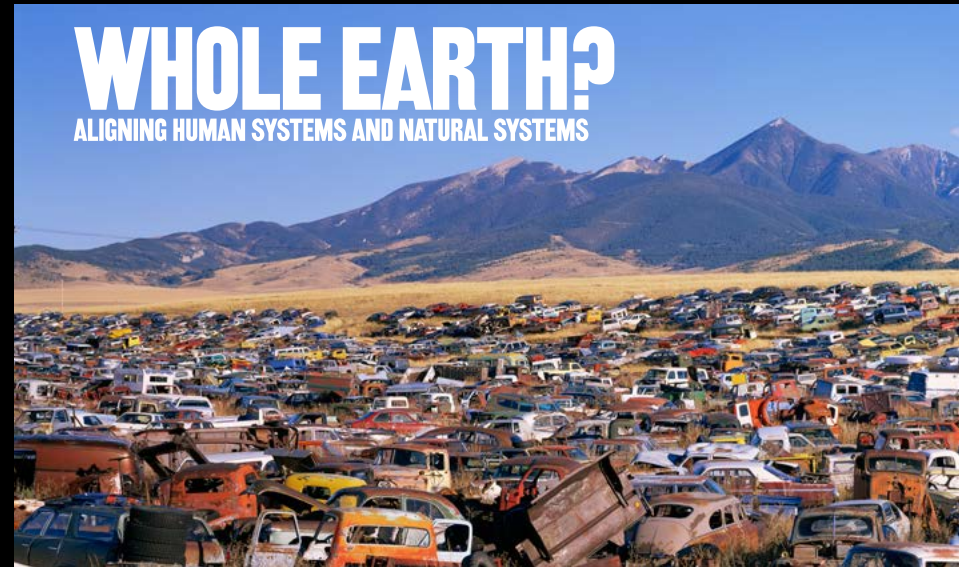
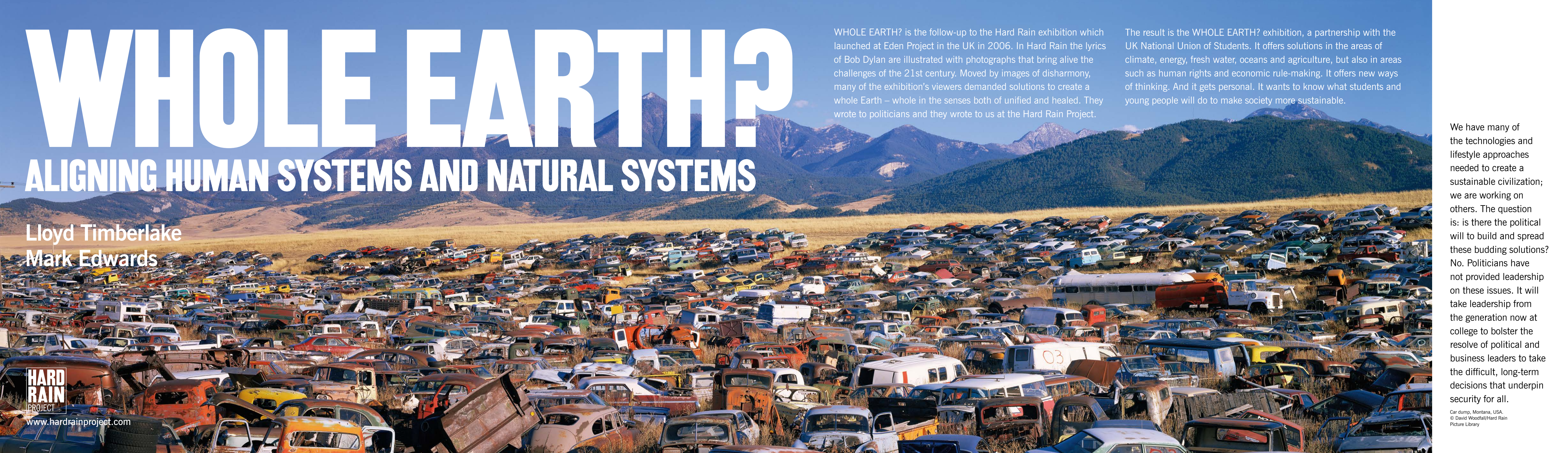


WHOLE EARTH? exhibition © Hard Rain Project
Universities and schools signed to WHOLE EARTH?
may use the images and text from the exhibition
as teaching aids. The text and images may also be
included in leaflets/posters to promote the exhibition
within universities/schools hosting WHOLE EARTH?
exhibition. It is not allowed to publish the last verse of
A Hard Rain's A-Gonna Fall.



WHOLE EARTH? is a modern day Bayeux Tapestry
– a visual monument of the environment that offers
solutions to the problems of climate change and
poverty. More importantly, it shows how students and
universities everywhere can play a leading role in
making society more sustainable.

*Joan Walley, Chair of the House of Commons
Environmental Audit Select Committee 2010–2015;
Chair of the Aldersgate Group*



WHOLE EARTH?

ALIGNING HUMAN SYSTEMS AND NATURAL SYSTEMS

Lloyd Timberlake
Mark Edwards

**HARD
RAIN**
PROJECT

www.hardrainproject.com

WHOLE EARTH? is the follow-up to the Hard Rain exhibition which launched at Eden Project in the UK in 2006. In Hard Rain the lyrics of Bob Dylan are illustrated with photographs that bring alive the challenges of the 21st century. Moved by images of disharmony, many of the exhibition's viewers demanded solutions to create a whole Earth – whole in the senses both of unified and healed. They wrote to politicians and they wrote to us at the Hard Rain Project.

The result is the WHOLE EARTH? exhibition, a partnership with the UK National Union of Students. It offers solutions in the areas of climate, energy, fresh water, oceans and agriculture, but also in areas such as human rights and economic rule-making. It offers new ways of thinking. And it gets personal. It wants to know what students and young people will do to make society more sustainable.

We have many of the technologies and lifestyle approaches needed to create a sustainable civilization; we are working on others. The question is: is there the political will to build and spread these budding solutions? No. Politicians have not provided leadership on these issues. It will take leadership from the generation now at college to bolster the resolve of political and business leaders to take the difficult, long-term decisions that underpin security for all.

Car dump, Montana, USA.
© David Woodfall/Hard Rain
Picture Library

What'll you do now?

Oh, what'll you do now, my blue-eyed son?

Oh, what'll you do now, my darling young one?

I'm a-goin' back out 'fore the rain starts a-fallin'

I'll walk to the depths of the deepest black forest

Where the people are many and their hands are all empty

Where the pellets of poison are flooding their waters

Where the home in the valley meets the damp dirty prison

Where the executioner's face is always well hidden

Where hunger is ugly, where souls are forgotten

Where black is the color, where none is the number

And I'll tell it and think it and speak it and breathe it

And reflect it from the mountain so all souls can see it

Then I'll stand on the ocean until I start sinkin'

But I'll know my song well before I start singin'

And it's a hard, it's a hard, it's a hard, it's a hard

It's a hard rain's a-gonna fall

Bob Dylan, A Hard Rain's A-Gonna Fall, last verse

© Bob Dylan, Special Rider Music/Sony/ATV Music Publishing 1963, 1991



Listen to a live version of "A Hard Rain's A-Gonna Fall" synced to the exhibition pictures at www.hardrainproject.com/film

Aligning human systems and natural systems

Bob Dylan’s 1962 song “A Hard Rain’s A-Gonna Fall” is “the greatest protest song by the greatest protest songwriter of his time”, according to *Rolling Stone* magazine. But what is it protesting against?

It is not specific. There are images: sad forests, dead oceans, a graveyard, a newborn baby surrounded by wolves, young children armed with guns and swords, poison and hunger. These build an unfocused feeling of dread. The rain is clearly not a nurturing rain; Dylan said of the hard rain, “I just mean some sort of end that’s just gotta happen.” It was written under a threat of nuclear war, and Dylan said each line was the title of a song he would not get to write.

The song goes from dread to action: the singer is “a-goin’ back out ’fore the rain starts a-fallin’” and he is going to do the job of an artist in threatening times: “I’ll tell it and think it and speak it and breathe it.” It will be well-informed speaking: “I’ll know my song well before I start singin’.” This final focus on knowing, and then speaking and thinking, is what makes Hard Rain relevant today.

Hard Rain can be seen as protesting against conditions that do not allow people to realize their potential, to write all their songs.

Climate change and poverty are the two starkest examples.

Climate change could alter just about everything about our lives. We are already experiencing increasingly severe weather events and are witnessing

dramatic ice melt in polar regions.

Absolute poverty is a reality in much of the global South. But in the North, policies are impoverishing the young, leaving graduates saddled with debt, with poor career prospects, with declining infrastructure. When economic crises come, budget cuts are to schools, teachers’ salaries, school lunches, school sports programmes – this despite everyone knowing that investments in education are the best investments that can be made.

So our development is unsustainable; we are robbing the future of the resources it will need to thrive. Society is moving toward major disasters: “the sort of end that’s just gotta happen”.

There are many technical solutions – many of them developed by universities. But we do not have effective political and economic solutions. In fact, the major political system – democracy – works against sustainable development, because majorities do not vote in favour of future generations. And the major economic system – capitalism – depends on rapid material growth on a planet whose resources are already being overused by its human population.

Given these realities, we are short of the political will needed to adopt and adapt sustainability solutions and to take them to scale.

It is a complex and difficult task to get political leaders to work together to tackle the long-term threats because political leaders don’t lead, they follow the powerful, which more and more means that they follow business, which thinks mainly in the short term.

Our political leaders have become crisis managers, managing the crisis caused by the systems they espouse.



Time and events are closing in on future generations, including the generation in higher education now. The way of life of the elders is limiting the possible ways of life of the young.

Introduction

The future of humanity will depend on mastering a balancing act, or perhaps a number of balancing acts, all balanced. The challenge is to provide for the needs of more than 10 billion people while safeguarding our planetary life-support systems, while conserving all the non-human lifeforms that make up those systems, while balancing concern for the future with concern for the present. Recent scientific insights better equip us to manage those balances. Doing this is your generation's great task.

Universities are at the cutting edge of this challenge. WHOLE EARTH? is an invitation to students and professors to share the research they are doing and approaches they are taking that might underpin future security for all. We have addressed some of the disciplines directly here, but to get through the climate/resource/population bottleneck will require the skills and ingenuity of people from all walks of life. Upload your contribution – from you personally or from your discipline – to the SOS YouTube channel via SOSnetwork@outlook.com, or tweet [#studentearth](https://twitter.com/studentearth), or email via www.hardrainproject.com/comment, and inspire a wider audience with new approaches to problems that sometimes seem overwhelming.

Tell it and think it and speak it and breathe it

WHOLE EARTH? is based on the premise that students and universities can help lead society toward a more sustainable future. The exhibition and the communications behind it are designed to give students the evidence they need to help create a safe and secure planet for all. No one has all the answers; the exhibition invites students and your professors to upload responses to the WHOLE EARTH? YouTube channel. The transition to a sustainable world requires contributions from people from all walks of life and from every university discipline.



Lund University students give guided tours around the pilot edition of WHOLE EARTH?, Sweden.
© Mark Edwards/Hard Rain Picture Library

The Arts

Sustainable development is an esoteric, theoretical concept. It does not work well as a call to arms or action. If it is going to get under people's skins, art is probably going to have to take it there. Can art students develop new ways of presenting sustainable development? Many art students go on to join advertising agencies. The advertising industry spends \$600 billion a year persuading us that we can consume our way to happiness. Imagine if all that talent was focused on communicating the benefits of sustainable development.

SOS

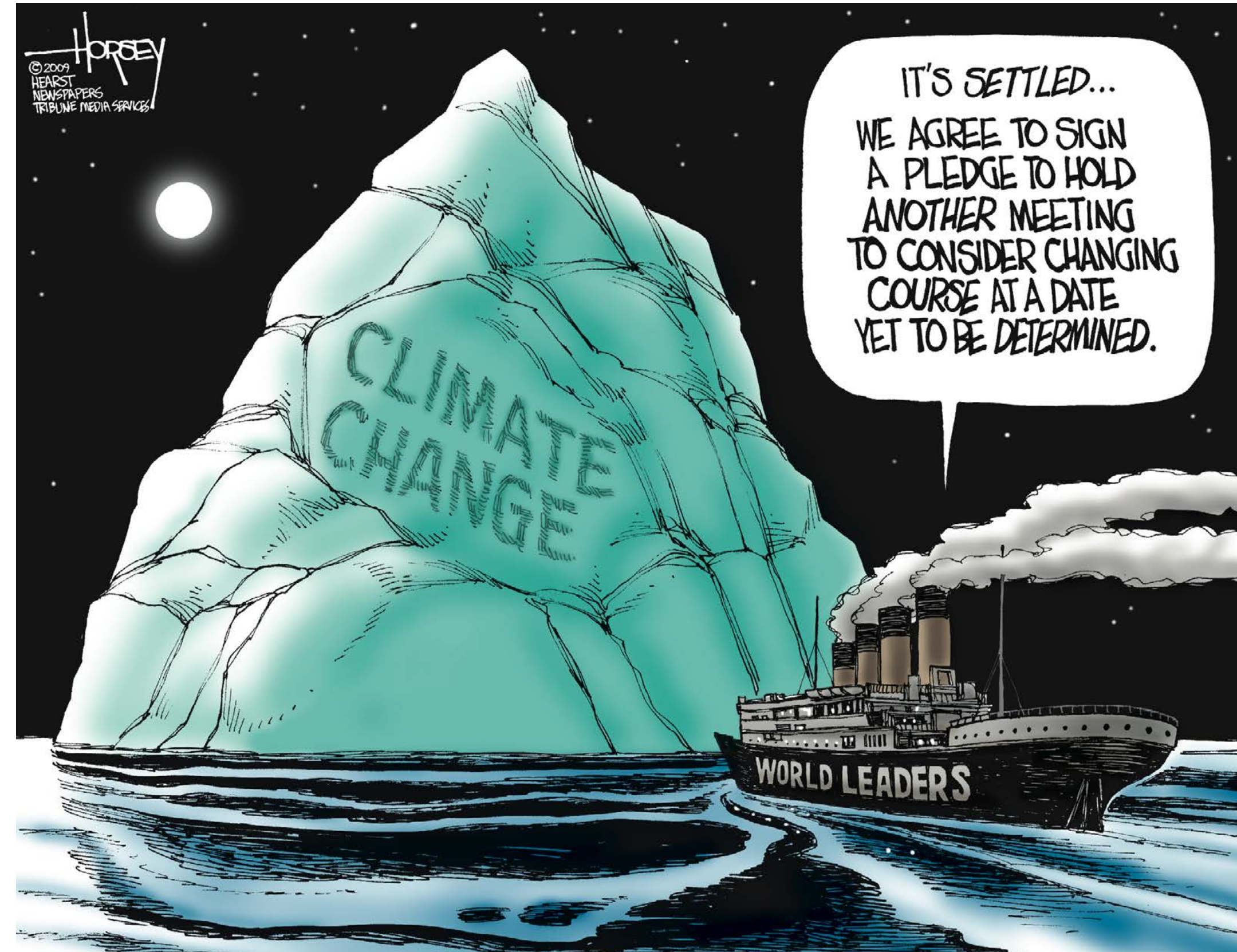
Students Organising for Sustainability (SOS) is a new, informal alliance of student organisations around the world, initiated by the National Union of Students in the UK. It will help student organisations to collaborate on research, campaigns and communications, providing a global response to global challenges. SOS will help students understand the connections, follow the changes and have the right sort of evidence to influence the decision-makers that need to be involved for change to happen.

“It is vital that students have a voice in the debate about our future. WHOLE EARTH? gives us the opportunity to connect students around the world and create a huge constituency to bolster the resolve of governments to take the difficult, long-term decisions that underpin security for young people alive today and their children.”

Piers Telemacque, NUS Vice President



Upload your contribution to the SOS YouTube channel via SOSnetwork@outlook.com, or tweet #studentearth, or email via www.hardrainproject.com/comment



The new economics

There already is such a thing as the 'new economics' and there are already students at prestigious universities demanding that the economics faculty teach an economics that fulfils its real responsibility – answering how the world's population can live well without further draining the planet's resources. What answers does this new approach offer? What other answers might it offer?

Upload your contribution to the SOS YouTube channel via SOSnetwork@outlook.com, or tweet #studentearth, or email via www.hardrainproject.com/comment

Our fragmented world

"The Earth is one but the world is not," began the 1987 Brundtland Report, which invented and defined the concept of sustainable development. It meant that the Earth is one whole planetary ecosystem, but the world we have constructed on it is fragmented, with parts in opposition to other parts. Worse, the divisions we had constructed to manage our world were breaking apart:

"Until recently, the planet was a large world in which human activities and their effects were neatly compartmentalized within nations, within sectors (energy, agriculture, trade), and within broad areas of concern (environmental, economic, social). These compartments have begun to dissolve."

That dissolution has gained momentum over the three decades since the report was published, creating the unmanaged, mismanaged, conflicted world we live in today.

Conflicts exist even within "areas of concern". Environmental groups preach constantly that it is "one minute to midnight"; we are running out of time to "save the planet!" Yet these groups spend a disproportionate amount of time and energy fundraising and increasing their own 'market share' of members and funders. They do not unite to save our planet.

A premise of WHOLE EARTH? is that university students may be a bit more 'reasonable' and less mired in mumbo jumbo than the general public, or at least than their elders.

By joining together to articulate the kind of world they want to live in and campaigning for it, students can be a hugely powerful group, reaching across the fractures of their world and creating a political force for sustainable forms of human progress.



Governments cannot manage the new ways environmental resources, markets, energy sources and agriculture overlap and surge destructively together. Few voters understand such complex assemblages of issues. Many react with beliefs rather than fact-based opinions. The results of this are plain to see: political deadlock, religious strife, evidence-free policy-making and a bottomless pit of mumbo jumbo.

Illegally logged timber, Nigeria, destined for Europe. Local communities receive no income to compensate for the loss of forest around their villages.
© Mark Edwards/Hard Rain Picture Library

Media studies

This project is based on the notion that living within the bounds of nature will require new forms of communication and persuasion. The media world is changing rapidly. The move from paper to electrons, the new social media and other radical changes in communications technology should create paths toward a sustainable world. Can universities work sustainability into their media studies courses?

Upload your contribution to the SOS YouTube channel via SOSnetwork@outlook.com, or tweet [#studentearth](https://twitter.com/studentearth), or email via www.hardrainproject.com/comment

Reinvent the modern world

The climate is changing because human and natural systems are out of sync. Climate change alters water availability, degrades ecosystems, destroys biodiversity, and acidifies oceans. Right now it is killing and impoverishing people in the poorest countries, who have contributed least to the problem. It could cut unirrigated farm yields by half in many African countries by 2020 – a vast human disaster an historic eyeblink away. It makes poor people poorer: Inuit, who can no longer hunt on the ice the way they have for centuries, and Sahelian farmers south of the Sahara, who find it too hot and dry to keep farming. Extreme weather events are increasing in the rich countries, causing huge property damage and loss of harvests.

All countries are ‘developing countries’ now, needing to develop new, lower-carbon ways of heating, air-conditioning, moving around, manufacturing, farming and prospering.

There is no single ‘solution’, but there are thousands of solutions: small individual acts; big government policy changes; radically new forms of global governance and co-operation; new and renewable energy systems; cap-and-trade systems to establish a high price for carbon; new technology standards; new technology. We’ll need them all. Changed human minds must drive these and other changes toward a new world of human activity and human living everywhere.

Can your generation reinvent the modern world so it is compatible with nature? Can your generation succeed where our generation failed?



So-called global warming is just a secret ploy by wacko tree-huggers to make America energy independent, clean our air and water, improve the fuel efficiency of our vehicles, kick-start 21st-century industries, and make our cities safer and more liveable. Don't let them get away with it!

Chip Giller, grist.org

Austfonna ice cap, Svalbard archipelago, Norway.
© Michael S. Nolan/Specialist Stock

Political science

Realities are global, but effective political systems for managing them are, at best, national: and multi-nationalism is not working very well. At one end of the political science spectrum: Can we develop effective world governance without a world government? At the other end: Can voters be effectively educated about sustainability issues? And can universities develop a political science that factors in sustainable development?

Upload your contribution to the SOS YouTube channel via SOSnetwork@outlook.com, or tweet [#studentearth](https://twitter.com/studentearth), or email via www.hardrainproject.com/comment

Poverty, people and planet

Poverty is disastrous for people and the planet. Over three billion people, almost half the world population, live on less than \$2.50 a day; and more than four-fifths live in countries where the income gap between the rich and poor is widening. Aside from being a personal tragedy, poverty can keep people from taking part in solutions – for themselves or their societies. The only way poor people can adapt to climate change is through having sufficient income, savings, insurance and mobility.

The planet is too small and interconnected for the rich to be comfortable and secure while billions suffer poverty.

Governments cannot solve poverty, but they can set up the conditions whereby people can pull themselves out of penury: access to credit and education for all; enforcing fair laws fairly; streamlining bureaucracies; and creating effective safety nets for the poorest. Poor-country governments would be helped in this effort if all the richer countries kept their promises: to establish a global trade regime that helps countries trade out of poverty; to increase aid; and to help poorer countries adapt to climate change.



Environmental refugees from rural Haiti. They suddenly appeared and flitted past me like butterflies. Look how delicately they pick their way through the dampened filth, the stomach-churning smells of ash and grease and shit. And like butterflies, they suddenly disappeared. The picture took itself. To watch those kids in their clean dresses on their way to a dime-a-day school in the middle of this squatter city is a simple but astonishing affirmation of human potential.

Port-au-Prince, Haiti.
© Mark Edwards/Hard Rain Picture Library

Science and technology

Universities teach many forms of sciences and technologies. Obviously both are crucial to sustainable development: new and renewable forms of energy; new ways to grow and use foods; new forms of transport; new ways of managing planetary systems; the list is endless. The debates on things like GMOs, nanotech and nuclear energy might be different if society, through democratic governments, were driving these toward the service of humanity rather than the service of corporations. So cutting-edge science and technology schools will want to see how they can combine values driven by sustainable development to produce “technology as if planet and people mattered”.

Upload your contribution to the SOS YouTube channel via SOSnetwork@outlook.com, or tweet #studentearth, or email via www.hardrainproject.com/comment

A web of energy

It is clear that we must shift from carbon energy – coal, oil and gas – to renewable energies: solar, wind, hydro, wave, geothermal. Yet even those who agree with this truth like to argue about which energy is best; some champion solar, some wind, etc. That misses the point. Each has its strengths and weaknesses. So the goal is to create vast networks – electricity grids – that make the best of all the renewable energies.

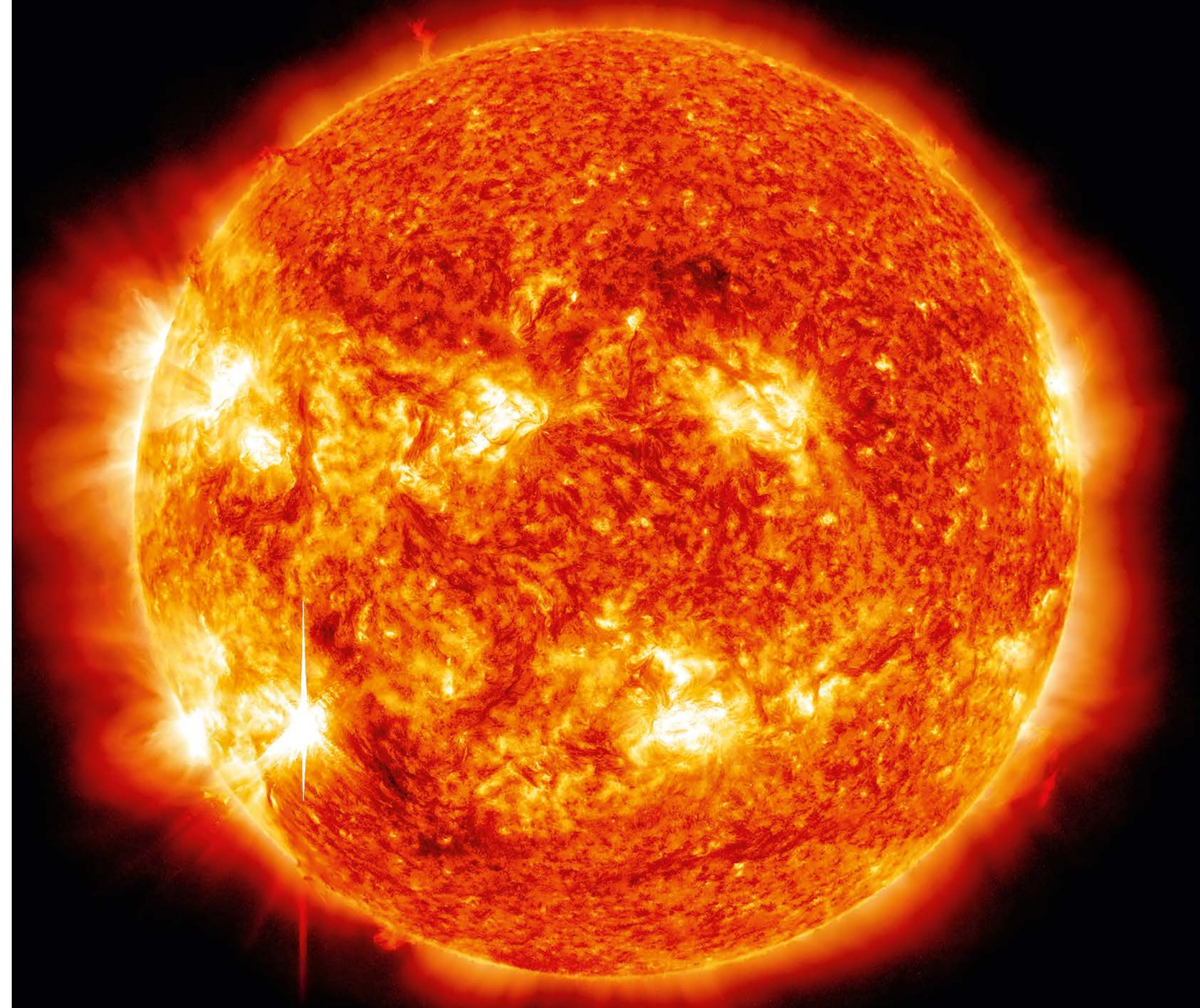
The global consulting firm PwC has offered “a vision of Europe, in combination with countries in North Africa, developing an integrated power grid with 100% of electricity generation coming from renewable sources by 2050.” Its roadmap of how to get there is based on “an evolutionary development mainly of the economical, legal and regulatory framework and does not require fundamental technological breakthroughs.”

While this ‘supergrid’ would depend to a great extent on solar power from North Africa, it would use renewable energy from everywhere: “Wind generation in the windy North Sea region, concentrating solar power with storage in the sunny South, biomass and wind in the Baltic Sea region and Eastern Europe, and hydro in the mountainous regions of Scandinavia and the Alps.”

The economic costs to society of restructuring the energy system in this way would be small – at most, a few percentage points of gross domestic product over the coming decades. So why haven’t countries done it already?

The 2050 vision requires simultaneous and coordinated progress on many fronts – including finance, technology, research and development, improved supply chains and increased grid capability. Above all, policy-makers will need to rewrite existing legislation to change the rules and incentives guiding participants in the energy market.

Most of the technical components for 100% renewable electricity are available in principle today.



Renewable energies such as hydro, wind and solar are all powered by the Sun, which lifts water into rivers above dams and creates differential temperatures which causes the wind to blow. Perhaps our ancestors were right to worship the Sun.

The UK National Union of Students is adding its voice to the global campaign to leave fossil fuels in the ground by getting universities to disinvest in fossil fuels and develop low carbon alternatives.

The Sun.
© NASA

Finance

It will be difficult to achieve sustainability amid global financial markets that discourage it through short-term goals. The same markets currently fail to value the most invaluable goods and services such as a climate that supports human endeavours.

Our goal, in the words of the UN Environment Programme, is “to advance policy options to deliver a step change in the financial system’s effectiveness in mobilizing capital towards a green and inclusive economy.”

But this is probably a job for academics and political leaders, not those involved in the melee of the present financial market. Will you use your skills to benefit more people, ecosystems and future generations?

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The off-grid revolution

Societies cannot develop without electricity. Yet so many people do without it. In Africa, only about 20% of people have direct access to electricity, and in some countries it is only 5%. Even in Africa’s cities, electrification rates are lower than on any other continent. Yet there are also millions in Asia and Latin America who work by daylight and firelight.

At the same time, solar power and mobile phones are revolutionizing much of Africa and other parts of the developing world, allowing people access to markets, banking and education. Imagine what ‘full coverage’ could achieve.

Solutions in sparsely-populated rural developing areas may never rely on grids, given vast distances and low housing densities. Villages and homes will need isolated solar cells, biogas digesters and wind turbines. It may require new and improved technologies, but it will certainly need new partnerships among governments, companies and citizens’ groups to disseminate the technologies.



Cleaning solar panels in Waat village, Sudan.
© Hartmut Schwarzbach/Hard Rain Picture Library

Philosophy

Some of the most pessimistic writing about humanity's future is being written by the philosophers, particularly the moral philosophers. They point out that any action on, say, climate change must be rooted not in science, economics or politics but in ethics. The generation running governments and companies today would not benefit from a switch to sustainability. They would pay and future generations would benefit. Meanwhile, they benefit greatly from GHGs in the carbon that fuels their world. But this will be true for each future generation; what will change will be the difficulty and expense of remedial and adaptive action. So philosophy is already helping us understand unsustainability and its motivations in the context of time. How can it help us navigate the transition to a sustainable civilization?

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Population: numbers and appetites

Some argue there are too many people on the planet. This is partly true; 7 billion is too many given the primitive technologies in use, from three-stone cooking fires to internal combustion, fossil-fuel engines. Education and reproductive health programmes can help stabilize population growth. This would also help reduce poverty and increase human potential. But since the mid-1990s, population has been a neglected issue. It is time to put it back on the agenda and renew efforts to educate and empower women.

Others argue that how people live counts more than their numbers. Only 5% of the global population live in the US, but they produce a quarter of the world's CO2 emissions. And, unlike Europe, the population of the US is growing fast – from 200 million in 1970 to over 303 million today, projected at 420 million in 2050.

And to complicate matters even more, many once-poor countries are moving up the ladder, from not having enough to offer their people dignified lives to living beyond planetary means.

More than three-quarters of the world's people live in nations where national consumption has outstripped their countries' biological capacity. The wealthier among us must find ways to live within planetary means: renewable energy; efficient heating, cooling, and transport; diets that need less land and water.

Now let's narrow this global view right down to you and a selfie in which the amount of possessions you own is 'just right'. Would there be a car, two cars, or only bicycles? A computer? A TV? How must both appetites and technologies change so that 9 billion people can live within the means of our small planet?



'Over-consumers' in rich countries blame 'over-breeders' in poor countries for the planet's ills, but the rich minority use the equivalent per person of three or even five planets. The key challenges of this century are to live and consume within planetary means, empower women to have as few children as they want and keep them alive and thriving and to help billions of people out of poverty and toward safe, fulfilled and dignified lives.

top The Namgay family, Bhutan and
bottom The Skeen Family, USA.
© Peter Menzel

Fashion

In 2014, the collapse of the Rana Plaza clothing factory in Bangladesh, killing 1,130 workers, focused the concern of consumers and activists on the true cost of clothes. Those costs not only involve the livelihoods of producers, but the environmental impacts associated with the production of clothes. Whilst consumer awareness of the issues is growing, designers have made some progress toward achieving a closed loop of production. Many fashion and textiles students now study sustainability as part of the curriculum to inform their design practice. As graduates and designers, can you – will you? – use your influence to shape the future of the fashion industry?

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The problem of stuff

When we students start living more isolated lives, do we then depend more on possessions to give our lives meaning?

We need to develop new design standards for the stuff around us, so that everything we buy reflects mounting environmental pressures. We need to invent a world in which all energy is renewable; all gadgets are designed to generate their own energy; all products are designed to last longer, and to be easily recycled at the end of their useful lives. A world where all materials can either be circulated in the economy indefinitely, or returned to nature's cycles. A world where our natural desires for novelty and the enjoyment of stuff are met in ways that are compatible with a world of 9+ billion people. Imagine a world where we design out waste, and design in a secure future and now make it happen.

Half of all the material that has ever been used in human history has been used in the past 50 years.



“7 Days of Garbage”

Most of us feel guilty about the amount of rubbish we create, but what if you were faced with your entire weekly output, and were then made to lie in it? After learning that the average American produces about 4lb of garbage a day (double the amount generated in 1960), Gregg Segal set out to create a project that highlighted these statistics. What does 7 days of your garbage look like?

Upload your ‘rubbish photo’ to the SOS YouTube channel via SOSnetwork@outlook.com.

© Gregg Segal
For more: greggsegal.com

Agriculture

Agricultural courses used to teach little more than how to maximise yield and maximise farmer income. Today concepts of sustainability, nutrition, food safety and health are creeping in – but way too slowly. We must double present food production in a few decades, but do it in ways that do not destroy the environmental resources upon which the future depends. That is a hard row to hoe.

Future farming

Given the numbers of hungry people alive today, population growth and changing lifestyles, feeding the 9+ billion people of 2050 will require a doubling of present food production levels. This calls for new hardware and new ‘software’ – in the form of educating farmers for a new sustainable Green Revolution. Governments need to put more effort into agricultural research and abolish the perverse subsidies that help the world’s richest farmers better compete against the poorest in Africa and Asia. All farmers need access to credit, markets and crop insurance.

Future farming cannot afford to waste water, land, living species or human labour. Does this mean controversial genetically-modified organisms? Perhaps in places it does, as large parts of Africa lack sufficient organic material for an organic approach.

Breakthroughs in technology are required to manage salty and acidic soils and to get plant roots to absorb more nitrogen and thus need less fertilizer. Methods of planting and harvesting using less machinery and energy must also be developed. Much land has been ruined by agriculture. This land will have to be reclaimed, and more farming be done in odd places, like city rooftops. And all this must be accomplished while adding to, rather than diminishing, the biodiversity and ecosystem services that make farming possible in the first place.

New technologies will be needed to get the most out of every bit of topsoil and every drop of water, along with new crop varieties to cope with extreme and changing climate.

And stop wasting food!! About a third of all food produced on Earth, worth around \$1 trillion, is wasted in food production and consumption systems. Converting this figure to calories, about one in four calories intended for consumption is never actually eaten.



Growing salad crops in a carefully controlled environment, Sweden.
© Mark Edwards/Hard Rain Picture Library

History

History involves studying moments of change. The historical narratives in which these individual moments are placed inform our own identity, and in turn this identity feeds into how we act today and the choices we make. Given how significant history can be in shaping the present and future of our world, is it surprising that the effects of climate change, a continuum of undeniably momentous change, are not given more focus in the subject? Can historians use their understanding of how change has occurred in the past to enact change now, when it is most needed?

Upload your contribution to the SOS YouTube channel via SOSnetwork@outlook.com, or tweet [#studentearth](https://twitter.com/studentearth), or email via www.hardrainproject.com/comment

Grapes of wrath

American farming families in the 1930s (top picture, right); and people in Ethiopia in the present day (bottom picture, right) fleeing a dust storm. The ‘dust’ is topsoil which all terrestrial life depends on. Over-farming and drought led to erosion on both continents and created a huge wave of migration to the cities.

Half of the topsoil on the planet has been lost in the last 150 years, according to the World Wildlife Fund.

But erosion is not the only issue. Soil can become too salty to grow crops, often due to over-irrigation. Tractors compact it. Nutrients leak out of over-cropped soil. Pesticides may kill the ‘good critters’ in the soil that aerate it and keep it porous so that rainwater can get to roots.

Erosion can also increase pollution and sedimentation in streams and rivers, clogging these waterways and causing declines in fish and other species, WWF adds. “And degraded lands are also often less able to hold onto water, which can worsen flooding. Sustainable land use can help to reduce the impacts of agriculture and livestock, preventing soil degradation and erosion and the loss of valuable land to desertification.”

We have not learned from our own recent history but perhaps that will change as more universities research solutions to these overlooked problems.



Cimarron County, Oklahoma, 1936, USA.
© Arthur Rothstein/FSA



Borkena valley, Wollo region, 1980, Ethiopia.
© Mark Edwards/Hard Rain Picture Library

Engineering

Engineers are problem solvers. Faced with a swelling population and all its associated challenges, how can we find solutions to meet the needs of today without compromising the ability of future generations to meet their needs? Can today's problems be solved without the unintended consequences of previous 'solutions', such as the carbon fuelling our economies? Can universities equip our engineers with a sense of responsibility for our planet and its inhabitants?

Water: scarce, cheap and wasted

Today, a billion people cannot get enough safe drinking water.

By 2050, 45% of humankind will live in countries chronically short of water. Water is scarce – but cheap (or free). It is valuable – but wasted and polluted. It is the stuff of life, but dirty water spreads disease: bad water and poor sanitation kill 5,000 children a day. Climate change is moving the available fresh water to different places, and new water systems are required to obtain it.

The biggest industrial use of water is for cooling thermal power stations, and carbon capture and storage systems would require vast amounts of water – two more reasons to move from carbon energy to renewable energy.

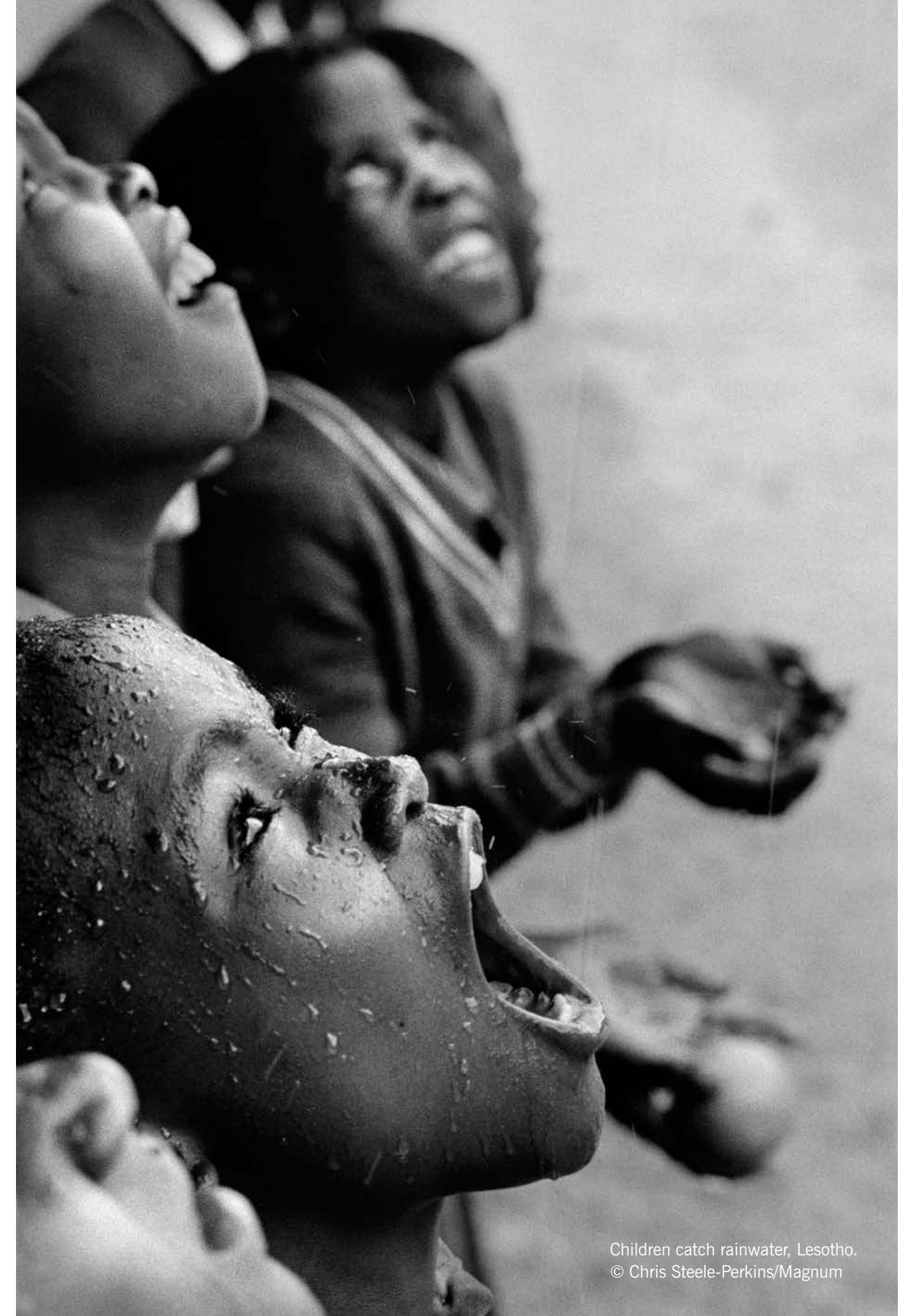
Two-thirds of all the water taken from nature is used to grow crops. This dries the landscape, empties wetlands, destroys fisheries and even alters the climate.

There are myriad solutions, both big and small. Sanitation systems that use little or no water are available. Drip irrigation, rather than flooding fields, can cut water use by 60% or more. Some Indian farmers make their own drip systems from plastic sleeves made to hold popsicles. If farmers are taught how to measure and evaluate their water use, they learn to use less of it. And effective water pricing can help people and businesses understand its value.

Many small dams are usually more effective than a few big dams, both in terms of irrigation and hydropower. Water use must be systematized overall, as it has been in Singapore, where domestic water use has fallen in the last decade since the introduction of water tariffs and low-use taps and toilets.

Living things need water. Let's use it carefully.

Our planet probably has no more and no less water than it has ever had, but many more people use much more of it.



Business

Cutting pollution usually saves money, because pollution is waste. Doing business with the poor in ways that benefit the poor can be profitable business. Being seen to ‘do good’ while doing business can attract the best employees and build customer loyalty. Companies are learning these things. And they are even slowly beginning to be taught in business schools.

Upload your contribution to the SOS YouTube channel via SOSnetwork@outlook.com, or tweet #studentearth, or email via www.hardrainproject.com/comment

Costing the Earth: changing the rules

Pollution costs lives, particularly the lives of the young, the old and the infirm. This is one of the biggest costs omitted from the prices we pay for energy, transport and goods produced in dirty factories.

Every time a group – whether economists, government bureaucrats or business people – sit down to decide how to encourage the planet toward sustainable progress, they end up calling for ‘full-cost pricing’. This means that the price we pay should reflect a good’s or a service’s full cost – including social and environmental costs.

The price of petrol should include the cost of sending armies to the Middle East. The price of coal-fired electricity should include the costs of the premature deaths caused by its pollution – and its mining.

Including such costs would not only better reflect reality (an alleged goal of economics), but also make renewable energy much more cost-effective than fossil fuels. (This approach is also called ‘internalizing externalities’ – the mild, technical word ‘externalities’ referring to things like extinctions and environmental destruction.)

Sustainable human progress also requires tax shifts: that is, we stop taxing things we like, such as jobs and investments in new technologies, and start taxing things we don’t, such as waste and pollution. Such taxes also encourage companies to keep improving, which laws requiring minimum standards do not.

If these steps are so logical, why haven’t they been taken? Because powerful industries oppose them; because government bureaucrats do not like change; and because we, the voters, have not demanded them.



We can’t afford to be ordinary human beings any more – our problems are too serious. If you are part of the silent majority, now is the time to find your voice.

Students protest against pollution, Russia.
© A. Zhdanov/Focus on Your World – UNEP

Biology

Given that biology is literally the study of life, it is the king of sciences when it comes to sustaining the various lifeforms of our planet. Yet in academic biology there is a tendency to specialize in minutiae, rather than link the learnings of the various fields of biology to maintain and improve the Earth's biodiversity. Can universities encourage biologists to write their discipline large, and join the dots?

The web of life

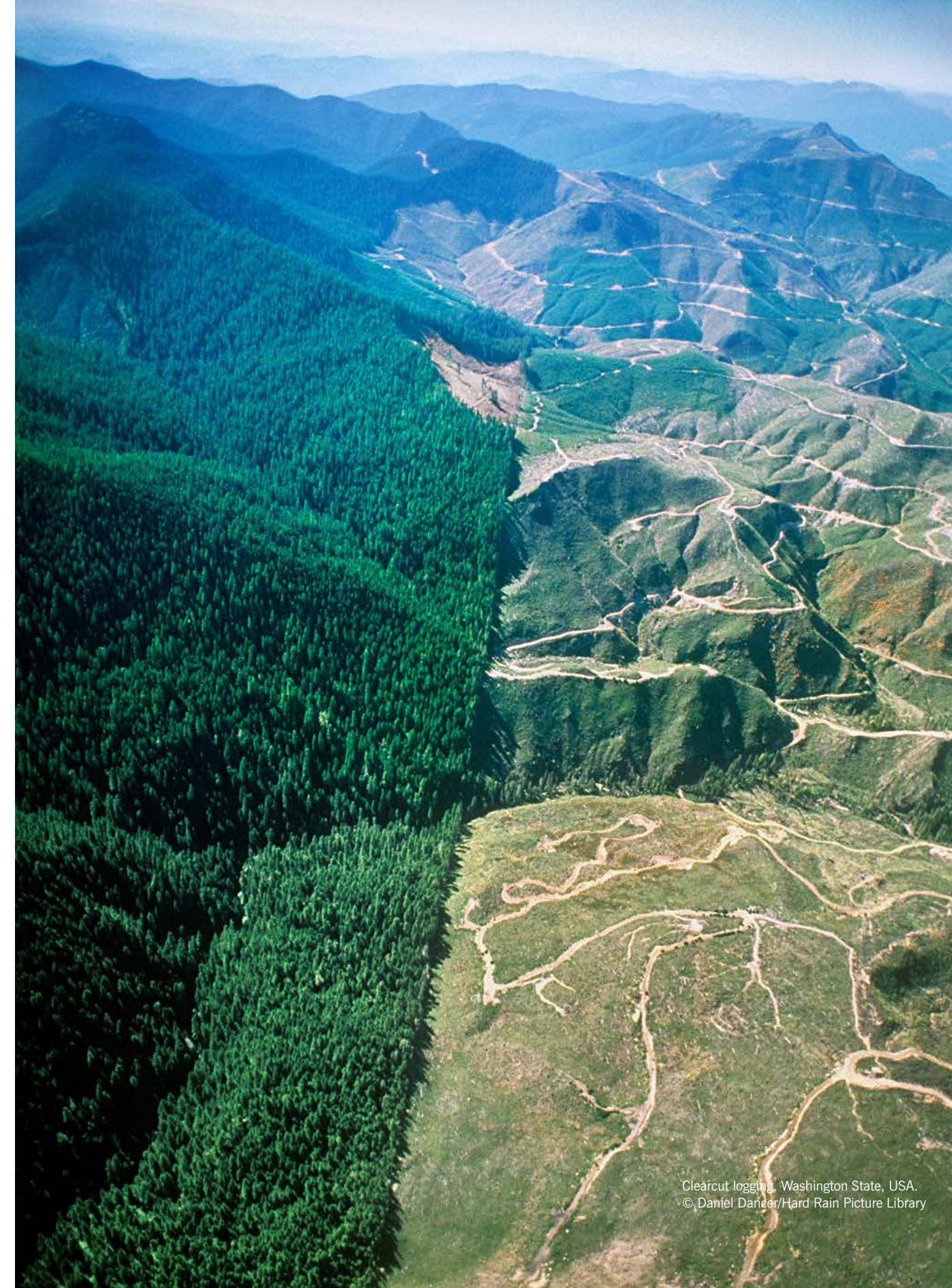
Sustainability means that human society can continue to exist because ecosystems are able to go on providing life-sustaining services such as clean water, soil fertility, climate regulation, etc. But today most indicators are moving in the wrong direction. We are overusing and/or misusing two-thirds of our major ecosystem services.

Growing numbers of people and their increasing consumption mean fewer resources for wild plants and animals: less land, less water, and changes in the climates they evolved in. Extinctions are rippling through the 30 million species thought to exist (about 2 million of which have been identified).

It is not just the destruction of habitat – land, oceans, lakes and rivers – but also the moving of plants and animals; these invasive species become causes of extinctions. More important than individual species are the networks – the ecosystems – that support them, support life on Earth, and provide us with food, water, topsoil and fibres. The most complex ecosystems containing the greatest species diversity tend to be in the tropics, where nations are poorer and populations are growing fastest.

It is impossible to put a monetary value on ecosystem services such as forests' and oceans' ability to lock up carbon and keep it out of the atmosphere, but when scientists try, they come up with figures far larger than global economies.

This truth ought to help us figure ecosystem services into our financial and economic planning, budgeting far more for investments in conservation, investments that will begin to pay off immediately and will be ever more important to larger, future generations.



Clearcut logging, Washington State, USA.
© Daniel Daner/Hard Rain Picture Library



Forest cleared to extend farmland, Brazil.
© S. Rocha/Focus on Your World – UNEP

far left Clear-cutting in the United States.
left Forests into farmland in Brazil.
Where are the treehuggers when we really need them?

Law

The Kyoto Protocol failed to tackle the key greenhouse gas emissions that cause climate change. How can we learn from our mistakes and create an effective international treaty to bring about real legislative changes at various government levels to cut these emissions? Such a framework would need to be firmly grounded politically, with goals and targets measured in ways that would convince citizens that their lives, and the lives of their children and grandchildren, were being improved, that terms were realistic, and obligations could be met.

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Human rights: the foundation of it all

There are two ways of looking at human rights issues in terms of aligning human and natural systems: negative and positive. The negative view asks what is the point of creating a sustainable planet upon which the rights of millions are denied on the basis of gender, religion, ethnic or national origins or sexual preference? A more positive approach starts with the frequently stated view that sustainability cannot be achieved without the effective, popular participation of all in decision-making.

The real environmental decision-makers are not governments but voters, the same people who also decide on a daily basis how to get rid of garbage, how to transport themselves and how much water to use.

Sustainable progress not only requires broad participation, it requires that individuals and the organizations they form have the right to be consulted in decision-making, the right to the information required to make good decisions, and the right to legal remedies and redress when their health and their environment has been or may be seriously affected.

These are the human rights that form the basis of sustainable human and planetary development.

Students, as key stakeholders in the future, should be consulted by the UN, by governments and by legislators on sustainable development.

Many universities are doing a good job at involving students in sustainability, often through student organizations and relatively new staff who are responsible for taking sustainable development across disciplines.



In much of the rural Majority World, women do most of the farm work, while men make most of the decisions. Yet throughout the Majority World, women are taking greater control of their lives and livelihoods.

Women at a village meeting, India.
© Mark Edwards/Hard Rain Picture Library



Across the UK, students are reclaiming space on their campuses to grow food, connect with their communities, and build new social enterprises.

© University of Cumbria Students' Union

Architecture/community planning

The world is moving rapidly into cities, and cities can be a powerful force for sustainable progress, benefiting from economies of scale and planning. But much of the planning is based on assumptions that the climate will continue within the parameters that have existed in the past. Can students of architecture design and promote cities that respond to the realities of a changing world while reducing pollution and promoting community?

Former UK Government Chief Scientific Adviser Sir David King believes that slums, shantytowns and favelas could hold the secrets to better urban living and should be studied by planners designing new green cities: “While slums represent urban living at its worst, the way they have been built to suit the needs of their residents also shows how developments should embrace self-organized development.”

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The great migration

Human civilization is changing. The hunter-gatherers who became farmers are now halfway down the road from being agriculturists to becoming urbanites. These migrants move in hope from field to favela.

These are the neighbourhoods where the transition from poverty occurs, where the next middle class is forged, where the next generation’s dreams, movements and governments are created.

Urban children are more likely to go to school. And because children are not so economically important to their parents, urban parents tend to have fewer of them. Families build their own homes, and work with other families to build their own neighbourhoods; there is energy and originality.

Social cohesiveness is the crucial factor differentiating ‘slums of hope’ from ‘slums of despair’. This is where community-based organizations shine: community theatre and leisure groups; sports groups; residents’ associations or societies; savings and credit groups; childcare groups; minorities’ support groups; clubs; advocacy groups; and more. They have filled an institutional vacuum, providing basic services such as communal kitchens, milk for children, income-earning schemes and co-operatives.

More than 90% of enterprises in developing countries are small businesses and provide jobs for millions of people.

The goal is to align the energy and organization of the slum and shanty dwellers with the best of enlightened urban government. There are good examples of such alignments all over the world. But they are rare, for many reasons, perhaps the most important being that neither side trusts the other.



Two billion people – a third of humanity – are currently moving from rural to urban living. Almost all cities start as shantytowns but the magic of squatter cities is that they’re improved steadily and gradually – by the people, for the people. Some use squatter cities as a stepping-stone to the US, Europe or Australia. So the great migration affects all the planet.

Environmental refugees from rural Mexico, recently arrived in Mexico City.
© Mark Edwards/Hard Rain Picture Library

Development studies

Universities have departments of development studies or they subsume the discipline under geography or political science. The key question for this discipline is how to make development sustainable.

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And those who stay behind

The other side of the urban-rural coin is that by 2050, some 2–3 billion people will remain in the world's rural villages and on its farms, growing food and fibre for the vast city populations. To fulfil this heroic task, they will need the best of all modern technologies – electricity, internet, transport, healthcare, housing, storage facilities, refrigeration – all the things that so much of the rural Majority World lacks today.

They will have to adapt their farming to the changes and disasters that climate change is bringing. No matter how big the drought or flood, the effects are always local, hitting individuals, families and villages. All disasters are local. So the solutions must be forms of local development that help individuals and families cope: jobs, income, credit, insurance, healthcare and transport.

The challenge today is to connect national and international aid agencies, UN agencies and the World Bank to the local level, with national governments acting as partners to both sides as intermediaries and honest brokers.

All the energy and all the knowledge are at that local level – whether in Latin American shantytowns, remote African farms, or Pacific villages on tiny atolls. If that energy and knowledge can be encouraged by outside resources, people will be able to cope, and maybe even to thrive. Peasant farmers won't feed the future billions. Neither will unsustainable, carbon-based industrial farming.



far left Children collecting water, Kalsaka Village, Burkina Faso. The water pump, installed with NGO assistance, frees women from a 7-kilometre walk to collect water from a pond.

top Sumatra, Indonesia. Kubu tribesman, with NGO support, mapping the boundary of their reservation to help prevent illegal logging.

bottom Cameroon. Farmers build contour hedges to help prevent soil erosion. Part of an NGO project to protect forest by preserving the fertility of existing farmland.

All © Mark Edwards/Hard Rain Picture Library

Geography

Geography is unique in bridging the social sciences (human geography) with the natural sciences (physical geography). Human geography concerns the understanding of the dynamics of cultures, societies and economies, and physical geography concerns the understanding of the dynamics of physical landscapes and the environment. This sounds as if geography would be a perfect discipline for setting the planet on a sustainable path. But the discipline too often becomes too fractured and specialized and broken into its sub-disciplines, rather than connecting human society with the realities of the world it inhabits.

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Indigenous people

A lot of indigenous people live in important and threatened ecosystems: the Arctic, the Amazon and the High Andes, the remoter parts of Africa, the ‘tribal’ lands of many Asian countries.

Everyone benefits when these ecosystems are protected and managed sustainably. By and large, indigenous people have done a fairly good job of their husbandry over the centuries. Sometimes they have failed by themselves – overusing natural resources or responding ineffectively to environmental damage – but usually their failures come when foreign ‘developers’ intrude into their land and cultures.

Most indigenous groups are good at involving all people in decision-making, and are good at planning for the benefits of future generations.

Few governments have managed to figure out how to reward indigenous people for conservation services that benefit the rest of us, or how to encourage them to keep providing those services. There have been minor exceptions: local indigenous people getting a cut of the proceeds of a lodge or game reserve in their lands, or building trade through forestry.

The challenge is to come up with policies to help indigenous people to keep protecting their lands, their ecosystems – but also their cultures and languages, parts of humanity’s shared adventure on Earth that are disappearing all too rapidly.



Yanomami mother
breastfeeding her baby
and an orphan monkey,
Venezuela.

© Mark Edwards/Hard Rain Picture Library

Teacher training

Teachers around the world are developing innovative ways to work issues of sustainable development into most class levels and most disciplines: maths, literature, science, geography, art, etc. These need to be gathered and the best approaches taught in teacher training courses. There is a spectrum of challenges: from giving teachers the overall mindset to help students think about how to care for their planet and their civilization, to giving teachers the individual techniques and ‘tricks of the trade’ to do this effectively and creatively. How do you think teachers can be equipped to effectively and creatively bring sustainable development issues to the classroom?

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Bring on the goals

In the year 2000, the planet’s governments agreed to eight ‘Millennium Development Goals’ (MDGs) to be completed by 2015: eradicate extreme poverty and hunger; achieve universal primary education; promote gender equality and empower women; reduce child mortality; improve maternal health; combat HIV/AIDS, malaria, and other diseases; ensure environmental sustainability; develop a global partnership for development.

None has actually been realized globally, but progress has been made (see <http://www.undp.org>), and simply setting the goals focused attention and even resources on the issues.

In 2015, governments and the UN got busy setting the Sustainable Development Goals (SDGs), dealing with the issues covered in this exhibition. Good! But students were not consulted. And in mid-2015 there were 17 overarching SDGs and 169 ‘targets’. It “shows what happens when a bureaucratic process runs out of control”, huffed *The Economist*.

It also shows why Students Organising for Sustainability (SOS) is so crucial.

But meanwhile, let’s each of us set our own sustainable lives goals, living the change we want, not desiring more and more but desiring the right amount, being mindful of the moment but also mindful of the planet’s and our descendants’ futures. Share your goals on the WHOLE EARTH? YouTube channel.

Meeting the needs of all would require spectacular global co-operation to rebuild capitalism, financial markets and trade regimes to make it possible. This is hard to imagine when so many governments, rich and poor, are today so ineffectual, short-sighted, divided and in the control of business and markets.

What will today’s students do when they move into decision-making roles in business and government?



UNDP statistics show that the MDG goal of achieving universal primary education made impressive strides forward at the start of the decade, but that progress in reducing the number of children out of school has slackened considerably. A school founded by J. Krishnamurti in India’s Rishi Valley shows how dropout rates are greatly reduced when schools serve the whole village. Contoured and planted with fruit trees, each school is a green public space, a village commons with facilities for everyone – a place for village entertainment, adult education classes and a centre for preserving local biodiversity.

Religious studies

In June 2015, Pope Francis released a 192-page letter (encyclical) calling for a new partnership between religion and science to combat climate change. He called on people to get involved in “saving the planet”. This was the Roman Catholic position, but everyone who believes in a supreme being and creator might be expected to want to cherish and preserve the creation of that supreme being. Surely it is time for religious studies courses to reconnect theology to biology, geology, hydrology, etc?

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Changed human minds

Change, if it comes, will originate not through changing our technologies first, but through changing our minds: changing from judging success by ownership, switching from wanting more of everything to wanting the right amount, developing a sense of solidarity with those suffering the brunt of climate change. It is tough enough to dematerialize development; it is tougher to dematerialize our own mindsets.

Perhaps the best beginning would be to imagine how pleasant sustainable development could be – without pollution, weather extremes, sprawl.

Stewart Brand of *Whole Earth Catalog* fame has argued that West Coast Americans take the environment more seriously not because they are more serious than most, but because they are hedonists. Cycling is more fun than riding in a car. Being out in nature is pleasant so it is worth protecting that nature. Etc!

It is hard to change, but people who have done it – even those who have tried – have found it liberating, exhilarating and a lot of fun.



Many of us in the modern world have felt a sense of loss, of missing something, in spite of our great technological gains, which should have made us feel that life has been enriched rather than impoverished. Can we live better with less?

Village celebration, Mauritania.
© Mark Edwards/Hard Rain Picture Library

Your turn

WHOLE EARTH? has been produced by an American and an Englishman who have spent their lives with people at the sharp end, documenting environment and development issues. We have tried to present a global perspective, but we have failed because the job is too hard. So we invite the universities in the tropics and the people of the shantytowns in Asia and Africa who will be hosting the exhibition to offer their interpretations and views, to “write all their songs”.

Acknowledgements

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Jamie Agombar and **Russell Warfield** and the uniquely creative NUS sustainability team, who took this project to a new audience.

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Jonathon Porritt, co-founder of Forum for the Future, for supporting this and so many sustainable initiatives. His contribution to the debate and practice of sustainable development is unmatched. Should we achieve the transition to a sustainable way of living, Jonathon should be given much of the credit.

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Partners

EAUC

The Environmental Association for Universities and Colleges is a not-for-profit charity with a membership of over 220 universities and colleges, supporting sustainability within the UK tertiary education sector.



Gardners

Leaders in multi-format digital printing who put sustainability at the heart of their business.



Ingvar Rönnbäck and the students at The Umeå Association of International Affairs for their enthusiasm and support. You make it all worthwhile.

Tim Smit and the superhuman crew at the Eden Project for hosting Hard Rain. Eden opened the way for its display at outdoor venues on every continent, and paved the way for WHOLE EARTH?.

Swedish International Development Cooperation Agency (Sida) for making the pilot edition of WHOLE EARTH? possible.

Lloyd Timberlake worked with me on Hard Rain and wrote the text in WHOLE EARTH?. He cuts through to the core of the argument like no-one else. Huge thanks for taking the project through to this next stage. What you might not know about Lloyd is that he is also a brilliant juggler – and performed on stage with the Rolling Stones.

This project began when a **Tuareg** nomad played me “A Hard Rain’s A-Gonna Fall” when I was lost in the Sahara desert. Very special thanks to **Bob Dylan** for inspiring the original Hard Rain exhibition, and allowing the use of his lyric and a live version of “A Hard Rain’s A-Gonna Fall” in exhibitions, presentations and the Hard Rain DVD, and to the people of the Sahara who rescued me.

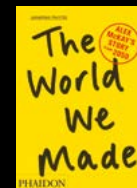
Joan Walley, Chair of the House of Commons Environmental Audit Select Committee 2010–2015 for her support and encouragement and for a lifetime dedicated to making the world a better place.

Additional photography

I’m so grateful to be able to include wonderful photographs and a cartoon from the following artists and organisations, in order of appearance: **David Woodfall**; **Chris Steele-Perkins**/Magnum; **David Horsey** (for the cartoon); **Michael S. Nolan**/Specialist Stock; **NASA**; **Hartmut Schwarzbach**; **Peter Menzel**; **Gregg Segal**; **Arthur Rothstein**/FSA; **A. Zhdanov** and **S. Rocha** with kind permission of the UN Environment Program, Focus on Your World collection; and **Daniel Dancer**.

Further reading:

The World We Made, by Jonathon Porritt, imaginatively looks back from the year 2050, describing how society created a civilisation that is sustainable: green, just, and truly democratic. We can have such a world, if we act immediately, he argues.



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NUS

The National Union of Students is a confederation of 600 students’ unions, collectively representing 7 million students in the UK.

They are student led and have 240 staff, of which 24 now work full-time on sustainability. NUS delivers student-driven sustainability projects in 85 universities and colleges and 60 community organisations including hospitals, local authorities and other public services.



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