III. DRIVERS OF CHANGING PRODUCTION AND CONSUMPTION PATTERNS

Though there are controversies around the way pressures on the planet's resources are measured, the message that consistently emerges is that the global economy is consuming resources at increasing and unsustainable rates. While substitution and new technologies can temporarily relieve resource pressures, the scale of use of finite resources continues to rise.

Delinking, or decoupling, refers to weakening or breaking the link between growth of economic activity and growth of consumption of materials, fossil fuels for energy and waste.

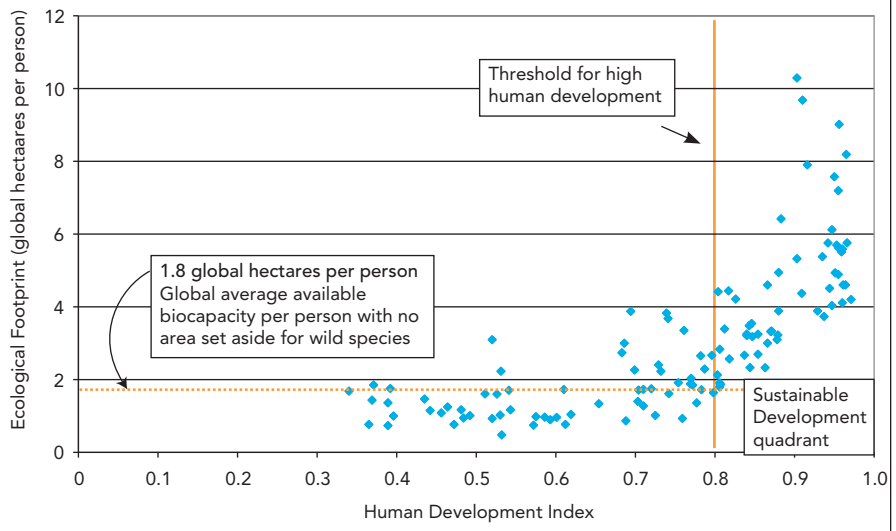
Delinking has occurred for some local environmental indicators, as rising incomes have been accompanied by improvements in access to clean drinking water and sanitation and some improvement in local and regional air quality. This has not been the case for other measures like waste generation, resource extraction and emissions of greenhouse gases. Even where delinking occurs it is in part the result of shifting resource extraction and production to other countries, including developing countries, as opposed to changes in patterns of consumption.

Growth in population, income and wealth over the next 40 years is expected to put increasing pressure on resources. Even if energy intensities of GDP continue to fall, the absolute levels of energy consumption are expected to continue rising and, without a major shift towards low-carbon energy, so too are CO_2 emissions.

Countries would appear to face a dilemma, as progress in human development (as measured by UNDP's HDI) is positively correlated with a country's ecological footprint. Few countries fall into the "sustainable development quadrant" of figure on the next page. The diagram illustrates well the notion of a dual convergence: in living standards (as those countries in the lower left quadrant would rapidly move to the lower right), and in environmental impacts (as those countries in the upper right quadrant would also move rapidly to the lower right).

The essential challenge facing humankind is to raise living standards and human development everywhere and for all while keeping within ecosystems' carrying capacities.

Human Development Index and Ecological footprint of nations



Source: Global Footprint Network, 2008 and UNDP, 2008.

AFFLUENCE

High-income countries have been characterized by a steady increase in the average per-person Ecological Footprint, from 3.5 global hectares in the early 1960s to roughly 6 global hectares at present.

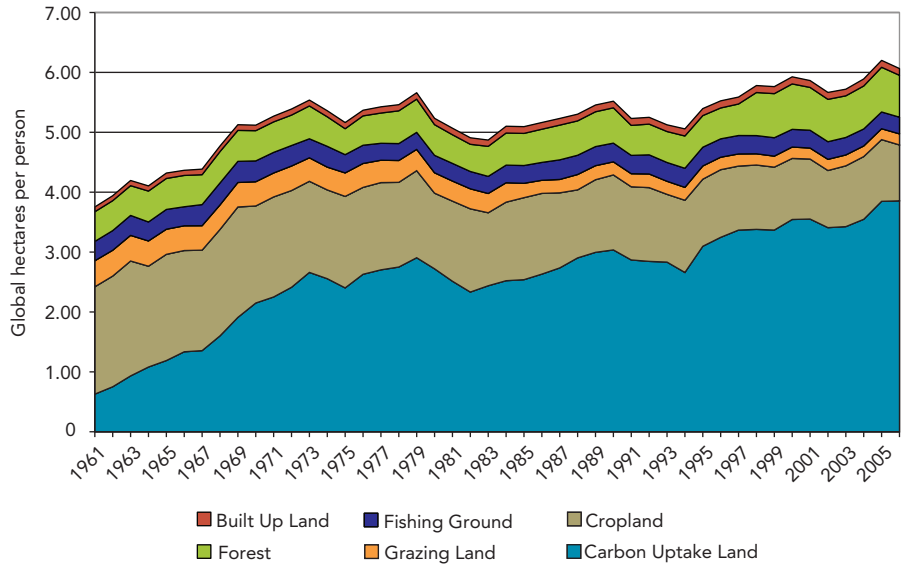
As emerging economies become more affluent, the size of the global middle class is expected to increase, from fewer than half a million in 1960 to 4 billion in 2030. The largest number will live in China and India. Residential water and energy use, car ownership, personal travel, food — notably meat and dairy — consumption, and waste generation all increase with income.[6]

Moreover, consumption of some goods — e.g. consumer durables like automobiles — can increase very rapidly once middle class incomes pass a certain threshold. Car ownership plotted against per capita income shows a non-linear relationship. Ownership rates are usually minimal in the lowest income countries (clustered near the origin), but increase rapidly as per capita incomes rise above a threshold (around $10,000 per capita at purchasing power parity exchange rates).

> "Without a fundamental shift in the way goods and resources are consumed, the world faces the prospect of multiple, interlocking global crises for the environment, prosperity and security. Sustainable consumption is a prerequisite for a more prosperous, safe and equitable global future."
>
> *World Economic Forum*

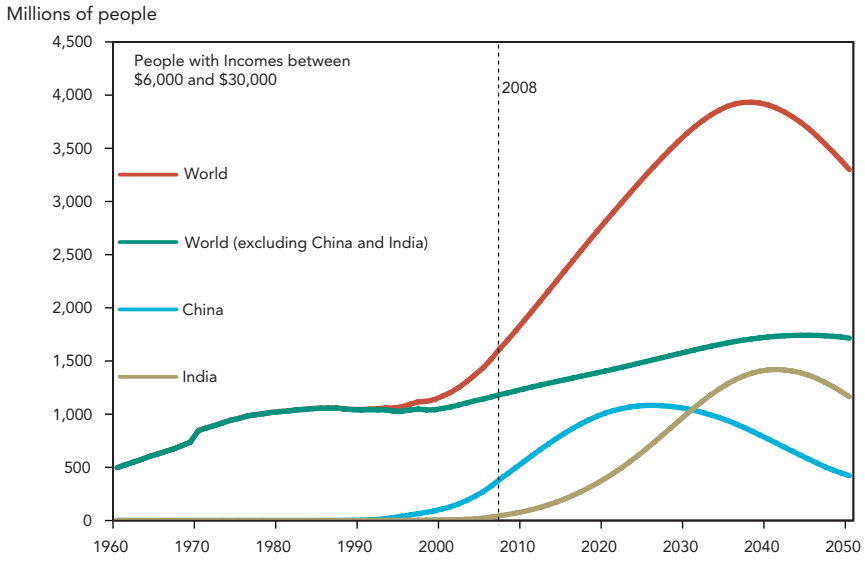
Both energy consumption in general and oil consumption in particular rise with incomes. A number of the countries with the fastest GDP growth since 1980 also experienced rapid growth in energy use. This is not always the case, however. A few countries (for example Philippines, Bangladesh and Austria) had GDP growth per capita which was much faster than growth in per capita energy consumption.

High income countries' ecological footprint per person, 1961–2006



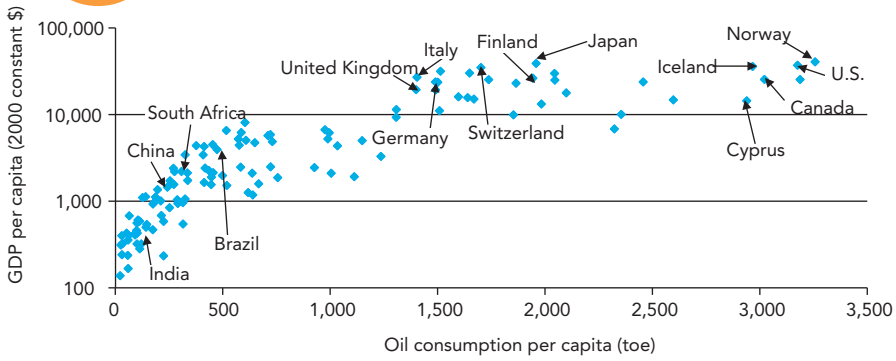
Source: Global footprint network, 2009.

Projected population that enters the middle classes



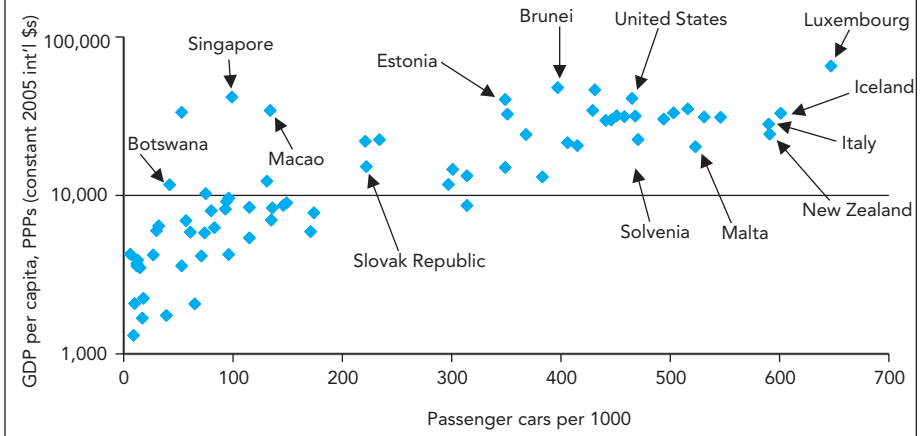
Source: Goldman Sachs, 2008.

Relationship between per capita income and oil consumption (2005)



Source: IEA, 2007.

Passenger cars and GDP (2004)



Source: World Bank, 2009.

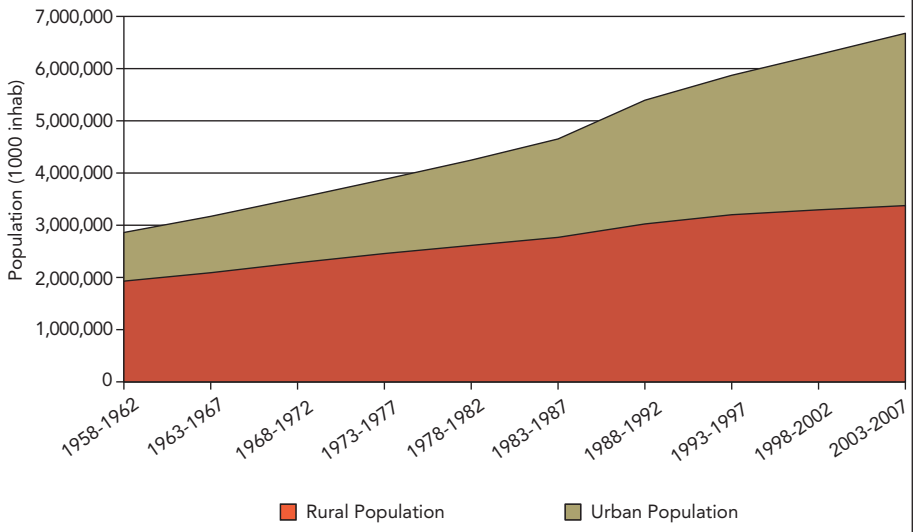
Also noteworthy is that for higher income levels there is a very wide range in car ownership per 1000 inhabitants, from the very high rates of Italy and New Zealand to the very low rate of Singapore. Size matters (to some degree) but so does government transport policy. Singapore, for example, invests heavily in public transport and uses a combination of regulation and economic incentives to limit private car ownership.

URBANIZATION

The planet's population is projected to rise above 9 billion in the second half of the century before leveling off. Between now and then, virtually all population growth will be in developing countries, with a very high proportion in cities.

As many of the countries where population is projected to rise have large numbers of people still living in poverty, levels of consumption will need

Rural and urban population



Source: Population Division, UN-DESA, 2010.

to rise as well. As more join the ranks of the middle class, this will place additional pressure on planetary resources and ecosystems.

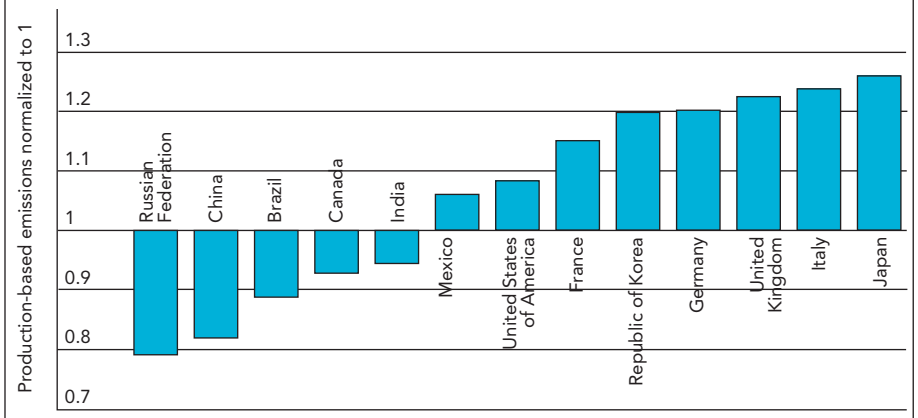
Hence the need for changing patterns of consumption and production, notably in developed countries, to relieve global resource pressures. Hence also the urgent need for diffusion across the globe of resource-efficient and energy-efficient technologies as well as renewable energy.

GLOBALIZATION

The globalization of production (and consumption) has brought opportunities to developing countries to raise their citizens out of poverty by participating in global production networks.

Yet, the growth in world trade and the global economy over the past several decades has not been matched by a growth in the capacity of nation-states and other actors to manage the consequences of growth for the global environment. Nor have the benefits of growth yet reached all.

The percentage difference between production-based and consumption-based CO_2 emissions for the 13 highest emitting countries



Source: Herwich and Peters, 2009.

Moreover, the (relative if not often absolute) decoupling of economic activity from resource use and pollution which has occurred in some developed countries has benefited from globalization, as resource- and energy-intensive activities are more and more concentrated in developing countries. On the other hand, the resource-intensity and pollution-intensity of consumption, considering entire product life cycles, is little changed.

This is illustrated by the difference between production-based emissions (all emissions produced within a nation's border) and consumption-based emissions (all emissions resulting from consumption within a nation) for the 13 highest emitting countries. Globalization has allowed production to be outsourced to rapidly developing countries, shifting the associated emissions to production activities in those countries, often for export back to developed countries.