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Rethinking Development in a Carbon-Constrained World

Development Cooperation and Climate Change

Fair Wealth: Pathways into Post-Development

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The rise of Europe to world dominance in the 19th century has excited the curiosity of historians for a long time. Why was Europe able to leap ahead of the rest of the world? A variety of answers has been offered by several generations of researchers. Europe was thought to have benefitted from its rational spirit, its liberal institutions, or its temperate climate. A few years ago, however, Kenneth Pomeranz of the University of California at Los Angeles advanced an “environmental” hypothesis (Pomeranz 2000). Putting the question more specifically, he wondered how England had succeeded in moving ahead of China, notwithstanding the fact that China had been on a level of development comparable to England as recently as around 1750. According to Pomeranz, at the end of the 18th century both the Yangtze Delta and England were constrained in their economic development by the scarcity of land available to grow food, supply fuel, and provide raw materials. But it was only England that succeeded in overcoming this limit. England was able to tap into new stocks of resources; it began to massively import agricultural goods from North America, and, above all, set out to systematically utilize coal for industrial processes. Only as foreign land replaced domestic land and carbon substituted for wood, were the natural resources constraints left behind and the English economy was able to take off. In contrast, China neither developed colonies overseas nor mobilised coal reserves in distant Manchuria. Put more generally, access to fossil resources from the crust of the Earth and to biotic resources from colonies was essential to the rise of the Euro-Atlantic civilization. Industrial society would not exist in today’s form, had not resources been mobilised from both the depth of geological time and the expanse of geographical space.

The development dilemma

In hindsight, Europe’s development path turns out to be a special case; it cannot be repeated everywhere and any time: the wealth of fossil and renewable raw materials at Europe’s disposal in the 19th and 20th centuries is no longer available. The use of fossil resources, apart from gradually depleting supplies, is destabilising the Earth’s climate, just as is the use of the biotic reserves of the planet that are still left. Resources, now and in the foreseeable future, are neither easily accessible nor cheaply available. Climate chaos as well as the Peak Oil phenomenon suggest that the past 200 years of Euro-Atlantic development will remain a parenthesis in world history.

Yet the end of conventional development has thrown the world into a tragic dilemma since fossil-driven development cannot simply be called off: it has already spread worldwide in both structures and minds. Obviously, urban life is underpinned almost everywhere by fossil-based systems of energy, transport, and food production. But more importantly, the meme of fossil-driven development has colonised the minds of people across the globe, even the minds of those who live in slums, villages or forests and are excluded from enjoying the fruits of economic progress. Partly through imposition, partly through attraction, the Euro-Atlantic development model has shaped Southern desires, offering tangible examples not only of a different, but of a supposedly better life. Countries in general do not aspire to become more "Indian", more "Brazilian" or for that matter more "Islamic"; instead, assertions to the contrary notwithstanding, they long to achieve industrial modernity. More often than not the idea prevails that shopping malls and steelmills, freeways and factory farms indicate the path to a successful society. Despite decolonisation in the political sense, which has led to independent states, and despite decolonisation in the economic sense, which has made some countries into economic powers, a decolonisation of the imagination did not occur. On the contrary, worldwide hopes for the future are fixed on Euro-Atlantic patterns of production and consumption. It is the tragedy of the 21st century that the imagination of the world is shaped by the Euro-Atlantic civilisation, yet the means for everyone in the world to live in such a civilisation are ever less available.

China provides the most visible example of where the world stands in the scramble for colonies and carbon today. No doubt, the rise of China is a success story in terms of conventional development. It has not only continuously achieved high growth rates, but also dramatically reduced the share of poor people earning less than one dollar a day, from 33% of the population in 1990 to 10% in 2006. Yet, what is a success for China is a failure for the planet. In absolute terms, China has become the world's second largest emitter of carbon dioxide after the United States, as well as the second largest importer of oil. Even more marked than the pressure Chinese economic growth has put on global resources has been the stress on local habitats: cities sick from polluted air, shrinking areas of cultivated land and dwindling water stocks are the emergency signs of a gathering environmental crisis. The annual economic costs of environmental damage as a result of economic growth were estimated in the 1990s between 8% and 13% of China's domestic product (Smil/Mao 1998): this means that the losses were higher than the growth-rate of the national economy! Furthermore, China is increasingly a burden on the rest of the world: it can be compared to a vacuum cleaner sucking up resources around the globe, be it copper from Chile, soya from Brazil or oil from West Africa. To be sure, China stands out because of the size of its population, but similar tendencies are at work in Brazil, India, Malaysia, Mexico, Indonesia and other 'take off' countries. With conventional development, the exit

from poverty and powerlessness leads straight into overuse and overexploitation. A higher income beckons, but in reality these riches just represent a greater share in the environmental robber-baron economy.

Indeed, it is difficult to see how, for instance, the automobile society, high-rise housing, chemical agriculture, or a meat-based food system could be spread across the globe. The resources required for democratising these models of wealth globally would be too vast, too expensive, and too damaging for local ecosystems and the biosphere. Since the Euro-Atlantic model of wealth has grown under historically exceptional conditions, it cannot be transferred to the world at large. In other words, the model is structurally incapable of social justice. Development, therefore, is at a crossroads. Either well-being remains confined to a global minority because the prevailing styles of production and consumption cannot be generalised across the board, or sustainable models of well-being gain acceptance, opening the opportunity of sufficient prosperity for all. Since industrial affluence and global equity cannot be attained at the same time, politics in both North and South faces a crucial challenge. Countries can either opt for affluence along with oligarchy or for sufficiency with a view to equity. Production and consumption patterns will not be capable of justice unless they are resource-light and compatible with living systems. For that reason, there will be no equity without ecology in the 21st century (Sachs/Santarius 2007).

Contraction and convergence

In order to picture which development paths might bring the world to a greater level of resource justice, it may be useful to employ the model of 'contraction and convergence' (Meyer 2000). This model schematically envisages two different development paths: one for industrial countries, one for developing countries. All nations of the world would adjust their use of resources so that in half a century from now they no longer overstretch the absorption and regeneration capacity of the biosphere. The model assumes no nation has the right to a disproportionate share of the global environment, so each one endeavours – though with individual variations – to achieve the common goal of material and energy consumption compatible with the demands of other countries, while remaining within the carrying capacity of the biosphere. In the end, there is no justification for any other distribution of globally important resources; the right of all nations to self-defined, self-determined and equal development permits it only to make claims that are socially and ecologically sustainable at a global level. This is what the contraction and convergence argument inspired by Kant comes down to: institutional patterns of resource consumption should be considered unjust if they rest upon rules which cannot in principle be adopted by all other nations.

Consequently, the model requires that the industrial countries contract – that is, that they reduce their consumption of resources drastically. Resource justice in the world crucially depends on whether the industrial countries are capable of retreating from overconsumption of the global environment. The example of greenhouse gases may serve to illustrate the path of shrinking resource consumption. By the middle of the century, the overconsumers must reduce by 80% to 90% the strain they put on the atmosphere by burning fossil fuels, in order to do justice to the precepts of both ecology and fairness. It goes without saying that this figure refers to the global North, i.e. the consumer class in the countries of the South is placed under the same responsibility. On the other hand, developing countries appear in the model as tracing an upward curve in resource consumption. First, poorer countries have an unquestionable right to attain at least a ‘dignity line’ of resource consumption which should apply to all citizens of the world. Without access to kerosene or biogas, without an energy and transport infrastructure, it is hard to satisfy even the basic needs of modern human life. Moreover, each country will try to achieve different images and forms of a prosperous society – an ambition that in turn requires access to resources such as energy, materials and land. However, this upward movement ends at an upper line of ecological sustainability for all; natural limits set the framework for justice. As it happens, a number of emerging economies are already about to hit that limit in the coming decade. The conceptual model of ‘contraction and convergence’ thus combines ecology and justice. It begins with the insight that environmental space is finite, and it ends with a fair sharing of the environment by the citizens of the world.

The triad of efficiency, consistency and sufficiency

How can the transition to a low-carbon and resource-saving economy be achieved? Over the last thirty years, a host of engineers, managers, activists, thinkers and scientists have been busily investigating the challenges of such a transition. What can be extracted from all their endeavours adds up to a conceptual triad: efficiency, consistency and sufficiency.

First, with regard to efficient resource consumption, the idea is to reduce the use of materials and energy per unit of goods and services, through improved technology and organisation, recycling and waste avoidance. There are numerous examples: washing-machines that save on water and electricity, lightweight motor vehicles, frequency-controlled industrial motors, high-efficiency power stations, recyclable products such as newspapers or chairs. Resource-efficient initiatives concentrate on the design of products for greater durability and repeated use, on the reduction of energy and material flows in the production process, and on corporate strategies to promote the extended use of products over numbers of physical sales (Weizsäcker/Lovins/Lovins

1997; Hawken/Lovins/Lovins 1999). In particular, there is considerable potential to raise the efficiency of energy use, as there is hidden scope at every level of the chain from production to consumption. Whereas for more than a century utilities have seen their profits as existing in expanding supply, today, under an 'efficiency strategy', they are expected to be as successful at avoiding waste. Instead of responding to ever increasing demand, they will have to learn to keep it flat. This change of perspective implies that the rational conversion and use of energy will take priority over its production.

But the efficiency strategy has an Achilles heel: it may score major successes in cutting the use of resources per unit of output, but it does not prevent greater overall consumption. The sum total of all resource and energy savings may be eaten up and even exceeded by global growth in demand for goods and services. In fact, that is what has been happening. And so, although the efficiency strategy has the greatest potential as the first step on the road to sustainability, it reaches its limits as soon as the increased production of goods combined with increased consumption of resources outweighs the total savings.

With regard to consistency, the key question is the compatibility of technology with the environment. The principle is that industrial metabolic processes must not disturb natural cycles; the two should as far as possible complement or even reinforce each other. Where this is not possible, substances damaging to the environment should be placed in a fail-safe technical circuit of their own or – if that is not successful – taken out of service altogether (Braungart/McDonough 2002). An economy can be organised in such a way that – except for the inevitable entropy – the waste from one activity is used as raw material for the next (Pauli 1999). In this organisation, it is less important to reduce energy consumptions and material flows than to manage them in an ecologically sound manner. This is precisely the charm of renewable energies: solar collectors and solar cells for the production of heat and current directly use the sun's rays; wind and water power are indirectly derived from solar energy; heat pumps draw on heat from the surrounding air, water and soil; and geothermic power stations use the energy stored in the earth. Even solar-generated hydrogen might one day make it possible to have an energy supply that does not damage the atmosphere. There is a similar potential in bionics, a technology which takes nature as a model to be imitated.

The consistency strategy is not a panacea, either. Agrofuels, for example, may not pollute the atmosphere, but they require arable land that is available only to a limited degree. Indeed, for all biomass applications, it is land which turns out to be the ultimate scarce resource. Furthermore, not all waste can become raw material for new products. There are some natural substances such as carbon dioxide or liquid manure which, in large quantities, cause ecological problems.

Sufficiency, on the other hand, raises the question of how much is enough, what is good for the economy and patterns of life. The etymology gives us a clue: the Latin *sufficere*, derived from *sub* and *facere*, means in its transitive use 'laying the ground', and in its intransitive use 'to be disposable, to be enough, to be able or capable'. The point of sufficiency, then, is not to fall victim to excess and overstretching, but to take only as much as is beneficial for the well-being of individuals and the whole. Whereas, to borrow from Paul Hawken, efficiency requires us to do things right, sufficiency calls for the right things to be done. It is doubtful whether the expectations raised in the age of resource abundance can be sustained in the age of resource saving. Strawberries in winter, four by fours in city traffic, hot water on tap day and night: such comforts add little but cost a great deal. A resource-light economy would therefore be better advised to adjust itself to an intermediate level of performance. For instance, if the target for a country like Germany is to use 50% less primary energy by the year 2050, efficiency and sufficiency will have to work together. Quantitative limits on the use of fossil fuels, as envisaged in the European emission trading system, will be defined for purposes of putting a cap on the use of vital resource stocks. Likewise, in transport, the avoidance of travel is part of a sufficiency strategy. Transport-saving urban planning cuts down on the need for moving around, walking and cycling can again gain ground, and initiatives such as car sharing (with the slogan 'access instead of ownership') offer the opportunity to downgrade the private transport option, to save costs, but to keep access to a car for special situations.

At any rate, the question 'How much is enough?' cannot be avoided (Sachs 1998, Segal 1999, Linz 2004). Since it is necessary to change behaviour and the way people relate to goods and services, eco-sufficiency is closely connected with what has been known since antiquity as the 'due measure', the good life, the art of living. And it may well be that the reasons for eco-sufficiency also stem from that wise ancient maxim: 'Nothing in excess'. The transition to a sustainable economy, therefore, moves on two tracks: the reinvention of means as well as the moderation of ends.

Ecological leapfrogging

Two main obstacles stand in the way of greater environmental justice in the world: the resource-intensive models of prosperity in the North, and the drive in the global South to copy those models. Skyscrapers in Shanghai, motorways in India, shopping malls in Morocco: historically outmoded types of construction, technology and marketing are spreading around the globe. Yet they embody the hope of escaping from poverty and powerlessness. It is precisely the challenge of sustainable development to achieve greater international equity without endangering the biosphere.

Such forms of development will aim both to ensure a livelihood for all citizens

and to maintain and renew the country's resource base. However, the historical pattern of scarcity, which has shaped economic development so far, is today outdated. While in the old days the world appeared full of nature, but empty of people, today the world is empty of nature, but full of people. The satisfaction of needs and wants is not constrained so much by the paucity of hands and brains, but by the scarcity of resources and ecosystems. Nature is now more of a limiting factor than money, given that development is more and more restricted not by the number of fishing boats, but by the decreasing numbers of fish; not by the power of pumps, but by the depletion of aquifers; not by the number of chainsaws but by the disappearance of primary forests (Daly 1996). In particular for Southern countries, the relevant question will be: How can both the abundance of people and the scarcity of natural resources be addressed by making the right choices?

The answer is to move out of an industrial economy wasteful of both natural resources and people, and head for a regenerative economy mindful of resources and in need of people. An economy that is based on the assumption that there are "free goods" in the world – pure water, clean air, hydrocarbon combustion, virgin forests, veins of minerals – will favour large-scale, energy and material intensive production methods; and labour will remain marginalised. In contrast, if an economy discourages profligate resource use and privileges non-fossil resources, a decentralised and smaller-scale production pattern requiring more labour and intelligence is likely to prosper. Rather than laying off people, greater gains can come from laying off wasted kilowatt-hours, barrels of oil, and pulp from old-growth forests. People will in part have to be a substitute for natural resources; such an economy, evolving with a minimum input from the natural environment, will have to rely much more on the strength, the skill, and the knowledge of people. Indeed, it will be post-industrial in the true sense of the word: finding new balances between hardware, biological productivity, and human intelligence.

This is even more true when it comes to changing the resource base altogether, from fossil-based to solar-based energies and materials. Apart from the obvious environmental benefits, the point here is that fossil resources usually imply long supply chains that make countries dependent on distant energy sources. Most countries and cities, finding themselves at the downstream end of the chain, are strangled by the high cost of fuel and resources imported from abroad. They pay, but most gains and jobs arise elsewhere. However, a change in resource base would turn this logic around (Scheer 1999). Reliance on photo-voltaic, wind, small hydropower, and bio-mass of all sorts, implies much shorter supply chains, not just for the energy resource, but often also for the conversion technology involved. As a result, income and jobs would largely stay at the local/regional level, recycling money within local economies. Furthermore, since sunshine and bio-mass are geographically diffused, they lend themselves to decentral-

ised structures of production and use, unlike fossil resources that are concentrated in a few places and give rise to centralised large-scale structures. The industrial pattern of squandering nature instead of cherishing people would be reversed; a solar economy holds the prospect of both encompassing people and saving resources.

Indeed, Southern countries have the opportunity to leapfrog into a solar economy, much earlier and much more solidly than Northern economies. In fact, it would be self-defeating for them, both in terms of livelihoods and in terms of the environment, to go through the same stages of industrial evolution that the Northern countries did. For instance, Southern countries face important decisions about introducing infrastructures such as energy, transport, sewage, and communication systems, the introduction and maintenance of which in industrial countries have caused the earth's resources to dwindle. Today, many countries are still in a position to avoid this unsustainable course, opting without further delay for infrastructures which would allow them to embark on a low emission and resource-light trajectory. This is equally the case for transition countries, where it is often preferable to build new infrastructure systems rather than to upgrade aging ones. Investment in infrastructure such as light rail systems, decentralised energy production, public transport, grey-water sewage, locally adapted housing, regionalised food systems, and transport-light urban settings, could set a country on a road towards cleaner, less costly, and more equitable production and consumption patterns. Consider the following three examples.

Decentralised electricity generation. In industrial countries, electrical energy is overwhelmingly supplied direct from high-output power stations along high-voltage networks, to the centres of consumption. The power flow is thus essentially vertical. In a mainly decentralised supply system, by contrast, a considerable part of the current is generated in small, modular output units, whose priority is to supply a large number of small consumers. Power generation becomes a local economic activity, and energy consumers increasingly become energy producers. Indeed, from the point of view of an Indonesian farmer, it would be real leapfrogging to have an energy-efficient cooker, a solar pump or a biogas system: all these technologies make living easier and spare the natural environment, and their sources – sunshine and biomass – are accessible everywhere.

Mobility without car dependence. A country with a low degree of motorisation faces an alternative: either it can promote a system based on high motorisation for a minority, or it can opt for a moderate motorisation favouring as many people as possible. Many countries strive to reach Northern levels of car ownership, but these are unattainable because the ecological as well as the social and economic costs will prove too high. At some point things will get stuck: either the fuel imports will become unaffordable or the land for roads will run out or the weaker sections of society will not have sufficient purchasing power. A sustainable strategy will therefore opt for a

different structure of transport growth, concentrating on where it will bring the greatest advantage to society. This means, for example, extending roads to remote areas so that teachers and doctors can reach people, and farm produce can be supplied to local markets, instead of building motorways and ring roads demanded by the car-owning upper classes. First walk, then bike, then ride, this ought to be the order of priority for transport planning in developing countries – and elsewhere.

Regenerative agriculture. Industrial agriculture – in both North and South – has manoeuvred itself into an ecological and social dead end. It results in soil erosion and declining fertility, in the pollution of groundwater, lakes and seas, and in a decrease in agro-biodiversity that is only worsened by the introduction of genetically engineered plants and animals. Methods of regenerative agriculture involve the following essential principles: simultaneous growing of several crops alongside one another in a single field (e.g., mixed and intercropping), so as to offer a habitat for natural enemies of pests and to stimulate the biotic activity of the soil; crop rotation to regenerate the fertility of the soil and to break the life cycles of pests; mixed use of land for agriculture and forest; and, finally, the integration of agriculture, animal farming and, where possible, fishing, to obtain sufficient biomass and to return both organic and natural nutrients to the cycles of matter (Altieri 2004). Regenerative agriculture is therefore more cost-efficient than industrial agriculture, especially in low-wage regions: labour-intensive units operating on relatively small plots of land permit considerable savings in comparison with outside methods involving machinery, mineral fertilizer and pesticides. Since the ecosystem survives intact and species diversity is preserved, poor people in particular can continue to practise hunting and gathering as sources of food and income. Moreover, in a oil-short world, labour-intensive and energy-saving production would enable a reversal of the role played by agriculture in the economy. It could become a branch of the future, as a central source of energy supply. The countries of the South have a historic opportunity to become the spearhead of this development and to make their farmers the ‘oil sheikhs’ of the twenty-first century.

Decoupling justice from development

For a long time it has been a core political certainty that justice is created through growth, both nationally and internationally. After the Second World War, coupling the pursuit of justice to the idea of economic growth has become the conceptual cornerstone of the development age. In the last few decades, however, since the finite nature of the biosphere became evident, this cornerstone has been on shaky ground: in a limited environmental space, conventional growth can no longer create justice – except at the price of a ruined biosphere.

In the development age, justice was understood as a greater share for more and more people in a growing world economy. The social contract between North and South envisaged that growth and social policy would start a process whereby the disadvantaged countries and peoples would be able to 'catch up' with the rich nations. This was the tacit assumption behind the United Nations system and bilateral development cooperation. This assumption has acquired proverbial status in the metaphor of 'a rising tide' that will 'lift all boats' (not only luxury liners but also little sloops), a metaphor which presides over so many development efforts: the forces of growth will raise the income of rich and poor alike.

Comfortably enough, linking justice to growth allowed the developed world to evade the hard issue of distribution, delegating justice to future growth. Indeed, for decades development experts defined equity primarily as a problem of the poor. They highlighted the lack of income, the lack of technologies, and the lack of market access, and advocated remedies for raising the living standard of the poor. In short, they worked at lifting the threshold – rather than modifying or even lowering the ceiling. With the emergence of bio-physical constraints to economic growth, however, this approach has turned out to be definitely one-sided; it is not just the poor, but also the rich, and their economy as well that have to be called into question. At any rate, the quest for fairness in a finite world means changing the rich in the first place, not the poor. Poverty alleviation, in other words, cannot be separated from wealth alleviation.

It was in October 1926 that Mohandas Gandhi already sensed the impasse of development. In one of his columns for *Young India*, the mouthpiece of the Indian independence movement, he wrote: "God forbid that India should ever take to industrialisation after the manner of the West. The economic imperialism of a single tiny island kingdom (England) is today keeping the world in chains. If an entire nation of 300 million took to similar economic exploitation, it would strip the world bare like locusts." Nearly eighty years later this statement has lost none of its relevance. Indeed, its importance has increased, since today there are no longer 300 million but 1,000 million setting out to imitate Britain. Gandhi suspected that it would not be possible to restore India's dignity, and still less China's or Indonesia's, at the economic level of Britain. The bio-physical limits to the spread of industrial civilisation have impressively confirmed Gandhi's intuition.

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