by miles of ice that have now melted.

The unintended consequences of such activity are largely predictable — because we have seen the same logics play out in terrestrial agriculture. The oceans are like a commons. We are seeing a classic “race to the bottom” when it comes to exploitation of this last and greatest frontier.

For anyone trying to respond strategically to this situation the challenges are formidable. Crudely speaking, there are three broad strategies in play.

The first are market-based strategies. These address either

supply-side dynamics including efforts at market incentives for fishermen, or demand-side changes such as improving traceability, labeling and consumer education.

The second are area-based strategies. This is where the locus of efforts is on a particular area, such as marine protected reserves or coastal communities. A trending example of this approach is “integrated oceans management,” a phrase that’s currently less a strategy and more a statement of intent.

The third are governance efforts, which predictably, are extremely slow moving, protocol-laden and unpopular with industry. (This is a broad characterization and there are exceptions such as the Regional Fisheries Management Organization for tuna, which has made real progress).

Each of these efforts will likely have some impact. Arguably, none of these strategies, even on paper, will result in the scale of changes needed to save ocean-based ecosystems from collapse.

The fact that the scale of ambition does not even exist on paper means that the likelihood that current policies or strategies will avert collapse is either zero or close to zero. The numbers don’t really add up to a solution. We are in all likelihood looking at the mathematical certainty that our ocean ecosystems will collapse. Currently it would be hard to name a strategy that even aspires to what could be thought of as a comprehensive solution to the challenges presented just by global fishing, let alone the range of issues across our oceans.



A pragmatic view of the oceans would be to say that just as the battle for terrestrial biodiversity has largely been lost, the battle for the oceans will also be lost. Of course, this doesn't mean that this is actually what will happen. It simply means that on balance, there are no real signs that we have a strategic grip on how to respond to the scramble for the oceans.

## **11. CODA: THE STRENGTH AND WEAKNESS OF ARK STRATEGIES**

The bulk of the world's population is not dependent on the global commodities system, even as this is changing rapidly. Even today, the bulk of the world's population feed themselves through subsistence agriculture. While we have in many ways declared a war on the notion of subsistence, perhaps the practice should give us pause. The long, delicate supply chains of the global-commodity systems (I won't call it a food system anymore) feed an increasing number of people. Yet this construct is immensely vulnerable.

As the historic drought in California really bites, hard questions are being asked about water usage by industry in the state. Suddenly there is an interest in how much water it takes to grow an almond. There is increasing concern about bottled water concessions. One of the production centers of the global commodities system looks like it is in dire trouble.

The system as a whole is probably robust enough to simply blink and continue in the event that agricultural business in California slows down or even ceases production. Almonds are one thing, but this would not be true if we consider the same happening where a staple grain like wheat, rice or soya were concerned. Global commodity prices would shoot up and that would result in serious problems for a lot of people dependent on this system. One study on the urban

dependency of cities on the global commodities system somewhat hyperbolically claimed we were “nine meals from anarchy.” But perhaps a form of anarchy is worth considering.

In the face of this wobbling system, an interesting question to ask concerns the regeneration of local food systems. What would it look like for a mega-city to embrace an aggressive food production policy? What would it look like to deliberately reduce dependency on the global commodities system? Encouraging the recycling of grey water, attendant spatial planning and raising awareness of a metropolitan agriculture? One examination of the potential for a metropolitan agriculture commented that, “While some recent work brings urban questions more prominently into the food systems discourse and grassroots urban agriculture initiatives continue to grow in number and scale around the world, a clear examination of the relationship between agriculture and cities remains elusive. What ‘types’ of agriculture best suit the needs and dynamics of contemporary urban life?”

The strategy of regenerating local food systems as a response to the challenge of sustainable food systems is an “ark” strategy. It involves retreating into a delineated space, physically and mentally. It means drawing lines around an ecosystem and then focusing on ensuring that everything within those lines can make it through the vicissitudes of whatever the outside (and the inside) throws at it. This is then the Ark.

The strength and weakness of ark strategy is control. Retreating into a local geography is graspable, we can see what is “inside” and we can focus our energies on making whatever is inside as strong, resilient and adaptive as possible. We can focus on what is within our control. If we want to change things we can do so without having to negotiate higher powers we cannot see or touch. It means we can also block out impulses, influences and forces we don’t like. Unfortunately the illusion of control is also the Achilles heel of ark strategies.

We now know that our ecologies are deeply interconnected. The proverbial butterfly flapping its wings half way across the world does cause a storm that arks have to weather. There is no controlling the butterfly. The ecology of an ark is necessarily dependent on wider ecological systems.

Water illustrates the fragility of ark strategies. What would a self-contained water supply for an ark look like? Ideally it would be an aquifer of some sort, where the source of the water itself was inside the ark. The rate of consumption of the water would be orders of magnitude less than supply.

These situations are comparatively rare though. And if we end up finding ourselves the lucky owners of a seeming infinite supply of water in the midst of a drought, then defending that source from external control (ranging from regulatory controls or worse acquisition) is a not trivial matter. What’s much more likely is that the source of water is a river, a lake or rain water — sources in other words

subject to disruption should the weather change.

California again leads, as a sobering example. Warnings that millions of people will run out of water in the immediate, foreseeable future abound. The supply chains that bring water to people are breaking down because the supply of water is drying up at source — aquifers running dry due to accelerated consumption patterns, changes in weather patterns resulting in declining snow melt and rain. In this context, an ark reliant on water from any source outside of its delineated borders would suffer like everyone else. Of course there are strategies that can be deployed to recycle water usage, improve efficiencies and so on. But ultimately the fact is that arks are embedded into the wider world.

It is possible to imagine ark strategies that are both wide and deep. So for example an ark strategy for a city like Greater London and its surrounding counties, or a city like Sao Paulo, is a very different proposition than an ark strategy involving ten rural farms. It is also possible to imagine ark strategies that focus on shortening their supply chains dramatically, while not entirely cutting ties to the global commodities system. Finally it is possible to imagine a network of arks, focused on the development of what could be a simplified, more resilient regional food system spanning several countries or bio regions.

While these are all interesting avenues for exploration, ark strategies are fundamentally strategies of adaptation. They are not systemic in that they rarely have a hope of

addressing the wider causal drivers that cause us to retreat into our arks in the first place. The basic bet here is that we can ride out the storm. And that is quite a wager.

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## **ABOUT THE AUTHOR**

Zaid is a strategist, writer and facilitator.

He has worked on issues such as agriculture, climate change, education, energy, financial systems, malnutrition, public healthcare, security, sustainable development, and youth issues.

In 2016 Zaid co-founded Roller Strategies. Roller Strategies is a professional services firm focused on next-generation solutions to the world's most complex challenges. Roller is founded on the belief that people want to solve their own problems and its purpose is to support this drive to its highest potential.

Zaid was the co-founder of Reos Partners, where he served as Managing Partner of the Oxford office from 2007-2014. Reos Partners is a social innovation consultancy that addresses complex, high-stakes challenges around the world. Reos helps teams of stakeholders work together on their toughest challenges.

Zaid was born in 1973 in London. When he was 7 years old, his parents decided to pack up and move the family, including his twin sister and younger sister, to India. The original plan was to go for 2 years and get a little experience of the wider world. Instead they were gone 12 years, travelling the world, moving to Bombay, then to New Delhi and then finally to the oil-rich emirate of the Abu Dhabi, in the United Arab Emirates.

Zaid came back to the UK in 1992, where he studied physics at undergrad for a little while (spending most of his time in the lab messing around with pre-web Internet). His familiarity with the Internet, IP protocols and rudimentary HTML skills sucked him out of the physics department into the .com boom where he worked for a number of years as a freelancer, then setting up his own production company Anthropic, working for a NASDAQ listed .com, and ending up as Chief Actualisation Officer for a non-profit tech start-up.

These experiences led him to the State of the World Forum in San Francisco in 1997. Here, he connected with hundreds of activists, social entrepreneurs, ambitious tech start-ups, world leaders, and young people all dedicated to tackling society's most challenging problems. A year later, Zaid found himself working as part of a small global team for a peer-learning youth group called Pioneers of Change. During his two years at Pioneers he helped run learning programmes in countries as diverse as Brazil, India, Egypt, and Mexico focused on creating change.

This marked the beginning of over a decade and a half of experimentation in catalysing systems change.

Zaid regularly teaches courses on how to address complex challenges. He is a Visiting Professor at the California College of Arts (CCA) where he helps teach a social lab on a graduate level Masters programme. He has guest lectured at The University of Oxford, The University of Bergen, Norway, The New School in New York and many more institutions.

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