

Sustainable cities

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In 2007, for the first time in human history, people living in towns and cities will outnumber those living in rural areas. Over the past one hundred years, urban populations across the globe have expanded from around 15 per cent to more than half the total. The current rate of expansion cannot be supported. This article discusses an innovative project to create truly sustainable cities, and outlines some of the possibilities that are available with sufficient government and consumer buy-in.

Expanding beyond our means

Already 80 per cent of Europeans live in urban areas and the figures are much the same for the Americas and Australia. Compounding this situation are the projections from the UN and other institutions that world population is set to grow rapidly over the next three to four decades, boosting human numbers by 50 per cent from the current 6.5 billion to approximately nine billion in 2050. That is around 80 million new citizens a year. Half this global increase will happen in just nine countries. In order of the magnitude of their projected growth they are: India, Pakistan, Nigeria, Democratic Republic of the Congo, Bangladesh, Uganda, the United States, Ethiopia and China. Most of this demographic expansion will take place in the economically less developed countries.

Herbert Girardet (1999) notes that the size of the modern city is unprecedented: in 1800 there were only two cities with more than a million people – London and Peking. At that time there were only 20 million city-dwellers around the world scattered across one hundred cities. The geographic scale of these cities was also relatively small, covering on average a few thousand hectares. However, by 1990, 220 million people lived in the 20 largest cities. These are mega-cities of over 10 million people covering areas of hundreds of thousands of hectares. And now at the start of the new millennium there are hundreds of cities housing in excess of a million people.

A large number of the world's cities and major towns have grown up around areas of high agricultural potential, on silt-rich floodplains, close to water sources or highly productive coastal zones. As they further expand, some of the world's most productive land will be lost to development, and rivers and oceans will be increasingly threatened by urban waste. If cities, like population, double in area, then by 2050 urban areas could cover as much as six per cent of the surface of the planet. Given that

| GLOBAL MEASURES OF BIOLOGICALLY PRODUCTIVE AREA | |
|--|-----------------------|
| Cropland | 1.3 billion hectares |
| Grazing land | 4.6 billion hectares |
| Forest | 3.3 billion hectares |
| Fishing grounds | 3.2 billion hectares |
| Built-up areas | 0.2 billion hectares |
| TOTAL | 12.6 billion hectares |
| TOTAL – 10 per cent for biodiversity | 11.3 billion hectares |
| Per capita allowance (assuming global population of 6.15 billion) | 1.8 global hectares |

only between 10 and 15 per cent of the land is considered suitable for arable farming, this could have a huge impact on food production, especially in the poorer countries.

Ecological Footprints

A city's ecological footprint (see box on next page) extends far beyond its geographic boundaries and its need for energy, food and materials acts as a serious drain on resources that often extends across the globe. Ecological footprint measures humanity's demands on nature. It estimates whether the impacts of our lifestyles – the processes, products and services we use as individuals or communities – fall within the Earth's regenerative capacity.

For example, Girardet has calculated that the footprint of London – with 12 per cent of Britain's population covering an area of 158,000 hectares – comes to almost 20 million hectares or 125 times the land-surface covered by the city itself. This vast area, required to meet Londoners' demands, is equivalent to the entire productive land base of Britain!

Sustainable development has become such an overused term, and one used in so many different contexts, that many people have lost sight of what it actually means. Similarly, defining what constitutes a sustainable lifestyle or community is clouded by the wide ranging, and often hidden, impacts of our globalised lifestyles, i.e., the

geographically diverse sources of the products we use and the widespread impacts of the wastes we generate. Yet if we are to persuade people to live sustainably, we need a robust way of judging what constitutes a sustainable lifestyle.

Ecological footprinting has been developed with the aim of bridging this gap. Simply put, ecological footprinting measures humanity's demands upon nature. Specifically, it measures the impacts of our lifestyles on the health of the planet. It is essentially an accounting tool that can be used to calculate the total impact of our various activities in terms of the area of biologically productive land required to sustain them. Every facet of our lifestyle can be broken down into the land area required to provide us with a specific good or service. For instance, the area needed to produce our food, sequester the carbon we emit, absorb the pollution we produce and meet our energy demands can all be calculated. The resulting total can then be compared to our 'allowable area', which is the total biologically productive area of the world divided by the global population. Our individual 'fair share' is currently about 1.8 hectares per person, as shown in Table 1.

Globally, we are consuming about 20 per cent more than the planet can sustain. In other words, we need 1.2 planets to meet our present demands; we are clearly living beyond our means. It's like eating into the capital in a

bank account instead of living off the interest. Moreover, if everyone adopted the consumer patterns of the Europeans or North Americans then we would need the equivalent of between 3 and 5 planets to support us!

So, faced with this kind of challenge can we develop intelligent solutions to meet the demands of a rapidly growing population in an increasingly urbanised world?

What are the solutions?

Although some environmentalists are of the mind that post-war developments in production technologies are at the heart of the problem; others such as authors: Bill McDonough and Michael Braungart *Cradle to Cradle*, 2002, Lester Brown *Plan B*, 2003, Paul Hawken, Amory and Hunter Lovins *Natural capital*, 1999, Janine Benyus *Biomimicry: Innovation Inspired by Nature*, 1997 and Jonathon Porritt *Capitalism As If The World Matters*, 2005 believe that the only way of achieving sustainability is through a 'second Industrial Revolution' and we would add an 'Energy Revolution'. As Porritt points out there are three variables in the equation: population, consumption patterns and technology. As the first two are generally treated as taboo by most governments this appears to leave technology as the only 'politically correct' option.

WWF and BioRegional, partners in the One Planet Living Initiative (OPL), believe that the future lies in harnessing technological innovation to create sustainable communities that

demonstrate how people everywhere can enjoy a high quality of life while living within the carrying capacity of the planet. The initiative aims to make sustainable living easy, attractive and affordable throughout the world. The OPL vision is of a world in which people everywhere can lead happy, healthy lives within their fair share of the earth's resources.

We are currently working with local people, companies and governments around the world to help create communities, products, and services, which can help people everywhere live within a fair share of the Earth's resources. We have identified a set of 10 principles that can be used to

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create a 'sustainability action plan' for individuals, companies, local authorities, cities, a region or indeed a whole country. Having 10 principles allows us to implement positive measures which can help change the default of our daily lifestyle decisions from ones that are unsustainable to ones that are sustainable, and set measurable targets for achieving these. The principles seek to address the basket of human needs – housing, clothing, food, healthcare, education, energy, mobility and leisure – as well as environmental sustainability.

To demonstrate One Planet Living

The 10 One Planet Living Principles

- Zero carbon
- Zero waste
- Sustainable transport
- Sustainable materials
- Local and sustainable food
- Sustainable water
- Natural habitats and wildlife
- Culture and heritage
- Equity and fair trade
- Health and happiness

in practice, WWF and BioRegional are working to create innovative public-private partnerships to develop 'Pioneer Communities' on every continent that will act as flagships to demonstrate sustainable urban living. Each will have a 'One Planet Living Centre' to explain the issues behind our ecological footprint and promote sustainable lifestyles. The 'One Planet Living' brand awarded to these communities will be promoted among businesses and to the general public as symbols of quality as well as sustainability. The communities will go a long way to helping reduce regional footprints, but their primary purpose is to show policymakers, investors and consumers alike that sustainable cities are both feasible and desirable.

Work is currently underway in

An example of how ecological footprints are calculated

How do we calculate the land area required to provide us with the services we use daily?

Food is an interesting example because getting food onto our plates impacts nature in diverse ways:

- Area to grow the food;
- Energy and minerals required to produce agricultural inputs;
- Energy to transport the food;
- Materials to package the food;
- Methane emitted when the food is thrown away.

The ecological footprint of our food is the sum of all these parts, but is non location specific. So for a loaf of bread the area required to grow the wheat can be calculated, yet in reality the area required will vary from place to place due to differing fertility levels of the soil. To account for such differences, a global average yield is calculated for each major foodstuff, and these numbers are used when calculating impacts involving that crop or products derived from it. Similarly, the average global productivity is calculated for products such as timber or fibres. The area that would need to be reforested to offset energy use and consequent emissions of greenhouse gases is likewise calculated, based on the idea that biomass can absorb the emitted equivalent volume of carbon dioxide.

Examples of land areas required are:

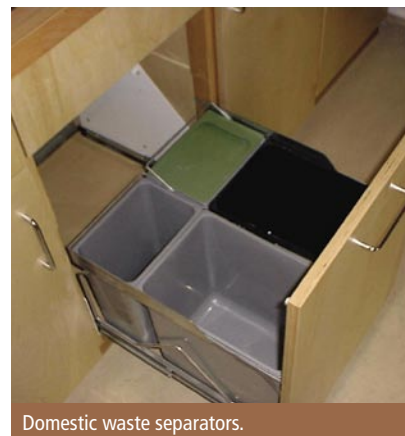
- 25 hectares of fishing grounds / tonne of fish
- 1.3 hectares of forest / m³ timber
- 0.35 hectares forest / tonne CO₂ from fossil fuels



Mata de Sesimbra – artist's impression.



A prototype of the "eco-block" house built by OPL partners Pelicano SA.



Domestic waste separators.

Europe, Australia, China, North America, South Africa and the United Kingdom to create these partnerships, and is at an advanced stage in Portugal. Here, a One Planet Living 'sustainable city' already has a site, masterplan, and highly sophisticated sustainability and conservation plans.

The Mata de Sesimbra development, 30 kilometres south of the Portuguese capital Lisbon, is a €1.1 billion residential and eco-tourism project that will build 8,000 zero-carbon, zero-waste eco-homes, hotels, shops, and sports and community facilities for up to 30,000 people. The project is under development by Portuguese company Pelicano SA and has secured financial backing from one of Portugal's largest mainstream banks. The government's statistical services estimate it will create over 11,000 jobs in an area of higher-than-average unemployment.

This development aims to show that it is possible to create an urban development that restores nature, and that makes it possible to live in an environmentally sustainable community and at the same time enjoy a high quality of life.

Buildings will be built using a revolutionary new non-toxic material that has low-embedded carbon, incorporates high quantities of recycled material yet is sufficiently flexible to create beautiful homes and whose thermal insulation qualities are such that they are comfortable to live in throughout the year without additional heating or cooling. The building system is fast and simple, low impact, and produces next to no waste.

Houses will be fitted with a normal range of quality electrical appliances, but because they will be energy efficient, energy consumption will be 40 per cent less than a comparable home. Energy required to heat and cool houses will be reduced by 95 per cent by using solar gain, optimal glazing and insulation, and bio-climatic solutions. Reducing, reusing

and recycling waste will be made easy by maximising the amount of produce available directly from local farmers, thus eliminating the need for excessive packaging and reducing transport costs and therefore greenhouse gas emissions. Placing separators inside the home and collecting separated waste from each home by electric truck will help reach the target of reducing the amount of waste that goes to landfill to just five per cent.

On-site facilities mean that over 90 per cent of organic waste can be composted and used for planting trees and shrubs, and even old clothes and electrical appliances can be dismantled or repaired.

Households will be water-efficient. Overall domestic water consumption will be 25 per cent less than that of similar dwellings in Portugal. Water for irrigation of all public spaces, including outdoor leisure facilities and golf greens, will be provided entirely by the recycling of waste water and the collection of rainwater from roof surfaces stored in 40 lakes built specifically for that purpose.

The design of outdoor spaces will include innovative measures such as 'brown' golf greens, using drought-tolerant varieties of grass and shrubbery, inserting water absorption materials into soil to maximise water retention, and using automated sensors to ensure watering only when necessary. Within the home, air-flow taps will reduce water consumption by an estimated 50 per cent but will give the same sensation of a 'power-shower'. This will also cut bills for heating water by around 60 per cent.

The developers bought the building rights to 11 other projects scattered about the area – one of them near protected sand dunes and beaches – and sought permission to pool construction into a single, high-density zone away from protected or sensitive areas. They opted to do so in order to prevent the fragmentation of habitat corridors that commonly occurs with urban sprawl. Pelicano, the developer, has also signed agreements with local landowners to stop further development here, and restore an area of 4,600 hectares around the development, currently occupied by



'A Living Machine' – for waste water treatment.

degraded exotic pine plantations and sand quarries, to native Mediterranean woodland. The €120 million restoration and conservation programme is entirely privately-funded, and includes linking habitat corridors through ‘green belts’ created within the development itself. Cities can and should be rich in biodiversity. The project’s conservation plan will help protect endangered birds of prey in the region and will work to reintroduce a range of plants and animals that have become locally extinct. This is a good example of how a partnership approach can ensure the market delivers net benefits to the environment.

This One Planet Living ‘city’ will have its own recreational, leisure, commerce and even spiritual services, and a comprehensive internal transport network designed to render the need for private car use obsolete. A comprehensive network of footpaths and cycle routes (complete with free bicycles) will be matched by dedicated hybrid shuttle routes linking every part of the development, and a car club for family outings further afield. But the project also aims to have a profound impact on mobility throughout the region. A €90 million sustainable public transport programme has been included in the project, which will build dedicated eco-shuttle lanes, park-and-ride networks connecting to rail networks, and provide direct transport to key points around the region and to Lisbon. To encourage uptake of these facilities, residents and visitors to Mata de Sesimbra will have an “eco-points” card where they can earn “credits” when they use the green transport facilities which then translate into discounts in local shops and restaurants. Removing cars from the centres of our cities is good for the community and good for public health. The increase in road traffic is driving children indoors where once they might have played on the street and causes or exacerbates physical and mental health problems amongst urban populations. The sustainable transport plan shows how protecting the environment can help protect our community.

Another way this development will profoundly impact both the region’s ecological footprint and economy is through the creation of a local producer’s accreditation scheme. Food miles now account for a heavy proportion of the ecological footprint of the average European citizen (see below).

When WWF partners BioRegional – who are based in London – compared the carbon footprint of strawberries grown in nearby Kent with those

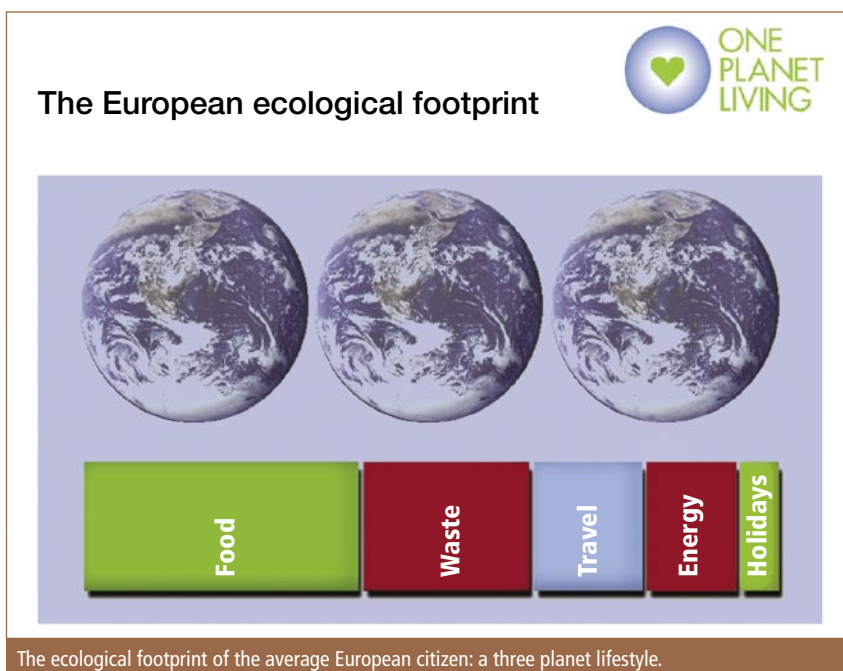


Car-free zones at the heart of the city.

imported from Israel, they found that for every tonne of strawberries, the Israeli imports ‘weighed’ an extra 4.6 tonnes in CO₂ emissions from air transport! The Mata de Sesimbra project has set as one of its core objectives that at least 50 per cent of products and services are to be sourced from within a 50 kilometre radius (and that of the remainder, the majority should come from within national boundaries). For example, at least half of all the food sold or served in the shops, restaurants and hotels on-site must have been grown locally by local producers. This will provide a welcome boost for small-holders in a region where traditional horticulture has been suffering from the advance of globalisation. The local region is famed for its high-quality cheeses, olive oil,

fresh fish and wines, but more sustainable produce and practices are being lost as pressure increases on farmers to meet mass market demand more cheaply. Local knowledge and customs are an important part of a truly sustainable community and should be nurtured.

Indeed, one of the problems with many of today’s cities and new towns is the blurring of local identity, and the loss of history and heritage. The Mata de Sesimbra development has a specific Heritage Plan to raise awareness of and promote the area’s values. On-site, there will be special promotions of local crafts and produce, and people will be encouraged to visit fairs, festivals and castles in the area as a way of preserving and promoting the region’s heritage. The project even has a ‘Quality of Life



Plan', designed to promote happy and healthy lifestyles. There are plans to use the development programme to generate a wide range of other spin-off benefits too – regenerating existing neighbouring urban areas pock-marked with blight and degradation, and a 'green levy' on house sales and hotel stays to go into a fund to save the country's most endangered species and ecosystems.

The Mata de Sesimbra partnership gives us an exciting vision of what a sustainable city can look like, of how sustainable development can be used to bring benefits to people and the planet. The One Planet Living communities in Portugal and elsewhere will show that it is possible to create cities attractive to residents, investors and policymakers alike. Given the inexorable flow of people into urban centres, the need for this kind of approach has acquired a fresh impetus. Cities can be sustainable – socially, economically, and environmentally – and the One Planet Living principles are an indication of an holistic approach that can be applied to achieve these objectives.

The objective of the One Planet Living initiative is to make such flagship projects the mainstream in our society. In 2001, UN Secretary-General Kofi Annan said: "Our biggest challenge this new century is to take an idea that seems abstract – sustainable development – and turn it into a reality for all the world's



BedZED, UK – an example of high density urban living.

people". For sustainable development to become a global reality, governments need to support and nurture the process and help people and businesses to overcome the barriers that currently exist in the housing marketplace. These include creating fiscal incentives to facilitate the financing and development of eco-efficient homes and other infrastructure developments, and to stimulate sustainable consumer demand. Changes to planning and building regulations would also speed up the transition and help achieve sustainability

targets. Governments need to move away from subsidising the carbon economy – through tax-breaks and benefits for the oil and gas industry, for example, and put the focus on supporting innovation that will enable the rapid expansion of a carbon-neutral economy based on renewable forms of energy. The challenge is to create partnerships between business, government and civil society to build a One Planet Economy.

ABOUT THE AUTHORS

Eduardo was officially appointed full-time co-ordinator of the joint WWF/BioRegional OPL (One Planet Living) initiative in Portugal in November 2004. In regular consultation with the two organisations, he is responsible for managing the project and the relationship with Pelicano SA – the Portuguese developers financing implementation of the OPL concept. Eduardo runs an organic smallholding – cork, olives, fruit and vegetables – at the foot of the Algarve mountains. He is a journalist by trade and served as a foreign correspondent and investigative journalist for 'The Sunday Times' and 'The Observer'. He has also written for 'The Ecologist' and authored a number of books including 'The Algarve Tiger' (about the Iberian lynx).

Jean-Paul has worked for WWF since 1990. After leading WWF International's Forests for Life Programme for six years, he was appointed Head of the newly created B+I Unit in December 2000. Currently Jean-Paul's responsibilities include planning, initiating and leading B+I policy work for the WWF Network and developing and tracking innovative business partnerships for sustainable conservation and development.

ABOUT THE ORGANISATION

WWF, is one of the world's largest global independent conservation organisations, with close to five million supporters and a network active in more than 100 countries on five continents. Since its creation in 1961, it has maintained a constant record of success. Today, WWF funds close to 2,000 projects and employs more than 4,000 people worldwide. WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity; ensuring that the use of renewable resources is sustainable; and promoting the reduction of pollution and wasteful consumption.

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