How fair can be green: exploring the connections between equality and sustainability

The Green Economy Coalition is the world's largest movement for green and fair economies. Our 50+ members represent poor people, workers, environmental organisations, faith groups and small businesses as well as international institutions.

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Contents

About

How fair can be green investigates how inequality and sustainability interact. It shows the connections in countries and across sectors, and highlights win-win projects that show how green can be fair.

It offers case studies and inspiration for campaigners, NGOs, researchers, policy makers, and anyone with an interest in how the world can move forward towards a fairer, greener future.

It draws on a collaborative research project conducted by WWF, Oxfam, Save the Children and Christian Aid.

Introduction

Inequality has risen up political, corporate and public agendas in recent years. Evidence now shows that inequality affects economic growth, wellbeing and sustainability, and even the stability of society and democracy. Consequently, the UN Sustainable Development Goals include the goal to reduce inequalities within and among countries.

At the same time, the world faces a huge sustainability challenge. With climate change, pollution, soil and water depletion, and the decline of biodiversity, there is an urgent need to improve environmental outcomes and switch to clean technology. Environmental goals also feature prominently in the SDGs.

Governments are under pressure to deliver change on both equality and sustainability, and sometimes that can lead to counter-productive policies. Measures to boost growth and raise people out of poverty can accelerate environmental decline. New clean energy infrastructure might exclude marginalised communities and lead to widening inequalities. Government departments can find themselves working against each other, inadvertently making it harder to meet targets and improve outcomes.

The good news is that it doesn't have to be this way, and these two challenges can be addressed together. There are many examples of policies that improve the environment and reduce inequality. By understanding more about how these two issues inter-relate, there is a better chance of avoiding counter-productive policies. Instead, policies can be put in place that have multiple benefits.

There are different kinds of inequality: income and wealth, gender, tribe or race. There are also inequalities of power or of opportunity. Many of these overlap, and some forms of inequality are usually talked about in terms of discrimination or prejudice.

This paper takes a broad view to look at patterns and themes in inequality as it relates to the environment. Who is excluded, and where? How do inequalities combine? Many of the problems are around different groups in society, rather than an individual's position on an income scale. These are what economist Frances Stewart described as 'horizontal inequalities', and they are to do with culture, geography and identity as much as economics.[1]

There are no easy answers, but as examples from around the world demonstrate, there are recurring ways that marginalised communities are affected by the environment. In some instances, environmental policy has made the situation harder for the poorest, whereas others have redressed inequality and channelled benefits to those who need them most.

Most importantly, this paper shows what is possible: social and environmental benefits can go together. Development can be both fair and green.

Summary

Equality and sustainability do not need to be competing priorities. Good policies can address both at once, but to achieve these twin outcomes it is important to understand how the issues inter-relate. This paper looks at this challenge through three longer country-based case studies, four different sectors of the economy, and a series of examples of policies that reduce inequality and improve the environment.

The UK case study focuses on energy and food, showing the dynamics of sustainability and inequality in both areas of the economy. The energy market delivers profits to a small number of people, leaves many in fuel poverty, and has been slow to invest in renewable energy. The food system is controlled by a small number of companies, is energy intensive, and creates poor quality jobs. In both systems the benefits go the richest in society, exacerbating inequality, while the harmful effects fall disproportionately on the poorest.

The Kenya case study draws on the experiences of several different regions, including Lake Naivasha and Mount Kenya. An important observation is that national growth does not necessarily mean local prosperity, with big agricultural projects creating few jobs and competing for land and water. Nomadic tribes and those without formal land tenure are particularly affected. Climate change and a growing population will increase the pressure on natural resources, presenting an escalating risk to already marginalised communities.

The India case study reveals the country's stark inequality, and how wealth and opportunity are divided along distinct cultural lines. Women and smaller tribal groups are vulnerable to exclusion or displacement, and India's caste hierarchy limits opportunities for those at the bottom of the social ladder. Marginalised communities are most vulnerable to air pollution and water scarcity, while being the least responsible. The chapter also looks at the role of agriculture and mining.

Part two looks for similar patterns, this time through four key sectors. The **energy** section highlights the challenge of providing power in rural areas, and shows how renewable energy can be good for equality. The **transport** section describes how the richest travel more and have higher carbon footprints, while quality public transport can reduce emissions and benefit those on lower incomes. **Food** choices affect sustainability and inequality, and when food is grown to feed animals or to provide biofuels, this disadvantages the world's poorest. Finally, the **waste** section surveys environmental inequalities, and how treating waste as a resource can benefit disadvantaged communities.

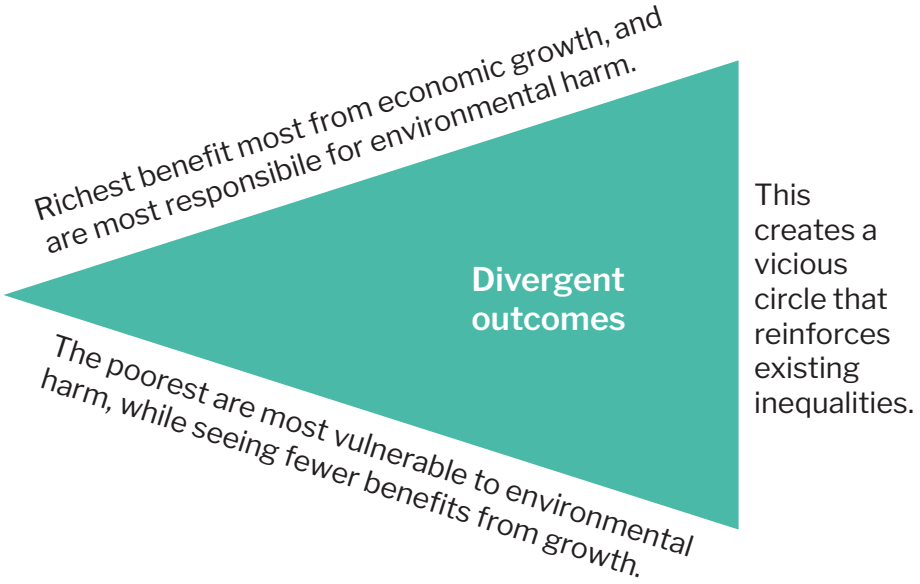
Key messages

A number of recurring themes and key messages emerge from the following chapters:

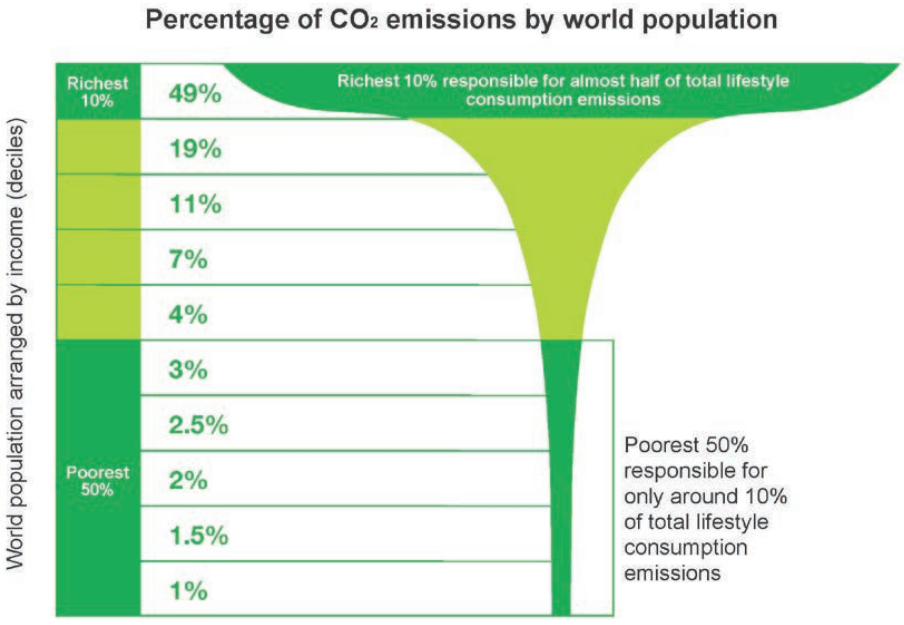
- **Inequalities in environmental impact reflect inequalities of wealth.** The richest have higher carbon footprints and contribute more to air pollution. They drive more, eat more meat, and produce more waste. This is true globally and within countries.
- **The poorest are disproportionately vulnerable to environmental harm.** As all of the case studies demonstrate, the smaller someone's contribution to climate change, the more likely they are to be affected by it.
- **The consequences of ecological damage will often fall on those who are already marginalised.** In India, this was women and the Dalit caste. In Kenya, pastoralists and nomadic people groups were easily disenfranchised. Floods in Britain affect the poorest most, as they are less likely to be able to recover.
- **What is good for national growth does not necessarily translate into local prosperity.** Big agricultural or mining projects create few jobs, while benefits go to faraway investors rather than local communities. Negative environmental effects, conversely, will be predominantly at the local level.
- **Inequalities of income lead to inequalities of power.** Where there are competing demands for resources such as land or water, poor or marginalised communities are less able to defend their claim.
- **Inequality creates the conditions for environmental damage.** Industrial development often damages people and the environment, yet the affected communities have less political and financial power. Inequality makes exploitation possible.
- **Environmental inequalities encourage further exploitation.** Inequalities of exposure to environmental damage mean that the richest are insulated from its effects, making elites less likely to support environmental policies.
- **Good policies can have benefits for equality and sustainability.** The flipside of these observations is that if the connections between the issues are considered, it is possible to reduce environmental damage and inequality at the same time. Pro-poor green policies can bring equitable sustainable development, and we feature several examples in the case studies.

> The average emissions of someone in the poorest 10% of the world population is 60 times less than that of someone in the richest 10%.[2]

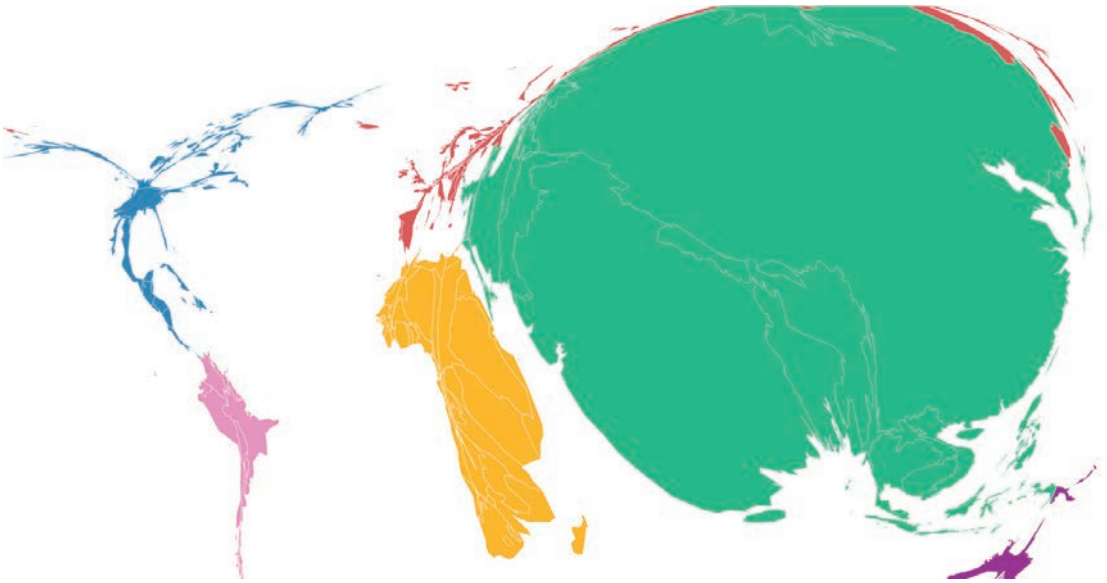
Infographic: connections between equality and sustainability



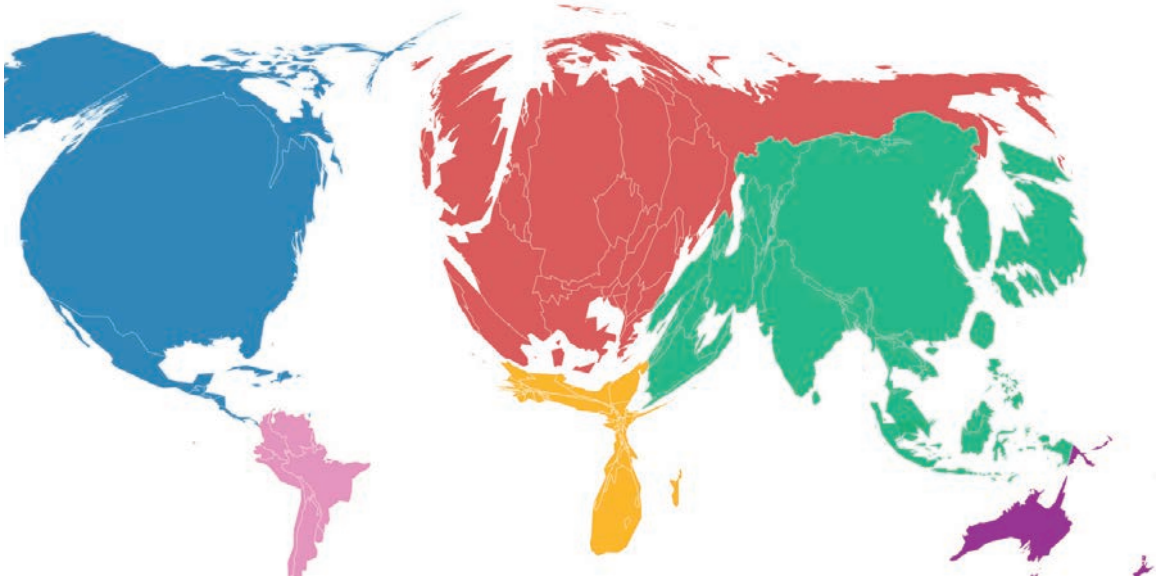
Global income deciles and associated lifestyle consumption emissions



Who is most vulnerable to climate change?



Who is most responsible for climate change?



These illustrations are cartograms - maps that change the relative size of countries to convey information. The top map adjusts country area relative to measured vulnerability to future climate change, with India, South-East Asia and China all particularly vulnerable. The bottom map adjusts for historic responsibility for cumulative carbon emissions, with Europe and the US far outweighing the rest off the world. Kiln.It, 2014.

Part 1

Exploring the connections across countries

Inequality and sustainability intersect in different ways in different places, though often with recurring patterns. Part one of this paper investigates three countries: the United Kingdom, Kenya and India. Written with agencies in each location, each chapter looks at particular situations where inequality and sustainability intersect – the fishing industry in Britain, for example, mining in India or large scale agriculture in Kenya. These examples demonstrate how environmental damage is caused, who is affected, and how existing inequalities are compounded.

Inequality and environmental sustainability in Britain

Local partner: New Economics Foundation

This chapter explores inequality and sustainability in the UK. It describes current trends, then considers who is most responsible for environmental degradation and who bears the greatest costs. It explores Britain's marginalised coastal communities, and then the food and energy systems and the ways that they reproduce inequality and environmental damage.

Key trends on inequality and the environment in Britain

The UK has been failing to meet environmental commitments.

The Environmental Audit Committee issues a scorecard across ten environmental categories: climate change; air pollution; biodiversity; forests; soils; flooding and coastal protection; resource efficiency and waste; freshwater environment; water availability and marine environment.[3] In the latest report the UK scored 'unsatisfactory or deteriorating' in all ten categories.

Carbon emissions within the country are falling, and progress is being made on renewable energy and on phasing out coal. However, transport emissions have barely budged in 25 years and are now the biggest source of Britain's carbon emissions, and the country is likely to miss future climate targets without new policies.[4,5] Air pollution also shows a long-term decline, though the downward trend has slowed in recent years.[6]

At the same time, wealth inequality has been increasing in the UK.

On income inequality, the richest fifth of the country enjoys incomes 12 times higher than the poorest fifth, though there has been a small decline in income inequality over the last ten years.[7,8] Wealth inequality, which refers to assets such as savings, shares or property, is more severe than income inequality in the UK, with wealth concentrated at the top. While official poverty rates have not declined, the number of people owning more than £30 million has risen by 39% in 10 years.[9] The finance sector, changes in the labour market, the cost of housing and regressive taxation all compound inequality in Britain.[10]

The double inequality of carbon and its impacts

One of the recurring themes of this report is that those who are most responsible for environmental damage are often least vulnerable to the consequences. It is a double injustice, and it can be seen internationally and within Britain.

In the UK, the highest consumers tend to be the least vulnerable to the impacts of climate change.

Those on higher incomes are more likely to drive or fly, and emit more CO_2 than those on lower incomes.[11] Oxfam estimates that the top 10% of earners in the UK emitted almost 25 tonnes of household CO_2 compared to an average of just 5 tonnes in the bottom 40% of earners.[12]

The impact of climate change is also unevenly distributed. For example, a report for the Joseph Rowntree Foundation found that flooding in the UK disproportionately affects the poorest and most vulnerable:

> *'people on lower incomes are less likely to have insurance, so reducing their access to safety nets at a point of crisis, while also having fewer resources to deal with the loss of possessions after floods occur or to take precautions in advance."*[13]

The people most impacted by floods in the UK are receiving the least amount of government spending on flood risk management.

Those who would be disproportionately disadvantaged in a flood were children, older people, those with physical impairments and chronic illnesses, those receiving care at home and the homeless. Anyone who is in one of these groups, and is also at risk of flooding, is at particular 'flood disadvantage'. The authors mapped flood disadvantage across the UK against planned expenditure on flood risk management, and found no association.[14] Without considering these inequalities, flood defences are unlikely to protect the most vulnerable.

Photo: Jon Tyson / Unsplash

> Climate change can compound poverty and disadvantage and, conversely, poverty increases vulnerability to climate impacts.
>
> **Joseph Rowntree Foundation**

Poorer people are more prone to live in areas of polluted air, yet, are the least responsible for that pollution.

The double inequality of air pollution and its impacts

The impacts of air pollution are also uneven. Car use is the primary cause of poor air quality in the UK,[15] and it increases steadily up the income ladder.[16] However, there is now substantial evidence that vehicle emissions are higher in deprived areas.[17] A recent study found that air pollution was responsible for a higher number of deaths from respiratory disease in the most deprived areas and where health needs were greatest.[18] Those living in poor areas are generally less able to avoid air pollution, for example by moving house.[19]

There is a strong overlap in the populations that suffer most from flooding, heatwaves and air pollution. Environmental inequalities are often looked at individually, but as the Environment Agency warns, they tend to be cumulative:

> *'People who are deprived may also be more vulnerable to the cumulative effects of environmental inequalities than others. Socio-economic, physical and demographic factors associated with deprivation (e.g. language barriers, ability to earn, old age, and health status) often affect people's ability to respond to other pressures, including those caused by environmental degradation.'*[20]

They find that Environmental Impact Assessments rarely consider cumulative impacts and therefore risk underestimating the scale of environmental inequalities. Britain's coastal communities provide an apt example of how inequalities combine.

Photo: Thomas Millot / Unsplash

Coastal communities: The double challenge of climate change and over-fishing

Coastal areas are some of the most deprived in the UK. When compared to inland areas, they experience higher levels of underemployment, economic inequality, and educational underachievement.[21] Although many of the issues they face are common to other deprived areas, coastal areas carry the added burden of climate change and overfishing.

Coastal communities are some of the most deprived in Britain, and have seen employment eroded by overfishing.

The deterioration of the marine ecosystem has entrenched poverty in already deprived parts of the country. Because of overexploitation of stocks, fishing today is less efficient than it was when Britain's fishing fleet was all sailing boats. The trawl fishing fleet today works 17 times harder to catch the same amount of fish than it did in 1889.[22]

Since the 1940s, the amount of fish landed in the UK has halved. Together with new technology, this has reduced employment. The industry now employs a third of the number of fishers as it did in the 1940s.[23] Unless the lost jobs are replaced, this will exacerbate the economic inequalities between coastal and non-coastal areas.

> Some coastal communities are pockets of significant deprivation surrounded by affluence – meaning their problems are often overlooked by policymakers.
>
> **Scott Corfe, Social Market Foundation[24]**

At the same time as employment in fishing falters, coastal communities are also at the frontier of climate change in the UK. Increasingly stormy and extreme weather will affect coastal infrastructure, such as local energy supplies. This is a particular risk to isolated areas with older populations who rely on public services, such as transport and health. More frequent flooding is likely to lower house prices, affect tourism, discourage investment, and reduce wellbeing. Rising sea levels are forcing people to make difficult decisions, such as having to leave their homes as they face coastal erosion.[25]

Coastal communities are at greater risk from climate change, compounding their disadvantage.

For coastal communities, the sea was once a source of economic prosperity. It is now turning into an environmental threat, threatening their sense of place and identity in the process.

Photo: VanveenJF / Unsplash

Britain's energy system concentrates profits to a small number of shareholders, while many live in fuel poverty.

> Fuel poverty is when you wake up to find you have no gas, no money and two days until payday. You have to feed cold food to your children and wrap them up in coats, gloves and scarves indoors.
>
> **Young parent in Lambeth**[31]

When green incentives are funded through bills, poorer households pay more but are less likely to benefit.

Decentralised, community-owned energy could be both green and fair.

Power: the inequalities of Britain's energy system

The UK's energy system was privatised in the 1990s, in the hope that competition would lower prices, and regulation and taxation would address any social and environmental concerns.[26] In reality the Competition and Markets Authority has found a severe lack of competition, which has repercussions for inequality.[27]

- **High energy costs hit the poorest hardest.** Over 2.5 million households in Britain – just over one in ten – are living in fuel poverty.[28] Many struggle to heat their home or cook food, with profound impacts on health and wellbeing, especially for children or the elderly. Public Health England reports that fuel poverty and cold homes are a major cause of health inequalities.[29] 'Excess winter deaths' numbered 24,300 in the winter of 2015/2016, with exposure to cold temperatures a leading factor.[30]
- **Current green levies are regressive.** Because they are passed onto consumers in energy bills, green levies cost poorer households more as a proportion of their incomes. At the same time, they are less likely to benefit from them. Low-income households have lower carbon emissions than richer households, but pay proportionately more for climate policies.[32] This imbalance must be corrected to ensure the transition to a low carbon economy is socially just.
- **Control of the energy system is too concentrated.** Just six companies dominate the UK energy market, earning £2.4 billion in profits in 2016 between them.[33] These profits are paid out to shareholders, with high bonuses for executives, all compounding wealth and income inequalities.
- **The energy system has been slow to invest in renewables.** Despite energy sector profits, UK investment in energy innovation is lower than most OECD countries.[34] The emphasis on quarterly profit reports to shareholders has motivated short-term investment in fossil fuels rather than long-term investment in renewable energy. Consequently, Britain's energy system threatens its ability to meet Sustainable Development Goals on clean energy, climate change and inequality.

This could be different. A more collaborative, decentralised approach would put communities in control, creating more affordable, greener and more equitable energy.

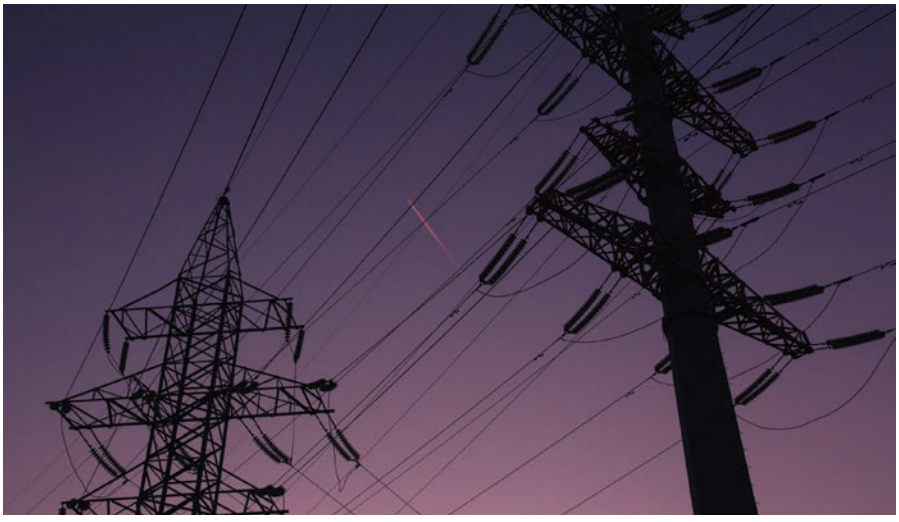


Photo: Alexander Popov / Unsplash

Fair shares in the UK's food system

Britain's food system is heavily reliant on fossil fuels.

The food system is controlled by large farms and a handful of big retailers.

Producing and distributing food in an equitable and sustainable way should be one of the most important functions of an economy. Britain's food system has several serious problems:

» **The food system is highly energy intensive.** Producing and transporting food is a major source of CO_2 emissions – the UK's food system uses eight calories of energy to produce every one calorie of energy from food, most of which is fossil fuels.[35]

» **Greater uniformity is threatening biodiversity.** Nearly 80% of UK crop production consists of just three species – wheat, barley, and oilseed rape. Livestock production is also increasingly concentrated in a small number of genetic varieties, putting native varieties at risk. Reductions in genetic and species diversity decrease disease resistance, ecosystem resilience and resistance to climate change.[36]

» **The food sector is failing to provide good jobs.** Agriculture employs very few people per hectare and the figure is declining. For every 10 farmers in the UK, there are 41 people working in business and finance. The jobs that are provided are of low quality. Although the official average farmer salary is only slightly below the UK average, many workers do not receive a salary at all. They are paid by the hour and report being underpaid and over-worked.[37]

» **Lower income households get poorer quality food.** Demand for food is relatively stable, so companies look to raise profits by 'adding value' and thereby make food more 'processed'. This results in less healthy food and poorer diets, and creates complex and opaque supply chains. The lack of transparency was exposed by the scandal of horsemeat falsely labelled as beef in 2013. It was often those on low incomes and with less consumer power who were mis-sold sub-standard food.[38]

Photo: Fancycrave / Unsplash

» **Consolidation drives inequality.** Farms in the UK are some of the largest in Europe and are increasing in size, from an average of 56 hectares in 2005 to 90 in 2010. The concentration is significant - six UK potato producers now control 60% of production. Furthermore, the price of land has tripled since 2004, as it is increasingly bought as a financial investment.[39] This creates a barrier to new entrants and increases the wealth of existing land owners.[40]

> The two farms next door have gone from being 1,000 acres to 4,000 acres each. There's no one there. There's no one living in the cottages, they've all been sold off. Two men running 4,000 acres and that's it.
>
> **British farmer**[43]

Inequality and the environment must be considered together if Britain is to enjoy a green and fair future.

Food manufacturing and retail are also dominated by a few large companies, and this concentration increases inequality in two ways. Firstly, smaller businesses create a disproportionate number of jobs,[41] as many of the economies of scale in larger companies require less labour. Concentration of farms and businesses is therefore likely to decrease the wage share and increase economic inequality. Secondly, larger corporations generally have higher income ratios and high executive pay.[42]

Britain's food system drives environmental destruction, concentrates wealth in the hands of a few big companies and their shareholders, and fails to create good jobs. This too could be different, with re-organising around smaller scale infrastructure, shorter supply chains and efficient resource use that could improve social justice and environmental outcomes.

Conclusion

The evidence suggests that in the UK wealth and income are concentrated in fewer hands, and these inequalities have been increasing. In the meantime, the effects of environmental degradation are falling disproportionately on the poor and most vulnerable.

One of the major challenges to progress is that inequality and environmental issues are too often considered in isolation. The result is a patchwork of taxes, regulations and incentives that treat the symptoms rather than the cause. Even well-meaning initiatives can inadvertently disadvantage those on lower incomes, making sustainability measures regressive or unjust. Understanding the connections between sustainability and equality is therefore key to delivering a fair and green future for Britain.

Photo: Ben / Unsplash

WHEN GREEN CAN BE FAIR:
AN EXAMPLE

Repair is a key element of a circular economy.

Repair creates jobs and benefits those on lower incomes.

Encouraging repair culture in Scotland

The Edinburgh Remakery is a social enterprise that promotes repair and reuse. It sells refurbished and upcycled goods, and hosts regular workshops and courses in repair, from clothing to bikes to mobile phones. "Our vision" says their website,"is to create an alternative to a disposable society by making repair education accessible to all, to build a stronger, waste-free community and support vulnerable people within our city."

To serve those on lower incomes, the centre runs repair workshops on a 'pay what you can afford' basis. They also partner with local agencies to provide furniture for those in vulnerable housing, and laptops and bikes for refugee families.

Repair culture is good for sustainability because it diverts waste from landfill – the Remakery intercepted and repaired 250 tonnes of goods in 2016.[44] It puts items back into service, saving the energy and materials needed to create new ones.[45]

It's also good for equality. Those on lower incomes benefit most from affordable repair, because buying a replacement would cost them more. It would cost more as a proportion of their income, but it might also come with a higher price tag too. A wealthier household can afford to buy a new appliance outright, where a poorer household might have to pay in instalments or take out a loan. After interest has been charged, they could end up paying more money for the same product.

Repair also creates good jobs for people who may lack other opportunities. In many advanced economies, jobs using manual skills have been automated or shifted overseas. Repair may not be able to offer the large numbers of jobs that manufacturing provides, but it creates more employment than other ways of dealing with waste. As the iFixit repair network highlight, every thousand tonnes of waste electronics creates less than one job if it is sent to landfill, 15 jobs if recycled, and 200 jobs if repaired.[46]

A growing number of projects are recognising the social and environmental benefits of repair, including iFixit in the US, the Restart Project in Britain, or Re:Tuna, a shopping centre for repaired and upcycled goods in Sweden – the first such centre in the world.[47]

Inequality and Sustainability in India

Written with the Development Alternatives Group, Anshul Bhamra and Dario Kenner.

In Gross Domestic Product (GDP) terms, India's economic model looks successful, with high growth rates for many years. But it has been accompanied by persistent poverty, widening inequality and huge damage to the environment. This study explores how economic development in India can ensure natural resource conservation while at the same time addressing inequalities.

Key trends in equality and sustainability in India

India has grown rapidly, but extreme poverty persists.

India's economy has grown by around 7.7% a year over the last decade.[48] Projections suggest India will have the largest middle class in the world by 2050.[49] However, India ranks 131st on the Human Development Index and approximately 680 million people in the country cannot meet their essential needs.[50],[51]

Photo: Annie Spratt / Unsplash

Inequality has characterised India's growth since the 1990s, including between states and between urban and rural areas.[52] The richest 1% now own 53% of the country's wealth,[53] and the number of Indian billionaires rose from nine in 2004 to a hundred in 2014 –often with fortunes made in mining and other environmentally damaging sectors.[54],[55] Oxfam estimates that 90 million people could be lifted out of extreme poverty if India were to take measures to reduce inequality.[56]

India has experienced jobless growth, and women and lower castes have been excluded.

GDP has delivered increases in infrastructure, transport and communications, but not necessarily employment. At around a quarter, the labour participation rate is lower today than it was in 1990, leaving India's informal sector larger than its formal economy. Prioritizing skills-intensive services over labour-intensive manufacturing may partly explain the disconnect between growth and jobs. Moreover, the jobs that have been created are mainly low paid, insecure and with poor conditions.[57] The benefits of economic growth also divide along class, caste and gender lines, with certain groups systematically excluded.[58]

India's rapid growth has been accompanied by extensive damage to the environment including biodiversity loss, air and water pollution and rising greenhouse gas emissions. A key driver of this environmental crisis is economic policy which favours large-scale developments, including coal mining and coal power generation.[59]

> What we need today as a nation is a new paradigm of growth... This doesn't mean we have to stop developing. We just have to do it differently. We cannot afford to do what China and America did: have decades of 8 percent GDP growth, then do a clean up act later.
>
> **Sunita Narain, Centre for Science and Environment**[60]

India's winners: the footprints of the rich

As the chapter on Britain also describes, environmental damage is not spread evenly across the population. The richest 10% spend seven times more on meat than the poorest 10%, and three times more on energy.[61] Differences in transport are more stark: in urban areas the richest spend 30 times more than the poor, and in rural areas they spend 170 times more.[62] Car ownership is the biggest factor, as only the richest can afford private motoring and the associated air pollution and carbon.[63]

Oxfam estimates that the richest 10% of India's households emit 2.07 tonnes of CO_2 per capita, while the poorest 50% average 0.42 tonnes.[64] Another study calculates that the emissions of the urban rich are 15 times higher than those of the rural poor.[65]

India's richest have a much greater impact on the environment.

Photo: Charl Folscher / Unsplash

India's excluded: gender and caste

It would be impossible to deal with inequality in India without talking about gender and caste, two important factors in poverty and environmental injustice in the country.

Women and lower castes are consistently excluded from India's economy and society.

Women are routinely discriminated against within the household and workplace. India scores poorly on the Gender Inequality Index[66] and there are high rates of violence against women and girls.[67] Male literacy was 82% at the last census, with female literacy at 65%.[68]

In the workplace, men are on average paid 2.5 times more than women.[69] Fewer women participate in paid employment, and the number of women in work is falling – suggesting that recent economic growth has not translated into more freedom and status for women.[70] Mechanisation has reduced the number of roles for women in agriculture, and even in the formal sector, women are systematically underpaid.[71] Many women are forced into unpaid 'invisible' domestic care work, such as collecting fuel wood and water.

Photo: Elcarito / Unsplash

The caste system in India is one of the most entrenched social hierarchies in the world, and consists of three 'forward castes', and then the 'Other Backward Classes' of labourers and artisans. At the bottom of the pile are the Dalits, also known as the Scheduled Castes. There are also Scheduled Tribes (also called Adivasis), and non-Hindu minorities such as Muslims.[72]

An estimated two-thirds of Schedule Castes and three-quarters of Schedule Tribes live in multidimensional poverty,[73] with higher rates of malnourishment and lower life expectancy.[74] Routine discrimination violates their rights to education, health, housing, property, freedom of religion, free choice of employment, and legal protection. Lower castes have few ways out of poverty. Many jobs are simply closed to them, or lower castes are paid less for the same work. The worst jobs imaginable, such as cleaning out pit latrines, are reserved for Dalit women.[75]

Water pollution and scarcity

India's water sources are declining in both quality and quantity.

WaterAid publish a list of countries with the 'lowest access to clean water close to home', and India comes top with over 163 million people. The country "faces challenges with falling groundwater levels, drought, demand from agriculture and industry, pollution and poor water resource management – challenges that will intensify as climate change contributes to more extreme weather shocks."[76] Water sources are declining in both quantity and quality, and on current trends the country will be in severe water deficit by 2030.[77] Water demand is being driven by a rising population, changing diets, industry and agriculture.

> People in north India always thought the water would never end. Now they have started to realize it's like a bank account - you can withdraw only as much as you deposit.
>
> **Rajendra Singh, water conservationist**[80]

Photo: Patrick Beznoska / Unsplash

Water shortages affect the poorest first.

Pollution makes water depletion all the more serious. WaterAid India calculates that around 80% of surface water is contaminated, mainly by domestic sewage.[78] Meanwhile an estimated 60% of groundwater sources are expected to be in a critical state by the 2020s as they are polluted by industry, run-off from agriculture, landfills or septic tanks.

There are inequality dimensions to water shortages. While all social classes are affected, wealthier households can adapt by purchasing a water purifier or bottled water.[81] These are beyond the budgets of the poor, making them more vulnerable to diseases such as diarrhoea, which kills 300,000 children a year in India.[82] Women and girls are particularly affected because they traditionally fetch and carry water.[83] Indian women can take up to six trips a day to get water, adding up to an average journey of ten miles a day in rural areas.[84] Water scarcity and depletion increases the burden for women.

Clean water and sanitation for the poorest will have multiple benefits for inequality and sustainability.

The flipside of water inequality is that providing water and sanitation for the poorest communities will redress caste and gender inequalities as well as improve environmental health.

The injustice of air pollution

India has 10 of the 20 most polluted cities in the world.

Air pollution caused 1.4 million deaths in India in 2013, and it is getting worse.[85] Rapid urbanization, traffic numbers, coal power stations and industry are all driving down air quality. The problem is most severe in urban areas, and India currently has 10 out of the 20 most polluted cities in the world.[86]

India's higher and middle income groups generate more air pollution than other groups.[87] In spite of this, several studies find that lower income groups are more affected by air pollution because of where they live; the fact they do not travel by car and so spend more time exposed to pollution; and due to existing poorer health conditions which particularly affect the elderly.[88] The poorest spend more time living and working outside, increasing their exposure to pollution. They are also more likely to live in slums next to industry, where living costs are lower.[89] When they suffer the health effects of pollution, the poorest often have less access to healthcare and fewer resources to pay for it.[90]

Air pollution is caused by wealthy lifestyles, but the effects are felt by the poorest.

Air pollution in India is a clear case of environmental injustice: disproportionately caused by wealthier households, while the burden falls most heavily on those least responsible.

> "Roll down the window of your bulletproof car, Mr Prime Minister. The security threat is not the gun, it is the air of Delhi.
>
> **Advert from Centre for Science and Environment[91]**

Photo: Hitesh Choudhary / Unsplash

Mining

Having described some patterns of exclusion, and the two issues of air and water pollution, it is worth considering how these intersect in the mining and agriculture sectors.

Evidence suggests that extractive industries can exacerbate inequalities across gender, caste, and urban/rural divides. For example, acid rock drainage from coal mines can pollute water sources and as we have seen, this affects the lives of women more. Soil erosion and contamination can also deprive people of crops, while land enclosure restricts the gathering of firewood – also a traditionally female role.[92]

Coal mines are often located in lower caste tribal areas, where people have little political power.

The location of mines is also relevant. Amnesty International notes that around 70% of coal reserves are located in regions where lower caste Adivasi tribes live.[93] There are reports of forced displacements and human rights abuses, and the Adivasi struggle to be heard either in opposition to new mining plans, or in seeking justice or compensation. In some cases, journalists, lawyers and activists raising the issues have been threatened or even killed.[94]

As the Kenya chapter also observes, land rights matter. Lower castes may have been living in an area for generations without ever holding formal land titles or rights to forest resources, with little recourse when their way of life conflicts with mining projects.[95] Still, there are occasional victories. After a decade long battle, the Dongria Kondh tribe halted plans for a bauxite mine in 2013.[96]

Coal power has increased power to the cities, rather than widening energy access. A clean energy drive would have social and environmental benefits.

Mining remains a source of inequity in its impacts and in its benefits. Coal, which generates 60% of India's electricity, is a driver of climate change.[97] This will affect the poorest most, but the growth in coal power has not led to higher electrification rates. It has increased the power available to those already connected, mostly in cities, rather than extending energy access.[98] Those most disadvantaged by coal are yet to benefit from the electricity. By contrast, a decentralised clean energy drive would have multiple positive impacts for both sustainability and inequality.

Photo: Environmental Change and Security Program

Agriculture

Approximately half of India's land is cultivated, but it is unequally distributed. 5% of farmers own a third of the farmland, while 56% of rural households own no land.[99] Dalits and scheduled tribes face higher levels of landlessness, as well as ongoing discrimination in the land market.[100] Consequently, poorer households often farm smaller and less productive plots of land. Providing land tenure and access to resources for marginalised communities could have multiple benefits, including greater equality.

Access to water is another area of inequality, with cash crops prioritised for irrigation. For example, 1.1 million farmers in Maharashtra State grow sugarcane, and use 70% of the water available for irrigation. Meanwhile 10 million farmers growing sorghum, pulses and oilseeds get 10% of the irrigation water between them.[102] The result is that a small number of farmers make a good income from sugarcane at the expense of the large number of farmers deprived of water and therefore decent incomes.

> Upper caste farmers use machines to plough their land, heightening the climate crisis with fertilizer and other things. Our impact on the climate is much smaller. Larger farmers grow money, we grow food.
>
> **Narsamma Managari, Dalit food sovereignty campaigner[101]**

Inequalities in access to water mean that cash crops are prioritised and poorer farmers face shortages.

Photo: Subro Sengupta / Flickr

Much of India's agriculture draws unsustainably on groundwater.

Because water is scarce, more farmers are drawing on groundwater, and 15% of food production is now unsustainably irrigated. In Punjab, 110 out of 137 groundwater blocks are classified as over-exploited, risking the state's reputation as the 'breadbasket of India'.[103] Groundwater depletion is more common in drought-prone areas, and it sets off a vicious cycle: farmers dig wells, water levels fall, and farmers dig deeper ones. The shared resource declines, and it becomes progressively more expensive to keep the water flowing. The poorest farmers cannot keep up, and lose access to water for irrigation and household use.[104]

Changing diets have put more pressure on land and water.

Food choices come into play here. Traditionally people ate fresh, locally produced seasonal food that was rainwater irrigated and had few chemical inputs. From the late 1960s, partly due to Green Revolution incentives, crop production began to shift towards higher value, water-intensive foods such as cereals, meat and dairy.[105] Consumers wanted foods that were more fashionable but less suited to India's agro-climatic conditions, leading to unsustainable practices and the exploitation of natural resources.

This shift in diets, along with the rise of export crops such as cotton or sugar, has driven up demand for water, fossil fuels, chemical inputs and machinery.[106] Profits from agriculture have risen, but could be undermined by climate change, water shortages and pollution.

Photo: Kyran Low / Unsplash

Conclusion

Inequality and sustainability impact on each other in different ways in different places, but often with recurring patterns. India's unusually clear-cut social categories and the extreme nature of the inequalities throw those patterns into relief, making them easier to trace. India's marginalised women and lower castes often miss out on the benefits of development, while suffering the worst effects of environmental decline, and being less able to adapt.

WHEN GREEN CAN BE FAIR: **AN EXAMPLE**

Food is wasted in both rich and poor countries, but in different ways.

Access to storage facilities can save food and benefit poorer farmers.

Food loss in India

According to the World Bank, up to a third of all food produced in the world is lost or wasted.[107] That's not just a waste of food, but of land, water, energy, money and human effort. It's also a climate change problem: if food waste were a country, it would be the third largest emitter of greenhouse gases after China and the United States.[108]

In advanced consumer economies, food waste is the main problem – uneaten food disposed of by households or retailers. Of almost a billion tonnes of food binned every year, 56% of it is wasted by the 1.2 billion people living in developed countries. The remaining 44% is from low and middle income countries, where food loss is the bigger problem. That's the accidental spoiling of food through poor storage facilities, pests or damage during transport.

India loses 21 million tonnes of wheat each year, and 40% of all its fruit and vegetables.[109] In a country with high rates of poverty and malnutrition, this is a double blow. One of the problems is that food spoils quickly in the country's hot and humid conditions. Once food is harvested, farmers rush it to market, often on bumpy roads and without the benefit of quality packing, such as crates. Food that cannot be sold in time, or that is damaged along the way, is lost.

Refrigeration solves the problem, but only larger farms with reliable electricity can afford it. This inequality of access to storage creates a secondary problem for smallholders – large farms can store harvests, while poor farmers need to take their food to market at once. The glut at harvest time pushes prices down for the poorest, while richer farmers can wait until the rush is over and earn more money for the same produce.

An Indian company called EcoZen has developed a solution in the form of a solar cold room: an insulated refrigerated container powered by a solar PV canopy on the roof.[110] They function independently of the power grid, making them accessible to remote areas. Where smallholders may not be able to afford them individually, they can be installed in a village or by cooperatives. There are also cheaper options, such as the Zero Energy Cool Chamber, which uses evaporative cooling to double the shelf-life of fruits and vegetables.[111] Low cost, low carbon cold storage reduces food waste and emissions, while raising incomes and improving the lives of disadvantaged small farmers.

Inequality and Sustainability in Kenya

Partner organisations: New Economics Foundation, NEF Consulting, and the African Centre for a Green Economy

This chapter explores the tensions between delivering economic development in Kenya, closing the inequality gap, and ensuring the health of its natural environment. It looks at four different locations in order to examine how inequality and sustainability interact in practice.

Key trends in sustainability and equality in Kenya

Kenya's rapid growth has not been shared with the poorest, and there is a sharp urban/rural divide.

GDP is rising in Kenya, but wealth is not shared equally.[112] GDP per capita increased by 36% between 2003 and 2017, but the share of income held by the poorest 20% of the population has fallen. Growth hasn't translated into significant new employment, partly because mechanized agriculture has led to higher yields with fewer workers. Where jobs are created, young people and women are less likely to benefit.

There are stark inequalities between rural and urban populations when it comes to basic infrastructure – 70% of the urban population has access to electricity, and only 8% in rural areas. Less than half of the rural population has clean water.

Growing industry and agriculture are putting pressure on water supplies, while Kenya's population has almost doubled since 1990.[113] Fertilizer use has increased pollution, which affects the poorest communities who often draw water directly from rivers and lakes.[114]

Kenya is at risk from climate change, especially drought.

Kenya is highly exposed to climate change, and the frequency and severity of droughts is set to increase.[115] Kenya's greenhouse gas emissions have nonetheless risen over the last 45 years and approximately doubled since 1990. In an already rapidly populating and resource-stressed country, managing the additional demographic, social and environmental challenge of climate change will be central to the nation's progress on development and inequality.

The Tana River Delta: whose land is it anyway?

The Tana is Kenya's largest river, rising in the central highlands and flowing into more arid regions to the south, where it grows in importance as the only major supply of water. Where it reaches the sea, the Tana River Delta supports a wide range of ecosystems, including forests, grassland, wetlands, mangroves, and a rich diversity of wildlife.

The Tana River Delta is seeing a boom in large-scale agriculture, but mechanised farms do not create many jobs for local people.

The silt brought downriver creates fertile soil for agriculture, despite relatively low rainfall. Because of this, the Delta has seen an influx of large-scale foreign-backed agricultural projects, and mounting demographic and environmental pressures. A scramble for land is underway, and the poorest communities face the biggest challenges. 76% of the population live below the national poverty line[116], but while the poor live with the environmental damage, the economic benefits largely go to wealthy investors.

Agricultural investments do not increase prosperity for all. New farming projects, funded by overseas capital and for export to foreign markets, are largely mechanised and thus labour-light. Land is often appropriated from local people on grounds of job creation, infrastructure development and economic improvement, but the reality can feel quite different:

- Few new jobs for locals, because mechanised farming doesn't require many workers.
- Where jobs are created, wages are low, and employment is seasonal and precarious.
- New infrastructure prioritises commerce (ports, highways) rather than local needs.
- Loss of access to land, water and fishing, in particular for nomadic communities.[117]

> "The project will pretty much catapult the area into the era of modern society... Life is changing. You either change or life will change you.
>
> **Evans Kidero, CEO of Mumias[119]**

To give an example, in 2007 the Mumias Sugar Company announced plans for a 20,000 hectare sugar cane operation. The Environmental Impact Assessment queried the level of water extraction from the Tana during the dry months, warning that decreased flow could impact the people, livestock and wildlife downstream. Cost-benefit analysis showed that the existing land usage by farmers, pastoralists and fishermen was worth 3.7 billion Kenyan shillings per year, whereas the Mumias project would generate only 1.2 billion for a far narrower set of beneficiaries.[118] Planning was nonetheless approved.

Photo: Ron Geatz/TNC

New farms compete for land with pastoralists, who often have no formal land rights.

There is not enough land to go around. Population growth, climate change, and large-scale agriculture reduce the available land per person, often leading to conflict and displacement. For example, 430 families were evicted in 2011 to make way for a Canadian biofuels project, and relocated to an inferior and polluted part of the Delta.[120] Competition for land also creates tensions between local ethnic groups. Part of the problem is a government scheme that distributes land rights to settled farmers. Land that had previously been used by nomadic people becomes private property, with no formal recognition of traditional access.[121]

What implications and lessons can we draw? The Tana River Delta highlights the complex relationship between sustainability and inequality and the implicit choices that policy makers take when the two are positioned against each other. Some important implications emerge:

- Economic policy focused on growth at the national level may not relieve local hardship. Profits flow to investors, with few benefits for those in poverty locally.
- Agricultural industrialisation can restrict resources for local communities, creating competition and inflaming existing tensions.
- Property rights matter. Government land adjudication may exacerbate problems if it is not clear why property rights are given to various interests. Property rights should respect all users, including nomadic cultures.
- Communities deserve compensation. When access to resources is reduced, local people may not be adequately compensated by growth or jobs. This could be a financial transfer, or retraining for the labour market or better service provision.

Photo: Tucker Tangeman / Unsplash

The Naivasha flower growers: whose voice counts?

Lake Naivasha is an important freshwater resource and a key driver of Kenya's economy. It supports tourism, small scale farmers and pastoralists, flower production for export and geothermal power. Managing it for the future is hugely challenging.

Lake Naivasha is home to Kenya's very successful flower industry.

The lake has seen a century of change. The area around Naivasha was traditionally a pastoral economy, but its fertile soils and fresh water brought settled farms in colonial times. After independence there was rapid growth in human settlement, farming and tourism. Flower cultivation began in 1983, business boomed, and today flower exports from Naivasha add 2.1% to Kenya's GDP. There are around 100 irrigated horticulture farms around the lake, mostly owned by wealthy Kenyans, immigrants or international corporations.[122] The boom brought population growth of 13% a year between 2000 and 2010. Many incomers are in search of work, putting downward pressure on wages.[123]

> "Kenya receives donations of food from the World Food Program, despite having the Naivasha freshwater lake that would allow us to grow crops and feed ourselves. But we prefer to use the water to grow flowers and send them to Europe.
>
> **Isaac Ouma, local activist**[124]

Growth has come at a cost. Such rapid development has caused inevitable pressures, and since 1980 the water level in the lake has fallen by 15 feet.[125] The flower industry accepts responsibility for a third of this, blaming the rest on evaporation and drought.[126]

The Maasai and Kikuyu communities that historically lived around the lake, and who depend on it for water or fishing, have been impacted most. As land has been privatized, herdsmen have lost access to the shoreline and to pastures. They have no choice but to trespass into protected areas to meet their basic needs, and tribal tensions flare easily. One study summarised the main problems between industry and communities:

Photo: Kate Holt/Africa Practice

» Communities are affected by degraded land and variable water flows.

» Local people report a bias in water allocation towards horticulture, and a lack of compliance with and enforcement of laws and regulations;

» Little opportunity for communities to influence the management of resources.[127]

Water levels in the lake have fallen. Pastoralists and fishermen have been excluded as land has been privatised.

National success may come at the expense of local communities, who will need to be compensated.

Whose voice will be heard? In order to resolve these competing claims, the Lake Naivasha Riparian Association expanded its membership to include fishermen and other stakeholders alongside land owners, government and private sector representatives. They worked with farmers and the tourist industry to develop an Integrated Management Plan for the lake.[128] This was partially successful, though small-scale farmers and pastoralists were not part of the process. Neither were residents in the informal settlements that had sprung up to serve the farms – places that lack decent housing and sanitation and that harm environmental quality.

What lessons can we draw from Naivasha? Multi-use of the lake basin by local communities, government, and corporate interests has created a complex and unequal situation where the needs of different groups are not always considered. Freshwater per capita is falling throughout Kenya, and intensification of agriculture and industry exacerbates the problem.

Photo: www.seedforlife.org

- Governance must consider the competing demands of all user groups when managing access to limited resources. All voices must be heard in decision making, particularly those that are most directly affected by decisions about land or resource use.
- Economic development around export industries must not neglect local needs. Government should ensure that jobs in boom areas are good jobs, and that wealth created in a region is shared through wages and in infrastructure and services.

Photo: Climate Centre / Flickr

Turkana County: drought and oil

Turkana is a dry province that has been 'left behind'.

> My people have always been marginalized, and their pleas have always fallen on deaf ears. Human rights organizations like Human Rights Watch have raised concerns about what's happening in Turkana with climate change, and the lake is disappearing.
>
> **Ekai Nabenyo, local activist**[130]

Conflict has made adapting to drought more difficult and dangerous.

Turkana County is a large arid province dominated by nomadic pastoralists. It shares borders with Uganda, Ethiopia and South Sudan, and has a history of tribal disputes. Historically and geographically marginalised, 88% of Turkana's population lives below the poverty line and only 15% have primary school education.[129] In many ways the region has been 'left behind'.

Environmental stress is likely to worsen. Turkana is dry, and many people rely on Lake Turkana for water, fishing and agriculture. However, 90% of the water flows in from Ethiopia through the Omo River. Water is already diverted to irrigate plantations across the border, and as flow is reduced again by Ethiopia's new hydroelectricity projects, water levels in Lake Turkana will fall further.[131] At the same time, climate change will increase the risk of drought.

Drought is nothing new to Turkana's pastoralists, who traditionally move to areas of higher rainfall in the dry season, then to drier areas when the rains arrive and pastures are renewed.[132] The ability to roam is key to survival, but conflict has made it harder to move freely through the region. This makes adapting to drought more difficult and dangerous, and causes overgrazing.

The arrival of the oil industry could deepen inequality. Climate change could have disastrous consequences for Turkana, yet oil has recently been discovered in the area, sparking a rush of investment.[133] This has created some jobs, but there is so little employment in the region that positions are easily filled. Many new jobs don't pay enough to live on, particularly since the oil boom has pushed up property prices.[134]

Indeed, there has been a scramble for land, and this has consequences for local people. Communal lands have been privatised and reserved for drilling, aggravating already limited access to land and water. Land tenure will dictate the flow of future revenues from oil, and elites and tribal groups have been accused of land grabbing in anticipation of oil profits.[135]

What lessons and implications are there? Turkana is an environmentally vulnerable region where marginalised people risk further disadvantage from climate change. An oil boom could extract riches from the area without bringing many benefits to local people.

- Development must not disenfranchise those with the most to lose. Privatising land can easily exclude nomadic people. The communities worst affected will be those at the margins and already vulnerable to climate change and resource shortages.
- Economic development strategies and climate adaptation plans should prioritise the needs of those facing the greatest risk from climate change and resource shortages.

Mount Kenya National Park: elephants and people

Growth around the Mount Kenya National Park has brought people and animals closer together.

Mount Kenya National Park is home to a wide variety of wildlife, including an estimated 2,600 elephants.[136] However, the park is next to one of the most densely populated regions in the country. Elephants and smallholder farmers regularly come into contact, revealing tensions between food security, development, and wildlife conservation.

Climate change and development are bringing wildlife and people into conflict. The wider region is undergoing significant development and inward migration, bringing human settlements closer to the protected areas around the park. This increases the chances of conflict between animals and people.

The impacts of population density and growth are further exacerbated by climate change. The dry season on Mount Kenya is lasting longer, and the land is drier and less productive. Forests fires are more frequent and vegetation recovers more slowly. Glaciers on Mount Kenya have depleted, which may impact water supplies in the surrounding areas.[137] Fertile land is in shorter supply, drawing people closer to areas designated for animal protection.

> “More and more new settlements are pushing right up to the park boundary and some have even encroached into the forest reserve. The population density in the area has become very high. As a result, the competition for resources between humans and wildlife has intensified.
>
> **Elizabeth Ositomo, Mount Kenya East Project**[138]

Conservation priorities clash with local farming needs. Farmers and wildlife have competed for generations, and the consequences can be devastating: livelihoods can be lost overnight. An elephant ‘crop raid’ can affect household income, food supplies and investments, and it is especially damaging to subsistence farmers.[139] In some cases the loss forces farmers off their land to work on plantations instead, despite poor conditions and low wages.[140]

Farmers recently held a protest aimed at the government, brandishing their damaged crops and demanding that elephants be kept away from farms.[141] Farmers feel excluded from the decision-making processes that affect their lives, and that politicians prioritise tourism over small-scale farming.[142] Nevertheless, community engagement initiatives are underway to ensure that elephants and people can coexist. They include building the world’s largest conservation fence around the National Park; compensation schemes; fenced elephant corridors; and allowing communities to harvest forest resources.[143]

An elephant ‘crop raid’ can destroy livelihoods, and farmers do not feel protected.

Photo: Matthew Cramblett / Unsplash

Conservation must work with local communities to ensure they are part of the solution, and included in any benefits.

Implications and lessons from Mount Kenya. Wildlife tourism appears to be a 'win-win', offering revenues from the preservation of biodiversity. However, local people should never feel that their basic needs are a lower priority than that of the lucrative tourism industry.

- Local impacts of apparently 'win-win' strategies must be carefully considered. Communities must feel that threats to their livelihoods are minimised, that their concerns are taken seriously, and that compensation is provided in the event of loss.
- Failure to address local needs can lead to conservation failures too. Crop raiding breeds resentment and an 'anti-elephant' mood that turns a blind eye to poaching.
- The economic benefits of tourism must be felt locally. Programmes should be actively designed to deliver local benefits as well as national.

Conclusion

These case studies from Kenya demonstrate the complex nature of the relationship between inequality and sustainability. They show the potential for national strategies to play out differently at the local level. Local context matters, and it is vital that people can participate in decision making. Without this guarantee, even well-meaning environmental strategies could disadvantage those with the least power or political voice.

Photo: Chen Hu / Unsplash

WHEN GREEN CAN BE FAIR: **AN EXAMPLE**

How Tropical Power is restoring land in Kenya

Tropical Power are an engineering firm based in Britain and working in Kenya and Ghana[144]. They recently built Africa's largest grid-connected biogas plant in Naivasha, the flower-growing region discussed in the Kenya chapter. The plant uses post-harvest waste to produce gas, which is then burnt for electricity. At the end of the anaerobic digestion process, the rich 'digestate' that remains can used as a soil improver.

The biogas plants need a regular supply of biomass. As the company has made a commitment not to displace food crops, they have turned to an unusual source: cactus.

Prickly pear and pencil cactus are common in Kenya's drylands. They can photosynthesize without water, and thrive in arid conditions where other plants could not survive. Cactus can be grown commercially without irrigation, saving water for other crops. It is a low-impact form of farming, as they can be harvested and left to re-grow, and do not need to be replanted. Cactus could also be grown on land that would not normally be considered productive, opening up new economic opportunities for communities in marginal territories.

Tropical power uses cactus to generate biogas, creating opportunities in marginal lands.

In fact, the biogas process would actually create water as a by-product. Cactus stores water as it grows, and this excess needs to be drained from the biogas domes. Tropical Power plan to experiment with greenhouses or aquaculture placed alongside biogas plants. With water and a soil improving digestate as the waste products, cactus biogas could be a restorative technology with multiple benefits.

Fertile and well irrigated land is often privatized for commercial farming. This reduces land and water access without necessarily creating jobs in return. Tropical Power could be the opposite – jobs would be created in dry and unproductive areas, and renewable energy is generated with a net positive environmental impact.

Well chosen energy crops do not need to compete with food crops, and can improve sustainability and inequality.

Tropical Power's experiments are ongoing. Similar trials are taking place in Chile, and many other countries have cactus growing naturally – often as a nuisance plant. [145]If successful, the approach could bring income and employment to arid areas without putting further stress on water supplies, benefiting the most marginalised and reducing inequality.

Part 2

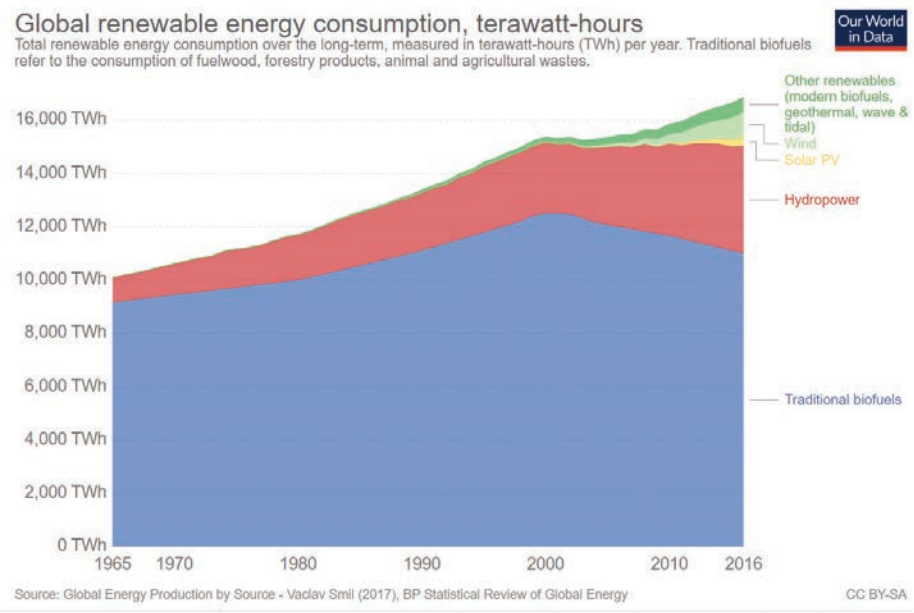
Exploring the connections across sectors

Having looked at inequality and sustainability in three different countries, we have seen a variety of different ways that they intersect and affect each other. In Part 2 we look for the same patterns across the four sectors of energy, transport, waste and food.

What follows is by no means a comprehensive overview of each sector. Rather, the aim is to highlight some key relationships and examples. What patterns can we detect? Are their groups that are regularly disadvantaged? How do inequalities compound?

Energy, food, waste and transport are all complex systems, each with their own national and regional contexts. It's important not to generalise, but what we can do is identify some tendencies and recurring themes. Those can prompt us to ask the rights sorts of questions, helping us to avoid counter-productive policies and pursue those with multiple benefits.

Energy



Global energy use is growing, reaching an equivalent of 13.2 billion tonnes of oil in 2016. The three most important sources of energy are oil, coal and gas, all of which produce climate-changing greenhouse gases when burnt. Together they account for 87% of the world's energy and represent the single biggest sustainability challenge of the 21st century.[146]

There are substantial inequalities in the use of energy. Countries with the highest energy use, mostly in the Middle East and North America, average 7-10 tonnes of oil equivalent per person per year. In the countries with the lowest energy use, the average can be as low as a third of a tonne per person per year.[147] Energy analyst Todd Moss highlighted the differences when he observed that his fridge alone used three times more electricity in a year than a typical Kenyan citizen.[148]

87% of global energy is fossil fuels, with huge inequalities in energy use between high and low income countries.

Small advances can make a big difference. Access to electric light can save money spent on kerosene, improve indoor air quality and health, and improve education outcomes as children can study after dark. A clean and reliable cooking fuel saves time spent gathering firewood. The ability to charge a mobile phone brings communications and internet services. Reliable power unlocks opportunities that can transform small businesses, from sewing machines to power tools to computers. Looking specifically at access to electricity, there has been considerable progress in recent decades. Between 1994 and 2014, coverage grew from 75% of the world to 85%.[149]

Most of those without electricity are in rural areas – a pattern of inequality that we have already identified. Globally, 96% of urban populations have electricity, versus 74% in rural areas.[150] The majority of the 1 billion people without electricity are in rural areas beyond the reach of national grids. Closing that divide would improve equality, and the good news is that in many places it will be easier and cheaper to meet rural energy needs with renewable energy than with fossil fuels.[151] With the tumbling price of solar panels and the development of micro-grid technologies, connecting remote populations is getting cheaper every year. Isolated communities can leapfrog the big infrastructure and environmental damage of fossil fuels, and gain access to clean energy from day one. Investment in rural energy access is a good way to address sustainability and equality at the same time.

Decentralised renewable energy is making it easier to bring power to rural areas.

Clean cooking fuels are a bigger challenge, both in numbers and in technology. Globally, over 2.5 billion people rely on traditional fuels such as charcoal, wood or dung for cooking. There has been progress – 49% the world's population had improved cooking fuels in 2000, and that had risen to 59% by 2016.[152] However, progress is not keeping pace with population

Photo: Patrick Bentley/SolarAid

growth, meaning there will be more people using solid fuels in 2030 than there are today. Once again there is an urban/rural divide, as urbanisation is a leading driver of the shift to cleaner fuels: people moving to the cities gain access to electricity or bottled gas. In rural areas, more efficient cookstoves are a useful intermediate technology, and biogas is a promising clean technology for the future. For example, China has supported rural household biogas systems that use agricultural waste, with 43 million of them installed.[153]

Better cooking fuels will improve gender equality, as women and girls are disproportionately affected by low grade cooking facilities. Female members of energy-poor households tend to spend more time on the unpaid work of gathering firewood. They also do more of the cooking, raising their exposure to smoke and indoor air pollution.[154] Clean cooking fuels have environmental, health, and equality benefits. In fact, the Global Alliance for Clean Cookstoves argues that "clean cooking can directly deliver gains across 10 of the Sustainable Development Goals", making it a priority sector for sustainable development.[155]

Renewable energy can address inequality in developed countries too. As the UK case study shows, Britain's energy system is dominated by the 'big six' energy companies, with profits from ordinary household bills flowing to shareholders. Diversification of the UK energy market could include not-for-profit utility companies, publicly-owned companies such as those recently set up by local authorities, cooperatives and community energy projects. All of these would reduce the power of corporations and give ordinary people a stake. Until recently only middle-class families could afford solar panels, but new schemes are emerging that use solar PV more progressively. A public-private partnership in Stoke-on-Trent, for example, will see solar panels fitted on 18,000 council houses, prioritising elderly residents who are often most at risk from fuel poverty.[156] This will bring annual savings for council residents, while reducing carbon emissions and lowering dependency on fossil fuels.

Renewable energy has the potential to be democratic, but isn't in every situation.

Renewable energy is not more equitable by default however. Small scale solar has the potential to be a democratic form of energy, but renewable energy at larger scale can replicate some of the problems of the old energy order. Oil interests have displaced people and led to land grabs in the Turkana region of Kenya, but similar disputes arose over wind power. The largest wind farm in Sub-Saharan Africa was built without consulting the local herdsmen who had used the land for generations.[157] Large scale hydropower often brings mass displacement, and clean technology can make inequalities worse if local people suffer the effects without receiving any benefits.

Communities serving the fossil fuels industry will need support during the energy transition. Coal mining regions are often marginalised already, with limited job opportunities and often poor working conditions. As the economics of coal shifts and jobs are lost, those areas will need investment and support for retraining and creating alternative employment. This is a just and fair approach, ensuring that nobody is disadvantaged by the shift to clean energy. Furthermore, guarantees of support may help to avoid political resistance to renewable energy. Germany has powerful mining unions, for example, leading to a policy disconnect between the country's Energiewende (energy transition) plans and Kohleausstieg (coal exit) strategy.[158]

WHEN GREEN CAN BE FAIR: **AN EXAMPLE**

Rural areas beyond the grid are often the last to get access to electricity.

Bangladesh has used solar PV to expand energy access without increasing emissions.

Solar power in Bangladesh

Rural areas are harder to electrify. Connecting remote villages to the power grid has been extraordinarily expensive, but renewable energy has made decentralised energy possible and affordable. Solar power can be installed at the household level, and one of the countries that has taken advantage of this is Bangladesh.

Just under a third of Bangladesh is had permanent access to electricity in 2000. The government set itself the target of providing electricity to all by 2020, and chose distributed solar as the best way to do it. A public-private partnership was set up to coordinate international funding with dozens of local agencies that provided finance, installation and maintenance. Households could buy a subsidised solar system that provided lighting and enough power to charge mobile phones or watch TV. Each household bought the system with a micro-loan and paid it off over three years.[159]

Four million households have been connected since 2002 – around 12% of the population – making it the largest distributed solar programme in the world. Only four countries (China, US, Japan and India) have more people employed in the solar PV industry.[160] The programme is still running at a smaller scale today, supplemented with other initiatives providing micro-grids, or solar pumps for irrigated agriculture. Schools, mosques, clinics and even street lights are also benefiting from solar power.

Since the solar systems replaced kerosene lamps, Bangladesh's household solar drive will cut an estimated 1.7 million tons of carbon dioxide emissions over 20 years. It has reduced inequalities in energy access between rural and urban areas, which in turn opens up communications, banking, and other services. 75,000 good quality jobs were created, often in marginalised areas.[161] Some agencies, such as Grameen Shakti, made a special effort to train women for the solar industry.[162]

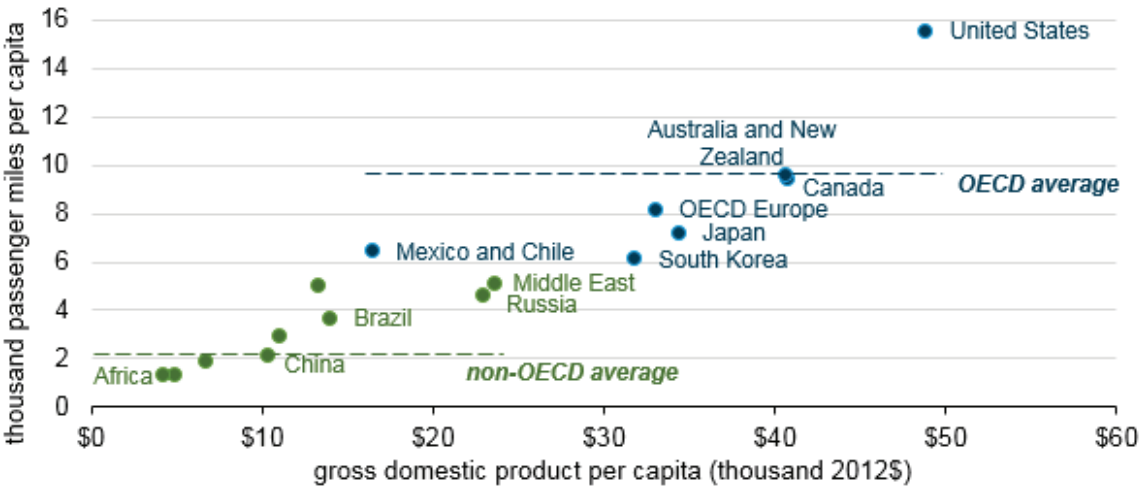
In a traditional Bangladeshi household, domestic solar benefits women more than men. Women spend more time indoors and are exposed to more kerosene fumes. Clean solar-powered light reduces health risks and saves the time spent shopping for kerosene – traditionally a woman's job. Women tend to fetch water, so solar pumps benefit women more. So do solar street lights, as women and girls face greater risks walking alone at night.

Distributed solar power has multiple benefits, and it is now being applied in many other developing countries.

Transport

Transport emissions are closely tied to economic growth. The ability to travel is a widely held human aspiration. From a pair of shoes to a bicycle, to a motorbike to a car, each advance in mobility expands opportunities for work, education and leisure. As incomes have risen and people have gained greater mobility, the world passed the one billion cars milestone in 2010, with 2 billion expected by 2035.[163] Oil powers 95% of those cars, making transport a major source of greenhouse gases.[164]

Passenger miles and gross domestic product per capita, 2012



Those on higher incomes travel more miles, in more polluting forms of transport.

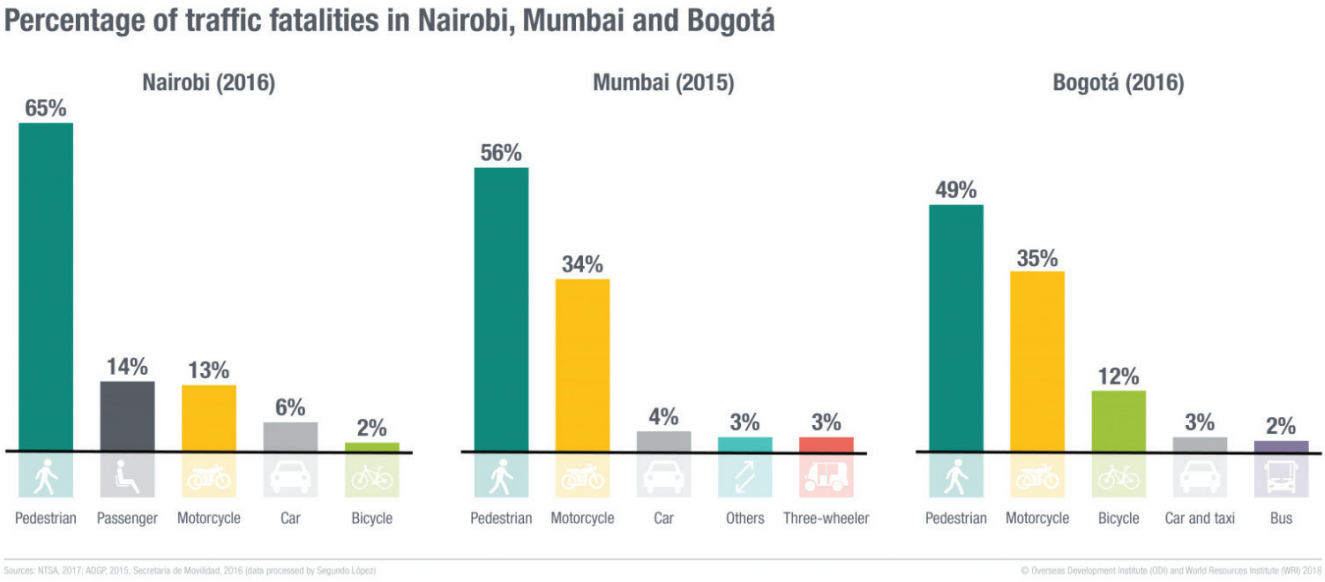
People in the world's richest countries travel more, and tend to use more polluting forms of transport. The 1.2 billion people in the OECD countries travel an average of 9,000 miles per person per year, 80% of it in light-duty vehicles such as cars. The 6 billion people outside the OECD travel around 2,000 miles per person, using a broader range of vehicles: 41% of that distance in light-duty vehicles, 35% by bus, 14% rail and 11% in two or three-wheeled vehicles.[165] These trends in travel use mean that the richest are disproportionately responsible for transport emissions, both between countries and in countries.

Transport inequalities affect marginalised communities. For example, transport poverty affects rural communities more than urban ones.[166] In remote rural areas people may need to travel further to access services, but with fewer public transport options. Those without access to a car can find themselves isolated, including children, the elderly, the disabled, and those on lower incomes. Inequalities can also fall along ethnic or racial lines. In Britain, 17% of the white adult population lives in a household without a car, while the figure for black British adults is 36%.[167] In some circumstances women can also be deterred from using public transport and face a higher risk of exclusion. A study of four Indian cities found that 71% of women had faced sexual harassment while waiting for public transport.[168]

The poorest are more likely to be displaced or inconvenienced by the negative aspects of transport.

The poorest are more exposed to the harmful effects of transport, including air and noise pollution, road traffic accidents, inconvenience and disruption.[169] Those on lower incomes are at higher risk of displacement as roads are built or extended. New roads will always require land and people may live along the planned route – for example, a highway that opened in 2013 in Dakar, Senegal, required 30,000 people to be relocated.[170] Where new roads are built through slum districts, land ownership is informal and residents could lose their homes or businesses without any right to compensation.[171] Communities can be bisected, cutting people off from neighbours or amenities, often with inadequate provision for crossing the road. In Kenya, the new six-lane Thika Road was opened in 2012. There were plans for 28 pedestrian bridges, but to save money only 18 were built. After a sharp rise in pedestrian fatalities, local residents had to petition parliament for more safe crossing points.[172] In these circumstances, communities suffer all the negative effects from the new road without necessarily being able to benefit from the new infrastructure.

Road safety is a particularly deadly inequality. Though they have fewer cars, 90% of road deaths occur in lower income countries, and the poorest are more likely to be affected.[173] In developing world cities, infrastructure for pedestrians and other vulnerable road users is not keeping up with growing car ownership. Without pavements or safe crossing zones, far more pedestrians are killed by cars than car drivers. In Nairobi, Kenya, 65% of traffic fatalities are people on foot, most of whom cannot afford to drive.[174]



Nine out ten of the world's population lives in an area of high air outdoor air pollution.

While more pronounced in developing countries, similar inequalities exist in the global north. In Britain, children from lower income households are five times more likely to be killed by a car while walking, and Aboriginal children faced a higher risk in Canada.[175]

Air pollution from transport is a social justice issue. The World Health Organisation now recognises air pollution as "the biggest environmental risk to health." Nine out of ten of the world's population lives in an area with high levels of outdoor air pollution, and road transport is a leading cause.[176] All road users are exposed to pollution, both inside and outside of vehicles – but

only those inside the vehicles cause it. Pedestrians and cyclists suffer the harmful effects of air pollution without contributing to it. Children and the elderly are more vulnerable to diseases or complications from air pollution, and those on lower incomes are disproportionately affected. This is because they are more likely to live in polluted areas or near busy roads, and are less able to afford the 'defensive expenditures' to protect themselves – such as the air filters that are popular among wealthier urban households in China.[177] The inequality of exposure to pollution reflects existing inequalities. A recent study in the United States found that black Americans were exposed to 30% more transport-related air pollution than white Americans.[178]

Quality public transport can reduce emissions and inequality at the same time.

Investment in public transport can improve sustainability and equality outcomes. From these interconnections we can see that investment in roads and infrastructure for private cars will benefit those on higher incomes, while increasing emissions. Public transport has the opposite effect. High quality public transport, such as Bus Rapid Transit systems, serve rich and poor alike, reducing congestion, transport emissions and air pollution.

Walking and cycling infrastructure is a win-win investment. Many global cities have large numbers of pedestrians and cyclists, often sharing road space with traffic and therefore vulnerable to accidents. In some cases cyclists are actually seen as an impediment to traffic and see their access restricted. Kolkata banned cyclists in 2008, prioritising the polluting mobility of richer car drivers over the cleaner modes of transport used by the poor.[179] By contrast, other cities encourage cycling as a way of reducing congestion, improving health and reducing emissions and pollution. Cycling infrastructure that separates bikes from cars is particularly important, making the roads safer and encouraging more people to cycle.

Photo: Freestocks-org / Unsplash

WHEN GREEN CAN BE FAIR: **AN EXAMPLE**

Bus Rapid Transit systems streamline bus travel to be fast, efficient and accessible.

High quality public transport serves those on low incomes, which reducing emissions and air pollution.

Bus Rapid Transit in Bogotá

Bus Rapid Transit (BRT) is a hybrid form of public transport that was developed in Curitiba, Brazil, in the 1970s. It was cheap and efficient, and soon 70% of commuters were using it.[180] The model became popular across Latin America, and today over 200 cities around the world use the system. Among them is Bogotá, which opened the 'TransMilenio' in the year 2000.

BRT streamlines bus travel so that it has all the benefits of a metro at the fraction of the cost. Buses run on their own roads or bus lanes, and get priority at junctions and traffic lights. Passengers buy a ticket in advance and board from a platform so that buses run faster. At their best, BRT can be good for the environment and for equality.

The TransMilenio reduced carbon emissions by 40% in its first year, and air pollution by a similar percentage.[181] It is currently introducing an electric bus fleet, adding further gains.[182] Climate change and air pollution tend to affect the poorest most. BRT systems redress these inequalities and several others. Platform-level boarding improves accessibility for wheelchair users, the elderly, and people with small children. Vulnerable users face a higher risk of accidents, and the TransMilenio reduced fatalities by 93% and injuries by 75%.[183]

BRT is relatively cheap to build and can therefore charge lower prices. Even those on the lowest incomes can afford a fast, modern service. In fact, in some ways the poorest benefit most, making it a progressive form of transport. Poorer users in Bogotá saw the biggest reductions in travel time, since they travel in from the outskirts of the city. The TransMilenio charges a flat rate rather than charging by distance, so those nearer to the centre subsidise travel for those at the periphery.

There are trade-offs – BRT often replaces informal 'paratransit' bus and minibus networks. They can be polluting and dangerous, but they're cheap and support many jobs, and drivers often oppose the introduction of BRT. Bogotá solved the problem by re-organising paratransit operators on feeder routes for the BRT, so that they worked together.[184]

Waste

Everything must go somewhere - whatever we throw away or flush away ends up in a real place.[185] Ideally that place is far off, out of sight and out of mind for the person doing the throwing away. But that real place may be home to other people. Removing waste from one person's environment may move it into someone else's, and that can lead to environmental and health inequalities.

Wealth and waste are connected: the richer people are, the more waste they create.

Waste and wealth are connected. Generally speaking, economic development brings higher consumption rates. Urbanization also increases waste levels, as people get access to a wider range of goods. Those on higher incomes throw more away, and city residents throw away twice as much as those in the country.[186] There is a wide disparity internationally too. The 1.2 billion population of the OECD generates 44% of the world's rubbish – as much as the 5.5 billion population of Asia and South America put together.[187]

However, wealthier countries tend to have better systems for processing waste, including recycling or incineration. 90% of Africa's waste goes to unregulated landfill sites.[188]

Poorer households and ethnic minorities often live closer to waste sites.[189] This recurring pattern was identified by civil rights activists in the United States. They noticed that there were social and racial inequalities in exposure to pollution and proximity to hazardous sites: lower income families and people of colour were more likely to live close to landfill sites, incinerators, or toxic waste facilities.[190] The likely reason is that when choosing a suitable location for a waste treatment site, authorities will look for marginal areas where land is cheap. These may "coincidentally be places where low income people and minorities live". Once there is a waste site nearby, those on higher incomes begin to move out. House prices fall, and those on lower incomes move in, including black and Hispanic families. A demographic shift occurs, leading to segregation and environmental injustice.[191]

This inequality is found in many parts of the world. A study in France found that towns with a high proportion of immigrants hosted more waste processing sites.[192] Research in Eastern Europe noted that Roma settlements were frequently next to landfill sites.[193]

Waste generated in rich parts of the world is often dumped in places where people are poorer.

Environmental inequalities lead to health inequalities. Communities that live closer to waste sites face greater exposure to toxins and pollutants, and may report higher rates of disease. Correlations between proximity to waste sites and health issues include reduced life expectancy, certain types of cancer, and low birth weight.[194] In some cases, marginalised areas will have poorer health services, making them more vulnerable to begin with.

Hazardous waste is exported to poorer countries. The Basel Convention aimed to ban hazardous waste exports, but common exceptions remain, including waste electronics and ship scrappage.[195] Electronics have toxic components that make them difficult to process, so e-waste is routinely exported to countries such as Ghana, Nigeria or Vietnam to be dismantled by hand. With few health and safety guidelines and little protective equipment, workers in e-waste dumps are exposed to numerous toxins and health risks. When one country acts to restrict imports or protect workers, waste

shipments move elsewhere. For example, the Basel Action Network warns that as China has banned imports, more e-waste has been arriving in Thailand.[196]

Though a health risk and an environmental hazard, e-waste does provide a livelihood. One study found that "Ghana's e-waste activities generate US$105–268 million annually and sustain the livelihoods of at least 200,000 people nationwide".[197] Unless there is support for them, halting the trade in e-waste could leave an exploited community even worse off.

Formalising waste practices can provide development opportunities. E-waste workers are one example of informal recycling in developing countries. The waste pickers who sort through landfill sites for valuable or recyclable materials are another. These are dirty and dangerous jobs, roles usually filled by the very poorest in society – but as Tearfund has shown, waste picking operates as an 'informal circular economy' that saves resources, cuts costs for business, and reduces waste sent to landfill. Rather than eliminating these jobs, they can be made safer and more secure, with contracts and steady wages. Brazil depends on informal recycling and has supported the formation of recycling cooperatives, who now process a third of the country's recycling.[198] Formalising these roles "can improve incomes and include often-marginalised groups such as women and youth within the economy."[199]

The circular economy could create a more inclusive economy. Industrial systems and consumer lifestyles rely on an 'elsewhere' to dump waste. In a circular economy, waste is 'designed out' so that goods are reused, repaired or reconditioned. Where waste is unavoidable, materials are either recovered for recycling or safely composted. This approach to materials cuts costs, reduces energy, water and land in mining new resources, and reduces pressure on the natural environment. It may reduce environmental inequalities as less waste is sent to landfill, easing some of the injustices that we discussed earlier.

Photo: Ayotunde Oguntoyinbo / Unsplash

The circular economy also has the potential to create many new skilled and semi-skilled jobs in repair and remanufacturing. These are often the jobs that have been 'hollowed out' in developed world economies. Research in this area is somewhat tentative, but one study of the British labour market suggested that the circular economy would create the most jobs in industrial areas where unemployment was highest, and that it could "contribute to offsetting the disappearance of mid-level occupations."[200]

Global waste is expected to rise, so using waste as a resource will grow in importance in the coming decades. In particular, waste in Africa is expected to boom as an emerging middle class gains access to a wider range of consumer goods and processed foods. UN Environment estimates that the amount of municipal waste created in Africa will double by 2025 – such a rapid rise that "any decrease in waste generation in other regions globally will be overshadowed."[201] In such a context, adopting circular economy principles is vital for people and the environment, making waste a tool for development and not a burden.

WHEN GREEN CAN BE FAIR: **AN EXAMPLE**

Plastic pollution often occurs where access to consumer goods has expanded faster than waste infrastructure.

Indonesia's 'waste banks' create incentives for waste collection and recycling.

Plastic recycling in Indonesia

Global plastic use has soared from 15 million tonnes a year in the 1960s to over 300 million tonnes today, with packaging the main application.[202] In many places access to processed foods and consumer goods has moved faster than waste systems and infrastructure, leading to mounting plastic pollution. Only 14% of the world's plastic packaging is recycled, while 40% goes to landfill. 32% escapes formal waste processing and leaks into the environment.[203] Plastic bags snag in trees, bottles clog waterways, and wrappers pollute the soil.

Municipal waste rises with income, and wealthier areas are more likely to have their waste collected.[204] The effects of plastic pollution are more likely to be felt by the poor, either because their rubbish is not collected, or because they live in areas where waste is dumped or burned. Mismanaged waste ruins the landscape, pollutes land and water, encourages vermin and carries disease. WasteAid warns that "nine million people die of diseases linked to mismanagement of waste and pollutants, twenty times more than die from malaria."[205]

Indonesia is one of the top five sources of marine plastic,[206] and one popular response has been Bank Sampah, or waste banks, that pay people for plastic and sell it on for recycling. There are an estimated 4,000 waste banks in Indonesia, over 400 in Jakarta alone.[207] For example, the marine ecology charity Misool Foundation runs a community recycling project as part of its conservation work. Local fishermen and coastal communities collect rubbish from the sea, the reef and the beaches, and bring it in for recycling. The foundation removes 700 tonnes of waste from the area every year and takes it to the mainland for processing.[208] This protects the reef and the surrounding marine ecosystem, raises the value of eco-tourism in the area, and creates extra income for local fishing and coastal communities.

With plastic use expected to triple by 2050, there is an urgent need for better waste collection and processing. In many places, local communities are organising to solve the problem themselves, and there are many opportunities for win-win policies. Waste collection and recycling can be pro-poor, with benefits for the environment and for equality.

Food

There has been progress on reducing hunger, but in an age of climate change that progress cannot be taken for granted.

Global food demand is rising. As the world's population has boomed in the last century, agricultural production has risen too. The proportion of people going hungry has almost halved in developing countries over the last few decades, but progress slowed from around 2010 and recently reversed. Hunger levels are rising again, due to "the greater number of conflicts, often exacerbated by climate-related shocks."[209] It is too early to tell if that will be a long-term trend, but food demand will certainly continue to rise: the world's population is expected to grow by a further 2 billion or more between now and 2050.

Alongside a growing population, demand for meat and dairy is rising and so more food is diverted to animal feed. More cropland is also given over to biofuels.

Food demand is growing in vulnerable areas. Almost all of the population growth between now and 2050 will occur in developing countries. The population of Sub-Saharan Africa will more than double. Growth will occur in the places where hunger and malnutrition are already more common, where food production is most vulnerable to climate change, and where people have the fewest resources for climate adaptation.[210]

There has been progress on reducing hunger, but in an age of climate change that progress cannot be taken for granted.

Sub-Saharan Africa has contributed the fewest historical emissions and is least responsible for global warming. And yet, it is expected to experience above average warming, changing precipitation patterns and extreme weather. Research suggests that many staple crop yields will fall, and food prices will rise.[211] Climate change from rich countries could reduce food production in Africa even as the population booms, triggering a major global injustice.

The world has more overweight people than hungry people. An estimated 815 million people experience hunger on a regular basis. At the same time, over 2 billion are overweight.[212] Food consumption is badly distributed. While malnutrition rates fall away as incomes rise, obesity levels are much more complicated. Low and middle-income countries also have rising obesity rates, and it is no longer considered a 'disease of affluence'.

Photo: Nonki Azariah / Unsplash

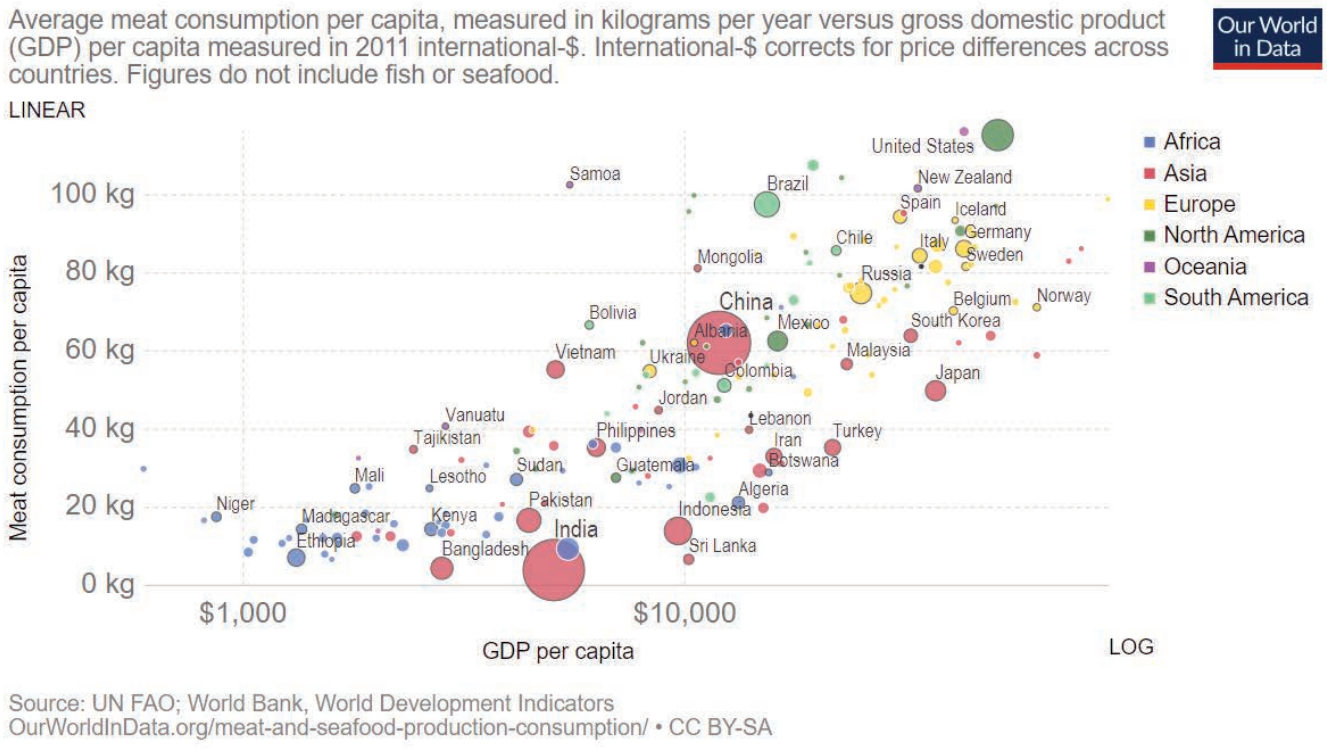
Obesity has sustainability implications: more pressure on food production, increased consumption of meat and dairy, alongside less active forms of transport and more fuel use to move heavier people.[213] It also has inequality implications. Between wealthy countries, countries with higher levels of inequality have higher rates of obesity.[214] The USA has very high rates of obesity. Japan, a much more equal country, has the lowest obesity rates of any advanced economy.[215] Within wealthier countries, the WHO warns of "a strong relationship between obesity and low socioeconomic status, especially for women."[216] Public health programmes around obesity could therefore have multiple benefits for sustainability, equality, health and wellbeing.

Meat production is unsustainable. Not all food is fed to people - only 55% of calories produced globally are consumed directly by humans. A further 36% are fed to animals, and 9% go to biofuels. This is an inefficient way to feed a growing population. "For every 100 calories of grain we feed animals," the National Geographic explains, "we get only about 40 new calories of milk, 22 calories of eggs, 12 of chicken, 10 of pork, or 3 of beef."[217]

Meat has a high ecological footprint, and consumption rises with income.

Meat production also uses more water, land, and produces more carbon emissions than plant-based foods. The FAO calculate that meat and dairy accounts for 14.5% of global emissions, about the same climate impact as the whole of transportation (14%).[218] Again, there is an equity question here. Climate change affects the poorest first, but meat eating is strongly correlated with rising wealth.

Meat consumption vs. GDP per capita, 2013



Source: UN FAO; World Bank, World Development Indicators
OurWorldInData.org/meat-and-seafood-production-consumption/ • CC BY-SA

Photo: Stijn te Sstrake / Unsplash

When meat-eating is aspirational and culturally important, addressing it is politically difficult. However, reducing intake of meat and dairy has many health benefits, and presents a potential win-win solution in parts of the world with a large appetite for meat.

Biofuels compete with food crops. Since the introduction of biofuels directives in the EU and US, the amount of food crops burned as fuel has risen. Many 'first generation' biofuels are made from food crops such as corn or vegetable oils, and therefore compete directly in the global food markets. Growing demand for biofuels was a noted factor in the food price spikes of 2008, which led to food riots around the world.[219]

This is a justice issue, as poorer people spend a greater percentage of their incomes on food, and are far more susceptible to food price spikes.[220] At the same time, they are far less likely to use biofuels. Food is burned for fuel while people riot because they cannot afford to eat, and there isn't even an environmental benefit: "first generation biofuels have around 50% higher lifecycle emissions that their fossil equivalent."[221]

WHEN GREEN CAN BE FAIR: **AN EXAMPLE**

Meat consumption is a major contributor to climate change emissions.

Thailand's insect farms create protein with a fraction of the emissions, land or water use.

Case study: insect farming in Thailand

In many cultures meat eating is aspirational and a sign of wealth, but livestock is a major source of methane emissions and a driver of deforestation. With meat consumption expected to grow by 75% in coming decades, Chatham House warns that "it is unlikely that global temperature rises can be kept below two degrees Celsius without a shift in global meat and dairy consumption."[222]

Despite the scale of the problem, few countries have targets for reducing livestock emissions, and even fewer have targets for meat consumption. (China is an exception.[223]) This is a missed opportunity in some countries, where eating less meat and dairy would reduce rates of obesity and heart disease. Vegetarian or vegan diets, or simply less meat, are all solutions. More radical options include bio-engineered 'cultured meats' and insect protein.

Insects are not eaten in the US and the EU, but a number of start-up companies are developing and marketing insect-based foods, including pasta, tortilla chips, or energy bars.[224] They highlight the environmental benefits of high protein content with minimal land, water and greenhouse gases. They often use cricket flour – assuming that people are much more likely to eat insects if they are ground up and imperceptible.

The main source of cricket flour is Thailand. It has an estimated 20,000 commercial cricket farmers, more than anywhere else in the world. If the market for cricket flour develops, it could turn out to be a sustainable growth industry, and potentially an equitable one too.

Cricket farming is small scale in more ways than one. It doesn't need large amounts of land or capital, making it accessible to the rural poor. You can start small, and many smallholder stake it up either as a supplementary source of income. It doesn't require great physical strength, and women or elderly farmers can participate – 60% of cricket farmers in Northern Thailand are women.[225] It may even help with climate change adaptation: it is largely unaffected by drought, and some farmers rear insects as a side-business to hedge against poor rice harvests.[226]

Village cooperatives are forming to invest in equipment and negotiate larger sales, and the government recently introduced standards and guidelines to support exports.[227] Time will tell if Western consumers are ready to eat insects, but domestic demand is already strong, and Thailand has pioneered a multi-million dollar market for 'six-legged livestock'.

Conclusion – 10 questions for securing win-win outcomes

There are multiple forms of inequality, and they intersect with sustainability in a variety of ways. Policies to improve environmental performance can disadvantage the poor and make inequality worse. Or they can benefit the poor and improve equality.

In the same way, policies aimed at improving equality – such as increasing the size of the middle class – could raise carbon emissions and waste. Or they can use green technologies and work with nature, and deliver sustainability gains at the same time.

Win-win interventions need to be both green and pro-poor, and many different policies would qualify on both counts. Rather than list them as recommendations, this paper concludes with some questions for policymakers. Drawing together observations about how equality and sustainability inter-relate, these are questions to apply to any new policy idea or suggestion. Use them to identify potential problems and spot possible co-benefits.

1. Who will benefit from any positive consequences?

Are the primary beneficiaries of this idea the wealthiest in society? If so, it is likely to make inequalities worse. How can the benefits be shared more widely?

2. Where will any negative consequences fall?

Who will be disadvantaged? If there will be environmental damage, either directly or indirectly through climate change, who will suffer? How can that harm be minimised or eliminated?

3. Are marginalised groups able to participate?

Will those on lower incomes be served by this policy, or further excluded? What about women, minority tribes or lower castes? What steps can be taken to ensure that nobody is excluded? This may need proactive steps to include.

4. Where will jobs be created and lost?

If a policy will create jobs, it is worth asking if local people will be able to take them, or if they will mainly benefit others. Will there also be job losses, including by displacement from land? What opportunities are there for those with low skills?

5. Are there any informal stakeholders?

We have seen how nomadic people groups may have used land for generations with no formal rights to do so. Slum areas may have informal tenure. Where these uses can be recognised, there is less chance of human rights abuses or conflict.

6. How will people be compensated for any loss?

There will always be situations where people need to be relocated or inconvenienced. Where this cannot be avoided, how will people be compensated? This may be financial, or it could be through new opportunities, training, or services.

7. Is our strategy adapted to local conditions?

National development priorities can easily override local priorities. What processes are in place to consult with local people and ensure that they are represented? Who has oversight, and is there a process for dealing with grievances?

8. How can we maximise co-benefits?

Knowing that equality and environmental co-benefits are possible, how can we be creative in seeking them out? Are their green technologies or strategies that could be used? What about business models that give more people a stake?

9. Do our monitoring systems and metrics give us the full picture?

Ecosystem services and subsistence lifestyles do not register in traditional accounting and are easily under-counted in cost-benefit analysis. Are systems capturing all the relevant information? Are environmental losses counted and tracked against GDP? If not, growth may actually be the unsustainable stripping of natural assets.

10. Do our plans fit within the framework of the SDGs?

Some policy ideas can meet multiple Sustainable Development Goals. The SDGs can be used as a framework for creating co-benefits, and that is as relevant to industrialised economies as it is to the majority world.

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