



Natural Prosperity and the Wellbeing Economy

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Introduction

This will be my last Gresham Lecture as the Frank Jackson Professor of the Environment. Over four years and 23 lectures I have had the chance to build a story around the concepts and ideas that I now call Natural Prosperity. Whether or not it can or will be considered a philosophy or theory has yet to be seen, but as an academic and interpreter of our planet, it seems that the time has come to integrate these ideas into a succinct thesis. It may not be mature enough to be considered a full theory, standing on its own but it feels sufficiently relevant to me to be thought of as a philosophy or motivation for how we might survive and thrive in the future on our changeable planet. In simple terms, I would like to present it through the lens of humans and nature, bringing out the ontology, underlying theory of change and assumptions, causal mechanisms and methods of analysis.

No matter how challenging, learning how to value our planet in ways that can move people and governments alike to act in the best interests of both humanity and the planet's myriad ecosystems is the underpinning tenet of *Natural Prosperity*. As a philosophy it couples the original precepts of natural philosophy i.e., of reasoning and explanations about nature (after Galileo) with a conceptual model of prosperity that combines community, trust, power of voice, life opportunities and nature. It draws on Ostrom's principles for the stable collective use of natural resources as well as the ontology of reflectivists, that emphasizes the importance of intersubjective meanings and human reflections about both institutional activities and individuals in shaping power and decisions. This is in contrast to rationalists (otherwise referred to as realists, neo-realists, liberal, neo-liberals and scholars using game-theoretic or expected utility models) who adopt the broad theoretical and ontological commitments of rational choice and positivism. Rationalist ideas are rooted in exchange theory which assumes that scarcity and competition are the root of people's decision-making.

In *Natural Prosperity*, the words used to describe something are not neutral, and the choice of one term over another has social and political implications. Things do not have an objective meaning independently of how we constitute them in language. For example, use of the word reparation or restitution in the dialogue of land tenure or genocide versus ethnic conflict. Events become "real" not only because they occurred but because they are remembered and have assumed a place in a narrative that can be documented and explained.

Understanding What Matters

However, ideas about prosperity that I have put forward do not just hang on the words we use. To prosper is to understand the meaningfulness of our lives in terms of the quality of our lives and relationships, the resilience of our communities and a sense of individual and collective meaning. It is about hope for us and the next generations' future. As HRH Prince Charles has said prosperity is about tackling the impact of consumerism which currently depends upon the unfettered exploitation of the "extraordinary bounty of Nature", and the limits that we have failed to respect.

The original prosperity indices of the World Bank were narrowly focused on poverty reduction, income inequality and shared prosperity as "the growth in the income or consumption of the bottom 40% of the population in a country".

Even today, the majority of studies of prosperity are overshadowed by reference to a nation's economic productivity, employment and household income, using a universal definition of wellbeing as a state of individual happiness, life satisfaction, absence of anxiety and feeling that life is worthwhile. The focus has

been on cross-cultural studies looking to measure equivalence of wellbeing, happiness and life satisfaction in different contexts, rather than understanding the differences in the meaning, value and relevance of these concepts in different communities.

Often prosperity is represented as the polar opposite of poverty such that designing pathways to prosperity is simply a matter of poverty reduction – i.e., wealth, assets and enhanced livelihoods. This framing limits prosperity to material concerns, overlooking the idea that categorising people as ‘poor’ or ‘living in poverty’ can misrepresent their lived experience, which is not always one of lack, deficit or deprivation in other domains of life.

The core of *Natural Prosperity* rests on a set of underlying principles captured in words including:

Dignity: Everyone has enough to live in comfort, safety and happiness.

Nature: A restored and safe natural world for all life.

Connection: A sense of belonging and institutions that serve the common good.

Fairness: Justice in all its dimension is at the heart of economic systems, and the gap between the richest and poorest is greatly reduced.

Participation: Citizens are actively engaged in their communities and locally rooted economies.

Natural Prosperity is about our quality of life as individuals, communities and societies and how sustainable that will be in the future.

It is about living a locally abundance life as part of globally frugal society.

It encompasses our personal and collective wellbeing as well as the wellbeing of planets, animals and our environment and it involves:

- Identifying trusted community institutions or leaders who can facilitate discussions on wellbeing priorities.
- Training policy makers to undertake open, co-creative policy design processes.
- Asking powerful questions that support communities to identify their positive vision for the future, rather than focusing only on existing problems or challenges.
- Allowing people to express their wellbeing priorities in images or stories.
- Ensuring consideration of both current and long-term wellbeing priorities. What is required for the wellbeing of future generations?
- Encouraging reflection on what matters for personal wellbeing, community wellbeing, humanity’s wellbeing, and the wellbeing of plants, animals, and the environment.
- Asking additional ‘why?’ follow-up questions to better understand the key outcomes and values underpinning the stated priorities.
- Identifying core values that relate to these wellbeing priorities and that can act as guiding principles in the policy design process.

With these aspects built into our lives, I believe we will gain a greater ability to deal with the rapid changes in the world and still ensure prosperity for all.

Making Decisions in an Uncertain World

What we know is that deliberative processes are important for some decisions, but that in uncertain environments, it is also our basal ganglia that are vital. Based on evidence from the learning circuit of worker bees, we now know that buried in our ancient mid-brain system is a small collection of neurons called the basal ganglia, which release dopamine - powerful influencers on our behaviour.

This is the area in our brains where temporal-difference learning, and dopamine gratification take place. Temporal difference learning “explores and discovers” the value of intermediate decisions in reaching goals by creating internal value functions based on dopamine neurons evaluating the state of the entire cortex and informing the brain about the best course of action. This might be a guess but over time these can develop into a “gut feeling” the - an especially important process when there are many variables and unknowns, and rational decision making is difficult.

The other part of our brains that are crucial to decision making is the hippocampus. People who suffer from poor nutrition, disease or other nutritional stresses do not grow to their full potential. In the Maasai village

where I live, it is possible to tell who suffered from the conditions of drought and starvation in the childhood from their height.

We know that from studies of malnutrition in children that the hippocampus can be damaged in such a way that effective decision-making or executive thinking can be impaired. There is a putative feedback loop from the basal ganglia to hippocampus, probably underlying co-participation of the two subcortical structures in the control of motor behaviour and decision making.

In the past decade, the upsizing of portions has become widespread; levels of obesity are at epidemic levels. In addition, food waste from households, retail establishments and the food service industry now totals 931 million tonnes each year. Nearly 570 million tonnes of this waste occurs at the household level, and the global average of 74 kg per capita of food wasted each year is remarkably similar from lower-middle income to high-income countries. Overall, 8-10% of global greenhouse gas emissions comes from food waste.

Our consumption patterns are addictive; but worse is the fact that our bodies are not inadequately adapted to cope with relentless supplies of excess energy. These contribute to serious mismatch diseases such as diabetes, atherosclerosis and cancers. From a primate's perspective, all humans – even very thin people – are fat. A typical primate averages 6 percent; hunter-gatherers such as the Maasai about 15 percent at birth and 10 percent in males and 20 percent in females. The Maasai benefit from this extra energy to forage and feed children during times of drought and food scarcity; women also benefit from fat for pregnancy and child rearing. In the wider populations, nearly 40 percent of adults are overweight or obese (> 24 percent fat male and female). However, many low- and middle-income countries are now facing a "double burden" of malnutrition with the problems of undernutrition and obesity co-existing in the same household.

Living at the Frontier of Change

When unknowns combine exponentially, our attention and working memory enable us to focus on the key parts of a problem. This is where our education systems are vital because they enable us to increase our memory capacity about a range of situations. However, when the uncertainty comes from the planet itself, the growing distance between millions of people and nature make it very difficult for temporal-difference learning and the system of dopamine rewards to take place. This is a powerful driver of our behaviour as this is how we combine information about value along many different dimensions, in effect combining apples and oranges to achieve distant goals.

In my first series of lectures called *Frontiers*, I spoke about antimicrobial resistance, malnutrition, climate change and droughts, plant toxicity and the impacts of pollution on our food and environment. In selecting these topics, I wanted to underline that our future is highly uncertain and that despite a rich and complex history, culture alone would not allow us to transcend our biology.

Clever as we are, we still have our bodies to live with: simply put we are furless, slightly fat, bipedal primates who crave salt, sugar, fat and starch, but are adapted to eating diverse diets of fibrous fruits and vegetables, nuts, seeds, tubers and meat. We still have bodies of endurance, able to walk many miles a day, and can climb, dig and carry. We are not well-adapted to live indoors and when we do we suffer from diseases of affluence, novelty and disuse. We then perpetuate a pernicious feedback loop between culture and biology. Our bodies in the past were molded by nature; given the uncertainty and extremes of environmental conditions that we are likely to face from climate change, we may have greater need of these ancestral, endurance bodies than ever before. Cultural innovations will only take us so far.

Danger surrounds us, yet billions of people suspend belief about the harm that hazardous chemicals and addictions such as tobacco and sugar can do to us. There are no simple answers why we do this, but extensive numbers of studies show that we habitually value costs and benefits more highly in the near term than in the future. Economists call this behaviour hyperbolic discounting. We take pleasure in potentially harmful activities because they enhance our lives now more than we judge the eventual risks or costs. Having a certain percentage of the population die from air pollution or car accidents is a price that modern societies are willing to pay to have the convenience of cars. Yet there are signs that the assemblage of norms designed to tackle climate change – for example taking public transport, sharing cars and purchase of e-vehicles – is beginning to shift the dial.

There is also an assumption that anything easy and comfortable is good for us. Shoes, easy to access foods, medicines to stop a headache or colds, heat and cooling of our houses, clothes that fit, or taking the lift. Comfort overrides our instincts for better judgement. The acceptance of comfort can lead to wastage as well as evolutionary mismatches – glasses, spinal surgery, orthotics – and an assumption that maladies are

normal and inevitable.

We do this in the unrealistic thought that others will deal with the problems of wastage and harm. Plastics are just such a case.

Natural Abundance

There is no doubt that an important consideration in learning how to live on an uncertain planet is how we will feed ourselves. Agriculture has been both a boon and bane to our world and the human body.

In general, it was thought that populations of early farmers initially benefited from their new access to food. However, with few exceptions, people shrank over millennia as agriculture intensified, because even though farmers produced more food overall, the energy available to each child diminished as they were fighting infections, starvation when crops failed and working long hours in the fields. Farming led to many mismatch diseases and the spread of genes to combat parasites such as the sickle cell to combat malaria or to digest foods such as milk. Farmers in particular have come to rely on a few staple foods that decreases their nutritional diversity and quality. Pellagra, a terrible illness from a lack of vitamin B, is common amongst farmers who eat mostly maize because the B₃ is bound to proteins making it unavailable to the human digestive system.

Stress caused by extreme climatic conditions can also reduce crop yields, increase postharvest losses, and threaten animal and human health as a result of changes in physiological and biochemical processes. Worldwide, over 80 plant species are known to cause poisoning from accumulation of nitrates under drought conditions: crop plants most susceptible include barley, maize, millet, sorghum, soybean, Sudan grass, and wheat. When cattle, sheep, and goats consume large quantities of high nitrate plants, their ruminant digestive processes cannot break down the nitrate fast enough to avoid poisoning. Acute nitrate poisoning in animals can lead to miscarriage, asphyxiation, and death. Nitrate poisoning in livestock can ruin the livelihoods of smallholder farmers and herders. Rain can help revitalise the plants and reduce the nitrate accumulation, but rapid growth in water-stressed plants can result in the dangerous accumulation of compounds that give rise to toxic hydrogen cyanide (also called prussic acid).²² Examples of plants that can accumulate prussic acid to toxic levels under extreme conditions are cassava, flax, sunflower, pigweed, maize, sorghum, Sudan grass, arrow grass and velvet grass.

Now we are also seeing the effects of climate change on pollination and reproduction, and fertility in crops. This is happening through changes in the morphology of pollen and stigma, pollen biochemical and lipid composition, sensitivity of floral reproductive organs and different heat stress thresholds. Even rapid increase in night-time temperatures, can affect productivity through a narrowing of the diurnal temperature amplitude. However, information on mechanisms leading to heat stress induced sterility is heavily biased towards rice, wheat and sorghum; across other field crops information is limited.

Along with changes to the plants themselves are the mycotoxins associated with climate change that can colonise crops. Mycotoxin-producing fungi infect many crops such as coffee, groundnut, maize, oilseeds, peanut, sorghum, tree nuts, and wheat. An estimate in 1998, backed up more recently by FAO, suggests that mycotoxins contaminated at least 25 per cent of cereals worldwide. One particular mycotoxin of concern is Aflatoxin, produced by certain species of *Aspergillus* fungi and particularly during drought conditions. About 4.5 billion people in developing countries are exposed to uncontrolled and unmonitored amounts of aflatoxins; in Africa studies in Ethiopia have shown how resource poor farmers have helped to spread the fungus by feeding livestock moldy feed.²⁶ More recently, the International Livestock Research Institute (ILRI) showed a large amount of milk and grains consumed by Kenyans in 2018 had aflatoxin levels exceeding internationally accepted limit. Concerns about Aflatoxin contamination need to be taken seriously: ILRI have estimated that 26,000 people in sub-Saharan Africa alone die annually of liver cancer associated with aflatoxin exposure. Evidence further suggests it may also stunt foetal and infant development, block nutrient uptake, and suppress immunity

It is no wonder that today we are seeing an upsurge in regenerative and conservation farming. Climate change, droughts and floods and Covid are bringing many smallholder farmers up short. Unable to afford fertilisers, seeds and water, some are returning to traditional foods and interestingly these often have a much wider range of nutrients in them.

Nature and Health

The underlying mechanisms of the positive effects of biodiversity, nature and especially green spaces on

human health are not entirely clear but there is a basic idea that natural environments and green spaces improve mental health, mitigate allergies and reduce all-cause, respiratory, cardiovascular and cancer mortality. We see that presence, accessibility, proximity and greenness of green spaces determines the magnitude of positive health effects, but that the role of biodiversity itself is still not properly understood.

What evidence there is shows positive associations between species diversity and psychological and physical well-being and between ecosystem diversity and immune system regulation, although high species diversity has been associated with both reduced and increased vector-borne disease risk. However, few relate measured biodiversity to well defined and measured clinical outcomes; rather there is more evidence for self-reported psychological well-being.

Although the actual biophysical causality is not understood in most instances, there is evidence that the physical and mental health benefits related to human interactions with natural and man-made green environments, depend on the duration and timing of the exposure.⁶⁻⁸ Short-term exposure to forests, urban parks, gardens and other (semi-) natural environments reduces stress and depressive symptoms, restores attention fatigue, increases self-reported positive emotions and improves self-esteem, mood, and perceived mental and physical health.⁹⁻¹⁴ Access to natural environments also tends to enhance outdoor physical activity, improving physical health, for example by reducing prevalence of obesity and type 2 diabetes. Long-term exposure to natural environments, such as residing in areas with high greenness or in diverse landscapes, is associated with reduced all-cause, respiratory, cardiovascular and cancer mortality and to improved respiratory and mental health.^{22,23} Such positive effects of green spaces have been demonstrated over distances varying between 150 m and 5 km.

There is evidence that exposure to green or natural environments is particularly important during prenatal development and early life. The greenness of mother's neighbourhoods has a positive effect on the birth weight of their infants.^{4,28,29} Childhood exposure to natural environments reduces the risk of developing schizophrenia.³⁰ Residential greenness has been associated to reductions in obesity prevalence and atopic sensitization in children and has a positive effect on blood pressure in adolescents. Early life exposure to natural environments also has a number of important long-term effects. The exposure to beneficial microbiota in the environment during the early life also has profound effects on the development of the immune system and on the prevalence of chronic inflammatory diseases.³³⁻³⁷ In addition, early exposure to nature amplifies the potential beneficial effects of green spaces in later life, including the stress-reducing effects of therapeutic immersion in nature. Conversely, the lack of interaction with nature during early life, for instance, due to the limited time spent in nature or green space in urbanized environments, has been associated to a number of emotional, cognitive and physical difficulties in children. The set of mental disorders linked to this disconnection with nature has been described as 'nature deficit disorder' (NDD)

The short- and long-term benefits that natural and man-made green spaces provide, in terms of human health, can be classified in terms of different ecosystem services. A growing body of evidence shows that many observed associations between exposure to green environments and human health and well-being benefits are mediated by these ecosystem services. They include those that reduce harmful environmental exposures such as air pollution, extreme heat, urban heat and noise. Biodiversity as a service delivers a variety of species (animals, plants, fungi and microorganisms) and their gene pools plus the variety of ecosystems in which the species reside. And there is some evidence of cascading links between green environments, biodiversity, ecosystem services and human health and well-being. For example, high plant diversity can result in high structural and functional variation which determines the potential of green spaces to mitigate air pollution.⁶³ Also, biodiverse green spaces may host a high diversity of environmental microbiota,⁶⁴ which may mediate biodiversity effects on human health through their impact on the immune system. Thus, plant diversity may have direct and indirect impacts on the potential of green spaces to reduce the acute and chronic health effects of air pollution, including allergies, asthma, cardiovascular diseases and premature death.

Redesigning Our World to be More Aligned with Natural Prosperity

Natural prosperity is a way for industrialised societies to achieve equity and wellbeing based on a lifestyle of planetary stewardship which delivers local abundance within a new context of global frugality that enables us to stay within the planet's limits. It is also a solution for the root causes of rising levels of ill health and stress associated with inequality, exposed during the current Covid pandemic.

Natural Prosperity thinking requires a shift in the way that we develop our policies, beginning with the goals we set. The goal of policy making shifts from promoting just economic growth, to promoting the wellbeing of

people and planet. Such policy design would aim to support the areas of society, the economy and nature that contribute to collective wellbeing, while shrinking those areas of the economy that damage it.

Natural Prosperity moves the government beyond just correcting 'market failures' to proactively fostering the activities and behaviours important for our wellbeing. This is no small shift, as you will have to move from focusing on problems or deficits (e.g., a lack of skills, tech or finance) to focusing on your priorities and strengths. This will require entering into new territory, to understand the existing actors, actions, behaviours, and institutions in communities that are aligned with Natural Prosperity's goals. New evidence will need to be gathered in areas that have not been previously considered or valued as part of the 'economy', in order to develop a holistic compass to help guide decision making.

This requires experimentation and co-creation to find the strategies and policies that can support communities and align economies with this vision for a better world.

Natural Prosperity living is about using participatory and holistic principles and methods.

Goal-oriented: the economy is not a means-and-ends in and of itself. It is a system to promote human and ecological wellbeing. Policy makers consistently reflect and align policies and processes to achieve the priority objective(s) determined by citizens.

Participatory/Co-creative: Policy is developed through open, co-creative and transparent processes. citizens are able to meaningfully engage and contribute throughout the policy design process.

Context-Appropriate: here are no "one-size-fits-all" solutions. Economic strategies and policies are based on local values, context and objectives.

Iterative: Processes encourage continuous learning and experimentation to find innovative policy solutions that suit the context.

Holistic: The economy is interconnected with other policy areas and integral to social, environmental and spiritual dimensions of life.

Evidence-based: Processes are informed through the systematic use of qualitative and quantitative evidence.

Positive framing/Strength-based: Policy is focused on achieving the aspirations of society rather than addressing negative outcomes. Positive framing is used to focus on the strengths and aspirations of the community.

Multi-dimensional: We live in complex systems and therefore must consider negative and positive inter-relationships between dimensions at every step of the process.

Fair and Just

The END!

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