The UNEP Magazine for Youth

TUNZA

for young people · by young people · about young people

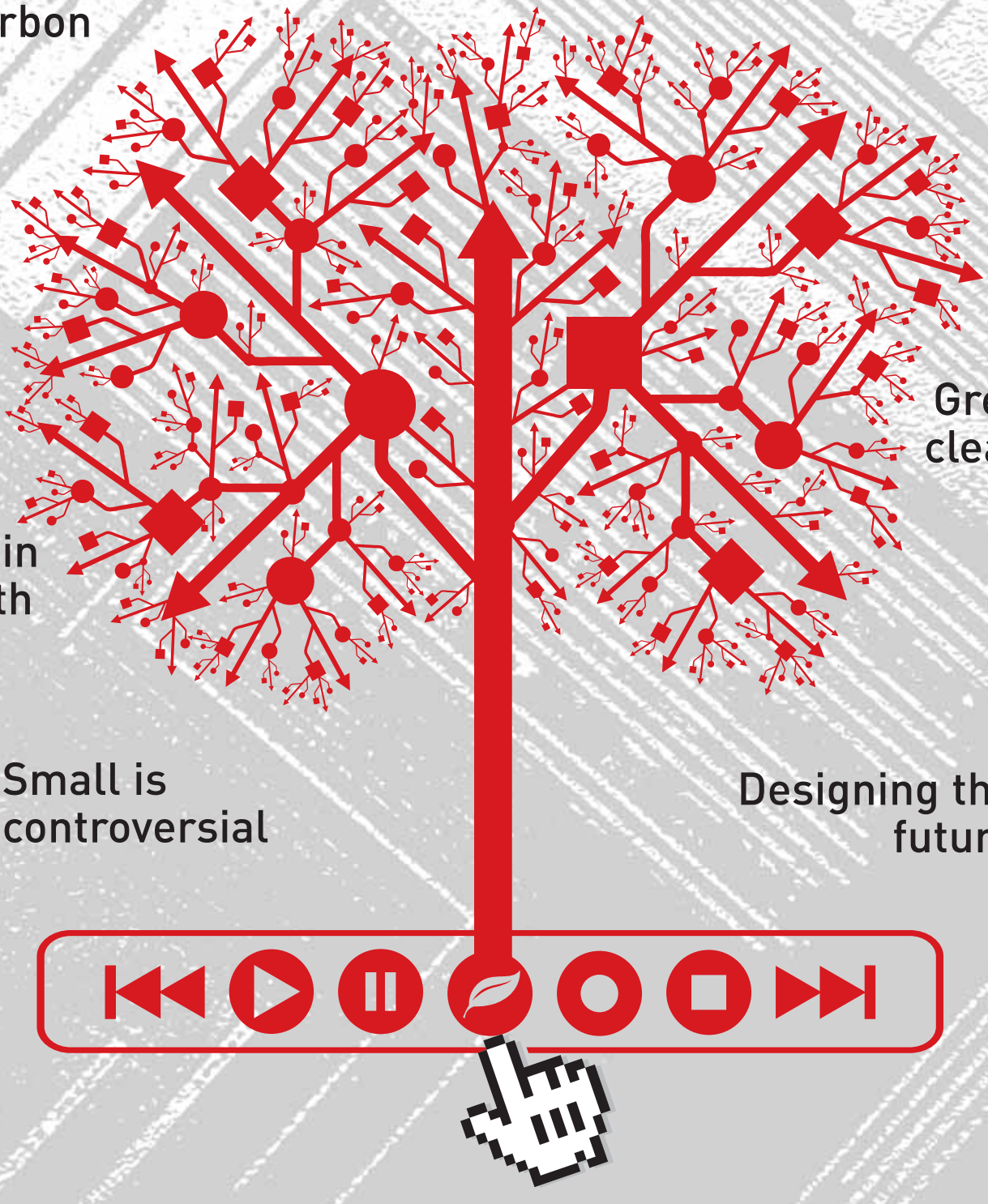
UNEP

Technology and the environment

Tunza Conference

Capturing carbon

Perennial dilemma



Greener cleaners

Virgin Earth

Small is controversial

Designing the future

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Partners for Youth and the Environment

UNEP and Bayer, the German-based international enterprise involved in health care, crop science and materials science, are working together to strengthen young people's environmental awareness and engage children and youth in environmental issues worldwide.

The partnership agreement, renewed to run through 2010, lays down a basis for UNEP and Bayer to enlarge their longstanding collaboration to bring successful initiatives to countries around the world and develop new youth programmes. Projects include: TUNZA Magazine, the International Children's Painting Competition on the Environment, the Bayer Young Environmental Envoy in Partnership with UNEP, the UNEP Tunza International Youth/Children's Conference, youth environmental networks in Asia Pacific, Africa and Latin America, the Asia-Pacific Eco-Minds forum and a photo competition, 'Ecology in Focus', in Eastern Europe.

Cool & **Cooler**

COOL: Wildlife-watching: birds, bears, dolphins, butterflies...

COOLER: Getting involved in wildlife surveys. Contact your local council, or national or regional environmental organization, find out what surveys are taking place in your area, and volunteer to help.

COOL: Energy-saving escalators. Escalators and moving sidewalks are handy. But continuously running motors consume enormous amounts of energy. Automatic stop/start escalators stop moving when they sense no one is using them, and turn on only when approaching riders walk though a barrier linked to a power switch. Some escalators and people movers are configured to use less energy by moving slowly when carrying a lighter load, and speeding up when more people step on.

COOLER: Taking the stairs – while helping that little old lady with her bags.

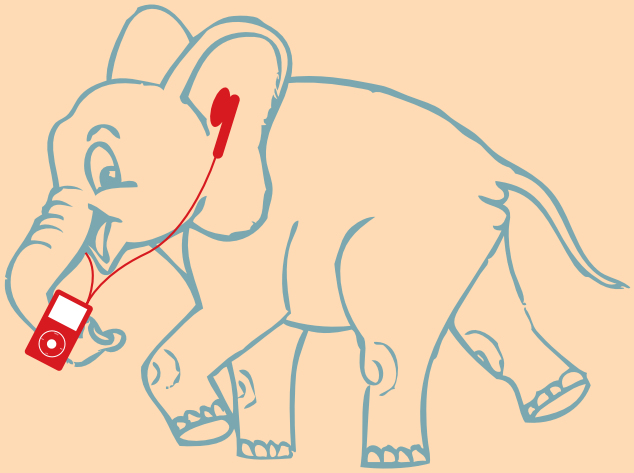
COOL: Clothes made of hemp.

COOLER: Surgical gowns made of bamboo. Bamboo contains a substance that kills bacteria, so researchers in Coimbatore, India, have used its fibre to make a highly absorbent garment that reduces the risk of infection during surgery.

COOL: Recycled rubber tyre swings. Eco-nostalgia: be a kid again, spinning under a tree.

COOLER: Recycled rubber tyre sandbags. Sandbags used to control erosion often disintegrate. Recycled tyres are now providing a sturdier substitute, and using them – instead of dumping them – takes pressure off landfills. Eco-Blocks made from tyres can be interlocked, stacked, and glued or staked into place, and can be reused for up to 10 years.

COOLEST: Recycled rubber tyre houses. Earthships, the brainchild of Michael Reynolds of New Mexico's Solar Survival Architecture, are houses made of stacks of recycled tyres rammed with dirt, packed with mud and plastered with adobe or stucco. The company teaches people how to construct them, and offers demonstrations to officials in disaster-relief areas like Mexicali, Mexico, and La Paz, Bolivia.



EDITORIAL

Technology is one of the things that separates humans from animals, and it has increasingly shaped our world. From earliest times, people have applied their knowledge to making tools and machines that serve their purposes – from the wheel to the computer. Some now laud technology as the foundation of all prosperity, and believe that few constraints should be put on its development. Others condemn it as the cause of massive environmental damage, and call for strict controls. But the truth is that it is both and neither. Technology has both helped bring wealth to much of the world, and been the instrument of much of the harm done to the planet and its life. But in itself it is neutral; its effects, for good or ill, are down to what we make of it.

As our scientific knowledge, and our ways of putting it to practical use, rapidly increase, we need to ask two questions. Technology for what? And technology for whom? Everything depends on the answers. It should be used for development, not destruction, it should benefit humanity as a whole rather than just the already wealthy few and, rather than be used to promote economic growth at all costs, it must continue to be underpinned by the vital services provided by a healthy planet.

One key is to ensure that technology is appropriate: empowering to the people that use it, suited to the places where it is applied, and – above all – designed to promote the sustainable development that eliminates poverty while safeguarding the Earth and its natural systems. Another is to ensure that it is widely shared, so that as many people as possible benefit from it. There are many cases where technology has fulfilled both these goals; more often, however, it is not even intended to do so. Our generation must redress the balance and concentrate resources and effort on developing technologies suited to our age, and to our fragile, interdependent world.

Letting in daylight

There's nothing like daylight – as those that are unfortunate enough to work at desks away from windows know too well. Overexposure to bright electric lights causes stress, whereas natural light can aid in relaxation. Producing electricity for lighting usually involves burning fossil fuels and emitting the carbon dioxide that causes global warming, but daylight is non-polluting and free.

Now a simple new technology, tubular skylights or solar pipes (as used at the clothes shop pictured right), brings natural light to interiors far from windows. It redirects sunlight through a clear plastic or glass dome fixed on a roof and sends it down a metal tube to the ceiling of the room to be lit. There, the concentrated light hits a lens or mirror that diffuses it, spreading out the daylight.

The tube was a big hit in Australia where it was first commercially produced in 1991, then spread to the United States of America, where it is used in schools and shopping malls. Today, solar tubes are being produced and used from Argentina to China, Guatemala to Japan, Mexico to Poland, Russia to the United Arab Emirates. The Food and Agriculture Organization of the United Nations has even considered using tubular skylights in developing countries to help micropropagation – starting plants in tissue culture, which increases the number of healthy seedlings.

The tubes can be installed easily, and are cheaper than solar cells. More advanced versions of them track the sun and can pull light down more than 100 metres.

Lighting accounts for up to 50 per cent of commercial energy consumption and up to 20 per cent of industrial consumption, so this emerging technology – besides improving well-being – could make a big cut in carbon dioxide emissions.


Aconccio Studio

Written nearly 300 years ago, Swift's words remain a telling endorsement of the importance of technology. And the scientists that developed the seeds that made possible the famous Green Revolution of the late 1960s and early 1970s fully deserved the accolade. Wheat and corn bred at the International Maize and Wheat Improvement Centre, in Mexico, and rice developed at the International Rice Research Institute of the Philippines were two or three times more productive than traditional varieties. Harvests soared. India, long a byword for famine, quickly reached the brink of self-sufficiency in cereals and was able to provide massive food aid to the newly independent Bangladesh; for a while she came second only to the United States as a donor. Mexico, the other country to pioneer the new crops, exported a tenth of her harvest for five years.

And yet malnutrition initially remained widespread in both countries, and a United Nations report concluded that the miracle crops had done little to increase the amount of food their people ate because so many remained too poor to buy enough. In some ways the Green Revolution made the poverty worse. Small subsistence farmers could not afford to buy the expensive new seeds, or the fertilizers they needed to make them so productive, and ended up being pushed off their land in favour of richer farmers able to make use of the new technology. Modern machinery was brought in to cultivate the bigger fields, which meant that the newly landless poor could not even get work as farm labourers. The variety of crops grown diminished as monocultures took hold, and biodiversity suffered as traditional agricultural methods that were friendlier to wildlife disappeared.

Lessons were eventually learned and care was taken to integrate the new crops into existing agricultural systems. And in the long run they ended chronic famine and helped to halve malnutrition in South Asia over three decades. But the story shows both the upsides and downsides of technology. There was nothing wrong with the Green Revolution seeds: they had great advantages and brought enormous benefits. But, like other technologies, they were not silver bullets capable of solving all of humanity's problems, and, where used inappropriately, they could also do great harm.

Controverisal technologies

Similar debates now surround a host of controversial new developments, including biofuels, nanotechnology, genetically modified crops, and automatic surveillance techniques. All could confer great benefits; all pose considerable risks. Everything depends on how – and for whose benefit – the technologies are used.

At the time that the Green Revolution was at its height, another famous book – *Small Is Beautiful* by E.F. Schumacher – was popularizing the concept of 'appropriate technology'. This means developing technologies that are suited to the environment, culture and economic situation in which they are used, so as to get the most benefit from them.

Appropriate technologies may be old or new, simple or high tech. People-powered pumps using cups tied to string,

Technology can help...

'***Whoever could make two ears of corn or two blades of grass to grow upon a spot of ground where only one grew before, would deserve better of mankind... than the whole race of politicians put together.***'

King of Brobdingnag,
in Jonathan Swift's classic satire Gulliver's Travels

which anyone can repair, are turning out to be much more appropriate – and much better at providing local people in remote areas with clean, life-saving drinking water – than modern ones requiring costly parts, fuel and maintenance. Yet mobile phones are proving to be a godsend in providing communications and spurring development in the same areas, which are unreached by landlines. By the same token, houses may be best made of simple, traditional local materials like rammed earth, but best lit by white LED lights powered by solar cells.

Renewable energy

Renewable sources of energy are increasingly proving to be appropriate technologies in both developed and developing countries. The sources of their power – the sun, wind or water – are distributed free by nature, allowing energy to be generated where it is needed. In developing countries, this makes it possible for people to have all the advantages brought by electricity even when they live far from the electricity grid. Where there are grids – as in developed countries or the cities of developing countries – the same free distribution enables families to generate their own electricity, feeding the surplus back into the general supply, thus reducing the need to build costly new power stations. And, wherever they are used, the renewables emit no carbon dioxide, and so are important in combating global warming.

Yet, however appropriate technologies may be, they cannot be relied upon to solve problems in the absence of action by people and governments. The efficiency of car engines in the United States of America, for example, has increased steadily over the past two decades, but this saving has been entirely offset by increases in the weight, size, power and accessories of the vehicles, so they burn just as much fuel per kilometre – and contribute just as much to climate change – as before. This has happened because the price of petrol remained low, and because government standards for car-fuel economy were not increased.

In fact, firm action is often needed to bring about technological change in the first place. Necessity remains the mother of invention: increasing incentives and rising legal standards almost invariably bring new technologies to market, sometimes even bringing out inventions made long ago but not commercialized because of a wish to get the maximum value out of the existing technologies before taking a risk with something new.

Sweet solution

Christopher Columbus said he had 'never beheld so fair a thing' as the rainforests of Haiti when he reached the Americas. Today they are almost all gone, and the bare land is severely eroded. What remains is threatened by making charcoal, the country's main cooking fuel. Now students at the Massachusetts Institute of Technology have worked out how to make charcoal briquettes from sugar cane bagasse, an abundantly available waste from one of Haiti's main crops. Dried bagasse is carbonized in an oil-drum kiln, mixed with cassava porridge and pressed into briquettes. These burn better than wood and produce less indoor pollution, a major cause of disease and death in the developing world.

KVA Matx

Permaculture Research Institute/priflickr

Call of

Agriculture can use huge amounts of water for irrigation as well as fossil fuels to power machinery and create pesticides and fertilizers. And it clears land that could sustain many different species, replacing them with the few that feed us.

Permaculture – developed by Australian environmental scientist Bill Mollison and his student David Holmgren – aims to produce food with fewer inputs while improving the environment. A wildlife biologist, Mollison observed that natural systems like forests and wetlands are self-sufficient and interlinked, with their different components working together: insects, for example, pollinate plants and provide food for birds, whose droppings nourish the soil. Permaculture sets out to mimic natural ecosystems to create large yields in a self-sustaining system of perennial agriculture involving a diversity of plant and animal species.

The idea is not new. Native Americans have long planted squash, maize and beans together: the beans climb the maize while fixing nitrogen to fertilize the soil; the squash covers the ground, discouraging weeds and retaining moisture. Similarly, contemporary Mayan forest gardens still grow many species of plants for food, timber and medicine, without ploughing and using only organic fertilizers.

The principle of permaculture is designed for application just about anywhere, from urban kitchen gardens to swampland or tropical rainforests. Says Mollison: 'Instead of "What can I demand this land to do?", anyone who asks instead "What does this land have to give me?" will naturally work in harmony with the Earth.'

Light clothing

High technology and traditional craft are combining to lighten the lives of Mexico's semi-nomadic Huichol people, who live in the Sierra Madre far from electricity grids. Women weave and sew high-brightness LEDs (light-emitting diodes) and flexible photovoltaic panels into textiles to make the Portable Light. They are then worn or hung outside to charge by day, storing enough energy to provide light for four hours of reading and writing after sunset. Such literal enlightenment is also being tried out by aboriginal people in Australia.

Greener greenhouse

High in the Himalayas – where temperatures can fall to -40°C – people are growing a range of vegetables and medicinal plants in greenhouses all the year round without using any fuel to heat them. They do it by using passive solar greenhouses, oriented to capture the maximum amount of the sun's heat, instead of burning propane or other fuels. Heat is stored in rock, earth or water, and released when the temperatures outside fall. Some designs even collect rainwater for irrigating the crops.

Martin Hughes

Professorhojo/Flickr

the wild

'First you take stock of external factors like climate, topography, soil and water supply, then choose plants and animals highly suited to these. Then you make the highest possible number of functional connections between species. Each plant or animal should serve a number of functions, and should also interact with others.'

Mollison has spent the last three decades teaching and encouraging people to establish permaculture communities, encompassing eco-villages and sustainable housing: he himself lives in one he founded in Tasmania.

And it's not just for richer countries. UNHCR, the United Nations refugee agency, has adopted permaculture principles to make the most of scarce land and water resources to help refugees attain self-sufficiency in Zimbabwe, and has used them to rebuild villages in war-torn Iraq.

Perhaps they have been most widely applied in Cuba. After the Soviet Union broke up, the country could not get enough oil to sustain its industrial agriculture. In 1993, its Government gave a grant to Australian permaculture consultants to establish a demonstration project in the capital, Havana, and to carry out training. People began growing food – bananas, pumpkins, grapes and more – in gardens on rooftops and patios as well as in car parks. Today, Havana grows 50 per cent of its own vegetables, while in other Cuban cities and towns, between 80 and 100 per cent of produce is grown locally.

'I like to call permaculture a "humane technology" because it deals in a very basic way with simple, living elements,' says Mollison. 'It doesn't involve complicated technology; it's a biotechnology which people, as living beings, can intuitively handle.'

Loans for phones

Mobile phones – and an innovative way of using them – are connecting remote communities in developing countries with the rest of the world for the first time. The Grameen Village Phone programme is bypassing the need for phone lines by setting up mobile phone businesses, giving villagers, mainly women, loans to buy a phone. The new entrepreneurs rent the phone out on an affordable call-by-call basis. Villagers can reach medical services, keep in touch with friends and family and even run businesses. And the operators earn profits to repay the loans and pull themselves out of poverty. Launched in Bangladesh in the late 1990s, the idea has spread to Cameroon, Rwanda, Senegal and Uganda.

Jeeves Sinclair/Flickr

Grant Gibbs/Hippo Water Roller Project (www.hipporoller.org)

Rolling hippos

Fetching water is an arduous, interminable, back-breaking daily task for women and children all over the developing world. They may have to trek for six hours or more a day, carrying 20-litre containers on their heads. The Hippo Water Roller replaces these containers with polythene barrels with steel handles, which are easy enough even for children and old people to push or pull over rough terrain. And since the Hippos can hold 90 litres of water each, they reduce more than fourfold the number of treks needed.

Water power

Some 45,000 African subsistence farmers have increased their incomes up to 10 times through simple foot-powered pumps. The pumps, which provide water for small-scale irrigation, were invented by a non-profit organization KickStart, and are now in use in Kenya, Mali and Tanzania, helping to grow high-value vegetable crops on small plots. The early designs pulled water from as deep as 7 metres; later versions can also push water uphill, making it possible to irrigate a slope from a stream or other water source at the bottom of a slope.

TUNZA answers your QUESTIONS

Q&A

1-2-3-4-5-6

Q How can technology best be harnessed in the service of people and the planet?

A The challenge is to harness technology so that we at least maintain standards of living in the developed world and improve those in the developing world while reducing our impact on the natural environment. That will probably involve accelerating innovation by investing a lot more in research and development (R&D). We need new institutions, visionaries, inventors and engineers, and we need to encourage more young people to become involved in and excited by science and technology. Environmentally sustainable technological R&D has to be seen as a public good if we are to begin harnessing new technologies in the service of people and the planet.

Q Is developing technology all we need to do to solve problems like global warming?

A Of course not, though technological developments – from harnessing wind, wave and solar power to carbon capture and storage – will certainly help. Fundamentally we have to change attitudes and evolve patterns of behaviour that provide stewardship for the planet. This particularly includes changing our patterns of consumption to reduce our impact on the Earth.

coal – for generating electricity. This poses two immense problems. First, though it will not run out anytime soon, oil is expected to get increasingly scarce, with production peaking in the next decades, putting an end to the cheap supplies that have powered industrial civilization. And second, burning it causes global warming, and there is still enough oil in the ground to destroy the atmosphere. We must tackle both problems by using it more efficiently – wasting less and consuming more sustainably – and by vastly increasing our efforts to develop renewable, non-polluting sources of energy.

Q We hear that 'waste is a resource we haven't yet found a use for…'. Can you explain?

A Wastes, by definition, are products we don't value. But many wastes, including ones currently considered hazardous, can be recovered, recycled and reused. For example, biodigesters can convert animal and human sewage into methane that can be used as a fuel for cooking and heating, and even for generating electricity, while the second generation of biofuels may well be developed from waste products such as sawdust and straw.

Q How do we make technology our servant rather than our master?

A There is no substitute for human intelligence and its transformational power. The challenge lies in striking a balance between common sense and innovation. This involves widespread acceptance by science, industry and consumers of the precautionary principle. The principle – enshrined in such traditional wisdom as 'better safe than sorry' or 'an ounce of prevention is worth a pound of cure' – provides for preventative action to be taken where there is good evidence that something may cause irreversible damage to people or the environment, even if there is no absolute proof of this. The principle has been attacked for impeding progress but, properly applied, it can boost safe technologies while minimizing the kind of damage that has been done heedlessly, for example to the Earth's ozone layer and climate.