

A Planet
for life

Consuming and
producing sustainably

Analysis

Consuming and producing sustainably

What is the nature of the sustainable production and consumption discussion twenty years after Rio? Has the approach to the issue really shifted from the management of the scarcity of resources to a sobriety of production and consumption cycles? How to think and implement public policies in this domain?

Analysis Consuming and producing sustainably

2015 was marked by two major events which show the international community's growing concern of reconciling our consumption patterns and the environmental and social challenges we will be confronted with. The first was the 17 Sustainable Development Goals (SDG), adopted by the United Nations, and specifically Goal 12 which recognizes the essential and transverse role of consumption and production in sustainable development. The next was the Paris Climate Conference where an agreement was unanimously adopted setting the target of limiting global warming to under 2°C, and aiming for the 1.5°C mark. The agreement is to be validated by the States party to it and will become effective in 2020: it calls for a reorientation of world economy and a deep transformation of the production and consumption patterns which were developed in 20th century on the basis of fossil energy exploitation.

This is not a new issue: the Earth Summit on the environment and development, which was held in Rio in 1992, had already announced the hope of a sustainable economy. It recommended doing away with unsustainable production and consumption methods and replacing them with those which are profitable to all and whose dissemination is to be encouraged. The declaration of 27 principles and the 2 500 recommendations of Agenda 21 which were adopted at the time remain as common references for all the countries which signed and committed to building a sustainable future.

During the Rio+20 Conference in 2012, the United Nations once again expressed their support for this agenda with an action programme (10YFP) on sustainable production and consumption, adopted in

article 226 of the final text, "The Future we Want". The programme which was entrusted to the United Nations Environment Programme (UNEP) and was based on five components: education and lifestyles, construction and buildings, tourism, consumer information and public procurement. Countries were invited to establish adequate participatory structures and to develop intervention strategies. But what do the terms "sustainable production" and "sustainable consumption" actually mean?



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From an environmental point of view, they mean addressing a use of products and services which responds to basic needs and provides a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the whole life-cycle of products and services. Sustainable consumption and production must make it possible not to jeopardize the needs of further generations.

The aim is therefore to limit impacts and disruption on the main natural cycles (water, carbon, nitrogen, phosphorous) of all the socio-economic activities (production processes along the whole life cycle; diets; types of habitat and transport; loss and waste; etc.). This is already a highly complex issue: what may appear to be an efficient policy in one field may have harmful effects in another.

For example, extending the biofuel offer to substitute renewable energies for fossil energies may also contribute to increased pressure on earth or water (APFL 2010, Focus 4). Countries attempting to ensure food and energy security have also acquired land abroad to the detriment of existing local communities. An argument which would be limited to improving usage efficiency, in intra and inter-usage, would not be satisfactory: the net reduction of the impact of our lifestyles on resources has become a necessity.

Planetary boundaries

Natural resources act as “sinks and for maintaining conditions for life” (European report on development, 2012). This refers to the capacity of ecosystems to regulate the hydrological cycle, to absorb and recycle waste and to maintain biodiversity. These natural systems may undergo sudden irreversible changes if tipping points or ultimate degradation is reached. For the living world and biodiversity, this means the brutal interruption of the food chain between species, acidification and the adaptation or non-adaptation of bacteria, and even the disappearance of large predators, or the interruption of pollination. For the climate, it means a brutal thermodynamic tipping and the radical modification of temperatures and rainfall patterns. Rockström et al. (2009) suggest nine planetary boundaries (figure 1). These boundaries would appear to be close to being reached in certain fields such as fresh water consumption, changes in land usage, the acidification of the oceans and the interference in the global cycles of phosphorous. Three processes are considered to have exceeded the alert threshold: climate change, the rate of decrease in biodiversity and human interference with nitrogen cycles. The other boundaries are chemical pollution, air pollution by aerosols and the decreasing ozone layer.

The increasing impacts of human activities on the four cycles of the global system (water, carbon, nitrogen and phosphorous) and, in fine, on the climate and biodiversity, are observed objectively. The word “Anthropocene” appeared in the literature to identify the geological era which began with the industrial revolution at the end of 18th century and during which human activities had a major impact on the terrestrial ecosystem (See Svedin, APFL 2012, Chapter 6): “*in a little over two generations, humanity has become a planetary-scale geological force*” (Steffen et al., 2015).

Regarding climate, the successive reports by the Intergovernmental Panel on Climate Change (IPCC) published since 1990 have shown unequivocally that human activities and particularly the use of fossil energies have led to an exceptional increase in greenhouse gas (GHG) emissions, which were established at 32.3 Gt in 2014. Their recent impacts on physical and socio-economic systems affect all the continents and oceans. They

INSERT 1 Goal 12: Ensure sustainable consumption and production patterns

Sustainable consumption and production is about promoting resource and energy efficiency, sustainable infrastructure, and providing access to basic services, green and decent jobs and a better quality of life for all. Its implementation helps to achieve overall development plans, reduce future economic, environmental and social costs, strengthen economic competitiveness and reduce poverty.

Sustainable consumption and production aims at “doing more and better with less,” increasing net welfare gains from economic activities by reducing resource use, degradation and pollution along the whole lifecycle, while increasing quality of life. It

involves different stakeholders, including business, consumers, policy makers, researchers, scientists, retailers, media, and development cooperation agencies, among others.

It also requires a systemic approach and cooperation among actors operating in the supply chain, from producer to final consumer. It involves engaging consumers through awareness-raising and education on sustainable consumption and lifestyles, providing consumers with adequate information through standards and labels and engaging in sustainable public procurement, among others.

Sustainable Development Goals, United Nations (2015)

have been the dominant cause of the warming which has been observed since the middle of 20th century¹ (figure 2). In a number of regions, the evolution in rainfall has modified hydrological systems, affecting water resources both from the point of view of quantity and quality². There has been an increase in the number of extreme events of high temperatures and heavy rainfall. Many terrestrial, freshwater and marine species have disappeared, or have modified their geographical distribution, activities and interactions³. The acidification of the oceans attributed to human activities has had an impact on marine organisms⁴. The negative impacts of climate change on crop yields have been more frequent than the positive impacts⁵.

1 Level of confidence: extremely high (See IPCC report, 2014)

2 Level of confidence: moderate (See IPCC report, 2014)

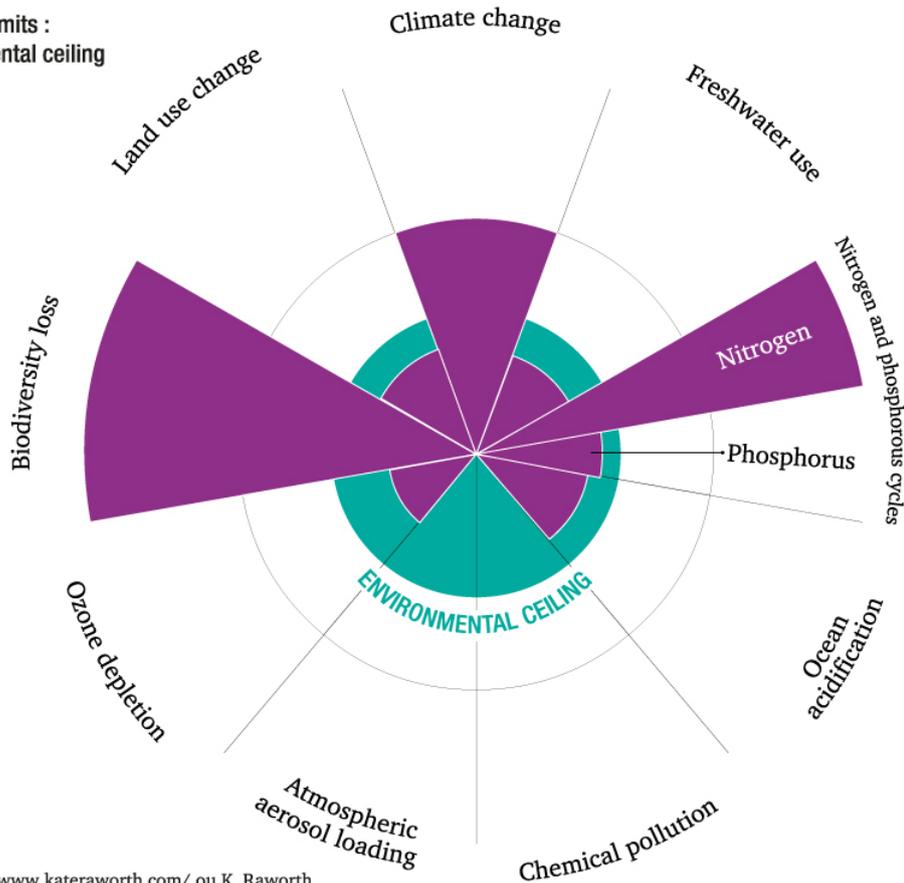
3 Level of confidence: high (See IPCC report, 2014)

4 Level of confidence: moderate (See IPCC report, 2014)

5 Level of confidence: high (See IPCC report, 2014)

FIGURE 1 **We have exceeded the environmental ceiling**

Planet Earth limits :
the environmental ceiling



Source : <http://www.kateraworth.com/> ou K. Raworth, *A safe and just space for humanity: can we live within the doughnut?*, 2012.

Like any ecosystem, the Earth has a significant, but not unlimited, capacity for resilience against natural or anthropogenic changes. Resource overexploitation and changes in global natural cycles, beyond certain thresholds, could lead to disastrous effects for humanity.

Lastly, the historical analyses carried out on the evolution of biodiversity on a global scale also converge on disturbing conclusions. Since the beginning of the industrial era, the reduction of terrestrial biodiversity has already resulted in the disappearance of around 50% of it (GCDD, 2010) and the strong decrease in sea resources: between 1970 and 2010, 39% of terrestrial species disappeared, 76% of freshwater species and 39 % of marine species (WWF, 2014). This trend towards erosion has accelerated over the last fifty years. Five major factors are responsible for these changes, in varying proportions according to regions: changes in soil use (deforestation, urbanisation, infrastructures); the overexploitation of resources; local and diffuse pollution; the introduction of invasive exotic species and climate

change. The changes in land use were historically the most decisive.

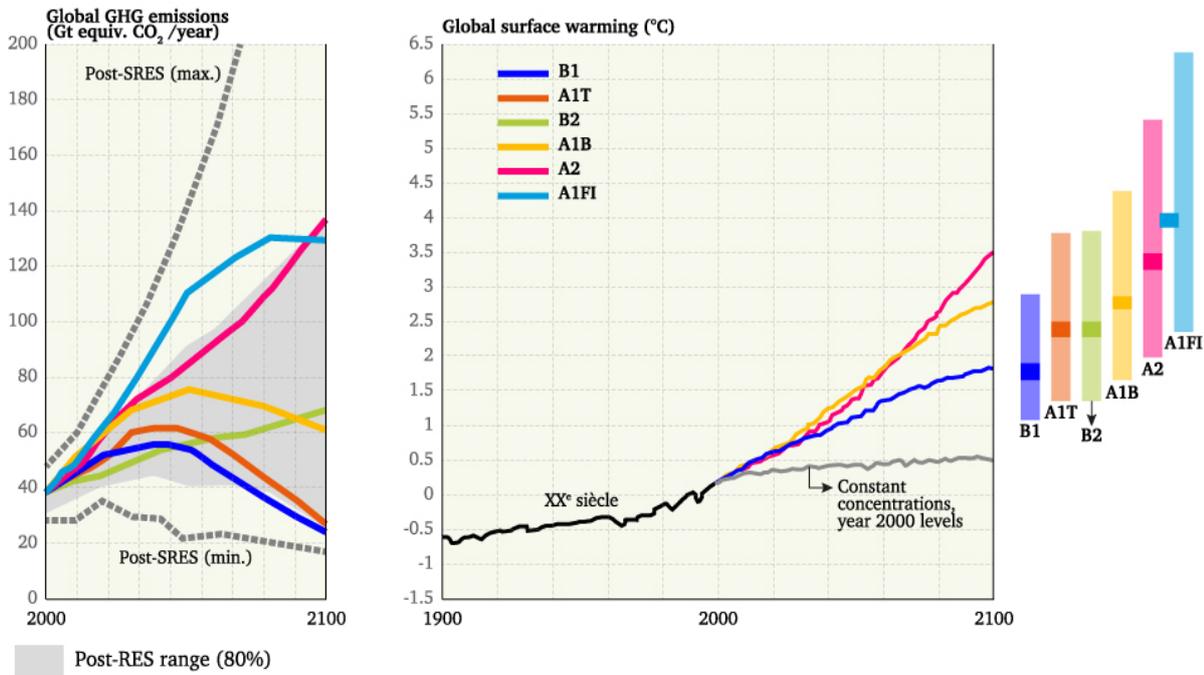
Multiple causes of degradation

If the impacts are clearly analysed, the underlying mechanisms to these evolutions, and to their acceleration since the middle of 20th century, are more controversial. Demographic growth is one of the main accelerators of the use of natural resources. The world population has multiplied more than four-fold since the beginning of 20th century, and this increase generates risks if the trends observed in the production and consumption patterns of developing countries converge with those of developed countries. From this point of view, demographic growth

FIGURE 2 High Greenhouse gas emissions expected for the 21th century

GHG emissions scenarii for 2000-2100

(in the absence of additional climate policies) and projections regarding surface temperatures



The **A1** scenarii suppose a rapid economic growth of global economy associated with a growth in world population up to the middle of the 21st century, then a slight decrease and the rapid introduction of new efficient energy technologies. Regional economies are rapidly developing and prosperity is equally distributed. With three further hypotheses:

A1FI, the world continues to function mainly with fossil fuels, **A1T** with non-fossil fuels, **A1B** with a mixture of both.

The **A2** scenario describes a world where there is no redistribution of available natural resources, technological knowledge and well-being among rich and poor regions.

Scenario **B1** follows the A1 scenario, but the world adopts clean sustainable technologies faster and service activities create more value.

Scenario **B2** talks about a world which focuses on the protection of the environment and social equality according to regional variations.

Source : IPCC, 2007.

GHG have been and will remain the dominant cause of the warming which has been observed since the middle of 20th century. Their observation established a clear human responsibility in the mitigation of their emissions.

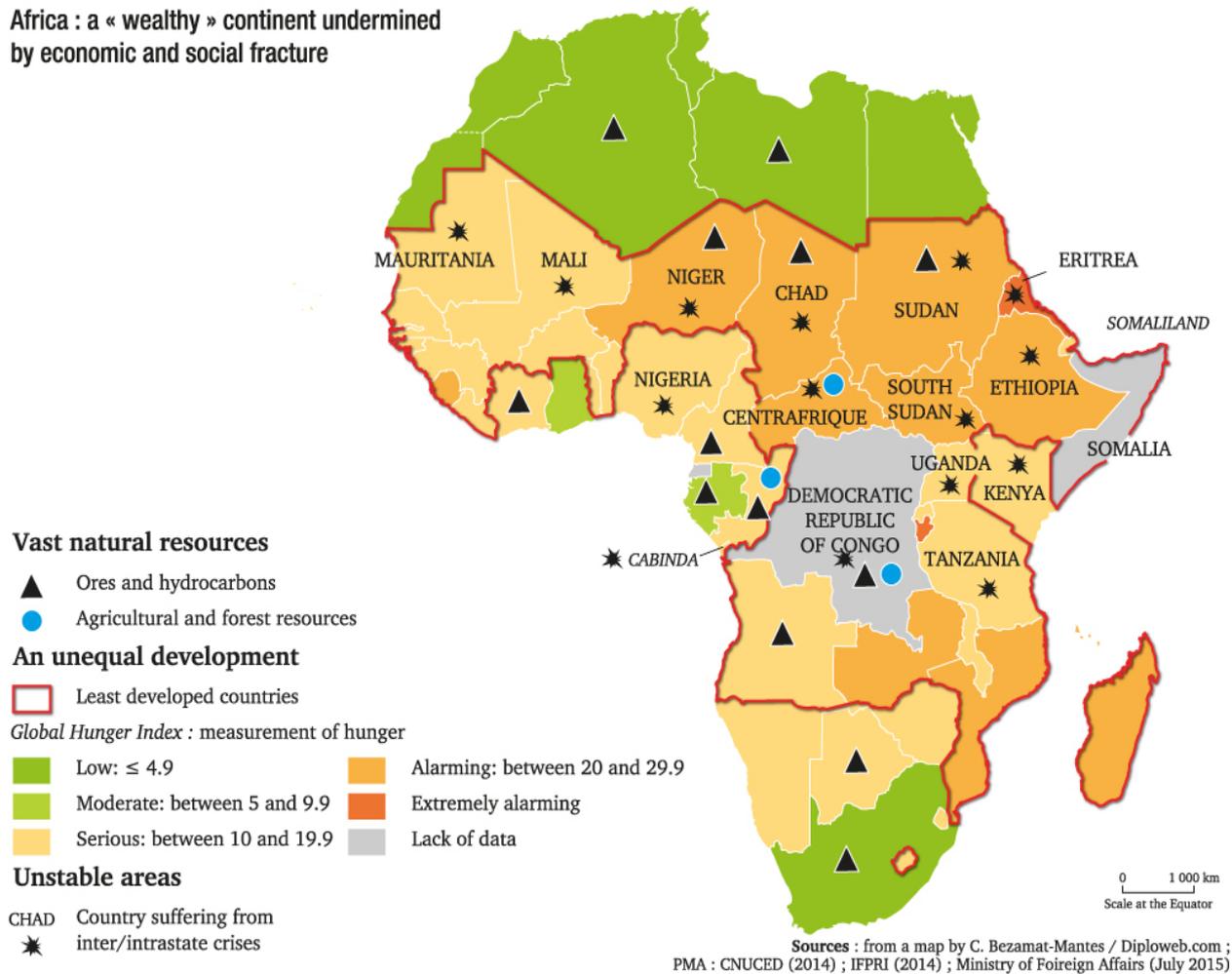
is not the only explanation: the same number of human beings can consume a great deal or moderately, according to their income and their access to technology, the political system, the degree of urbanisation and their cultural standards.

Simultaneously with the increase in population, the level of economic growth and the quality of this growth are major vectors of the use of natural resources. The improvement of man's living conditions during the last century coincides with the increased use of natural resources. The history of this relationship shows two trends (European Report on Development, 2012).

Economic growth is first and foremost associated with an absolute increase in the consumption of natural resources. The increasing use of individual means of transport results in a higher demand for fossil energies. Higher standards of living also often go with a higher consumption of meat products. "The number of plant calories (except grazing) needed to produce one animal calorie varies from two to five according to the areas concerned, the type of animal production and the technical system used." (FAO, 2015). This therefore results in a significant rise in production needs and increased pressure on resources.

FIGURE 3 Africa: a “rich” continent undermined by economic and social fracture

Africa : a « wealthy » continent undermined by economic and social fracture



Africa illustrates sadly that the abundance of local natural resources if useful does not guarantee alone economic development. Management and governance are as strongly needed in this case as in the situation of scarcity.

However, and this is the second trend, the growth rate of the economy is higher than that of the use of natural resources. Actually, as societies get richer, technological progress allows them to use the resources more efficiently. This could have resulted in dissociation between the GDP and energy consumption. But this is not the case, because of the rebound effects of the dissemination of this technology which leads to a strongly increasing consumption (as has been observed successively with the use of coal and oil) or the withdrawal of sustainable methods of exploitation which have matured (animal traction, use of wood, wind, water, etc.).

The increasing demand for limited resources

resulting from this aggravates the competition between uses and users. The pressure brought to bear on resources is thus made more complex and worsened due to the links existing exist between the different types of demand. For example water is necessary for urban, industrial and agricultural users, not to mention the elementary needs of ecosystems in order to regenerate.

This pressure is aggravated in a global economy which is strongly interconnected by trade exchanges; the pressure on the natural resources of one country is not attributable solely to the internal factors of this country: an increase in the demand for meat in a part of the world will result in pressure on the lands and

water in another region. Moreover, the rapid industrialisation of China has led this country to become the largest GHG emitter, artificially creating an illusion of sobriety in developed countries.

These different observations raise the question of scarcity (physical unavailability) and the political challenges linked to the management of this scarcity. Technological progress has partly enabled, up till now, to face up to an increased demand by replacing certain resources with others; by juxtaposing their use (oil for transport, coal and others for electricity, etc.); by increasing their transfer or by using them more efficiently. Natural resources nevertheless do not have the same levels of substitutability (European Report on Development, 2012). The resources which involve absorption and life-sustaining capacities cannot be replaced, which obliges us to establish physical boundaries where the secure functioning zone for human society is concerned (Rockström et al., 2009). Before reaching these zones of physical unavailability, the geographical concentration of certain resources (phosphate for example or rare earths) is already a source of conflict. And lastly, the abundance of local natural resources does not guarantee economic development as can be seen on the African continent (figure 3).

Controlling energy

What is the socio-eco-bio-geosphere system's adaptability, to be resilient and embark on a process of transformation to reduce its impacts? What is the likelihood of an absolute scarcity of certain resources or of reaching the tipping points of the main cycles?

Once the issue has been raised, the solutions considered focus very rapidly on technical innovations with a view to limiting the carbon footprint of our production methods. Sustainable agricultural intensification patterns such as agro-ecological systems are developed as alternatives to the conventional methods of increasing yields through the use of fertilizers, pesticides, improved varieties or mechanization. Projects for reusing waste water treated for agriculture, industry or urban needs are being developed.

In the energy sector, the heavy trend is still the massive use of fossil energies. If we take into account the recoverable quantities, the basic resources of coal, oil, gas and uranium resources. And the constraints do not only concern the potential

resources themselves, but rather the way in which they will be exploited (Giraud, 2014): they are above all of a technical, economic and political nature and are closely related to the actors' ability to take the climate stakes into consideration at all levels. GHG reduction is based on two fundamental pillars.

Controlling energy consumption is the first pillar. Digital technologies currently make it possible to optimize the production, distribution and consumption of electricity in order to improve energy efficiency (smart grids). By smoothing consumption peaks and decreasing the most expensive production capacities, these technologies enable securing of the grid and reducing its cost. According to the United States Department of Energy, if smart grid technologies were to increase the efficiency of the American power grid by 5%, this would be the equivalent of a saving in terms of GHG emissions of 53 million cars. This type of development could develop rapidly and generally. A number of end-use devices, industrial processes, heating systems, components of infrastructures and housing developments, are beginning to be replaced using new technologies, and a number of existing electric power plants are coming to the end of their useful lifespan. These transformations depend on the technologies deployed and the relative R&D expenditure.

The development and dissemination of renewable energy (RE) make up the second pillar. These technologies are gaining ground subject to incentives, particularly those of a financial nature (sustained support), the lowering of costs (improving the efficiency of the technologies) and proactive policies. Up until quite recently, it was in OECD countries that the relative share of RE increased the fastest, even if the production potentialities and the needs are actually more outside this area. In 2015, the share of developing countries reached a level which was almost equivalent to that of developed countries, both in terms of investment and in electrical power, thanks to projects developed in China, India, South America, and to a lesser extent, Africa. At the end of 2015, 173 countries had set targets where RE was concerned, including 146 which have established their own support policies on a national and territorial scale.

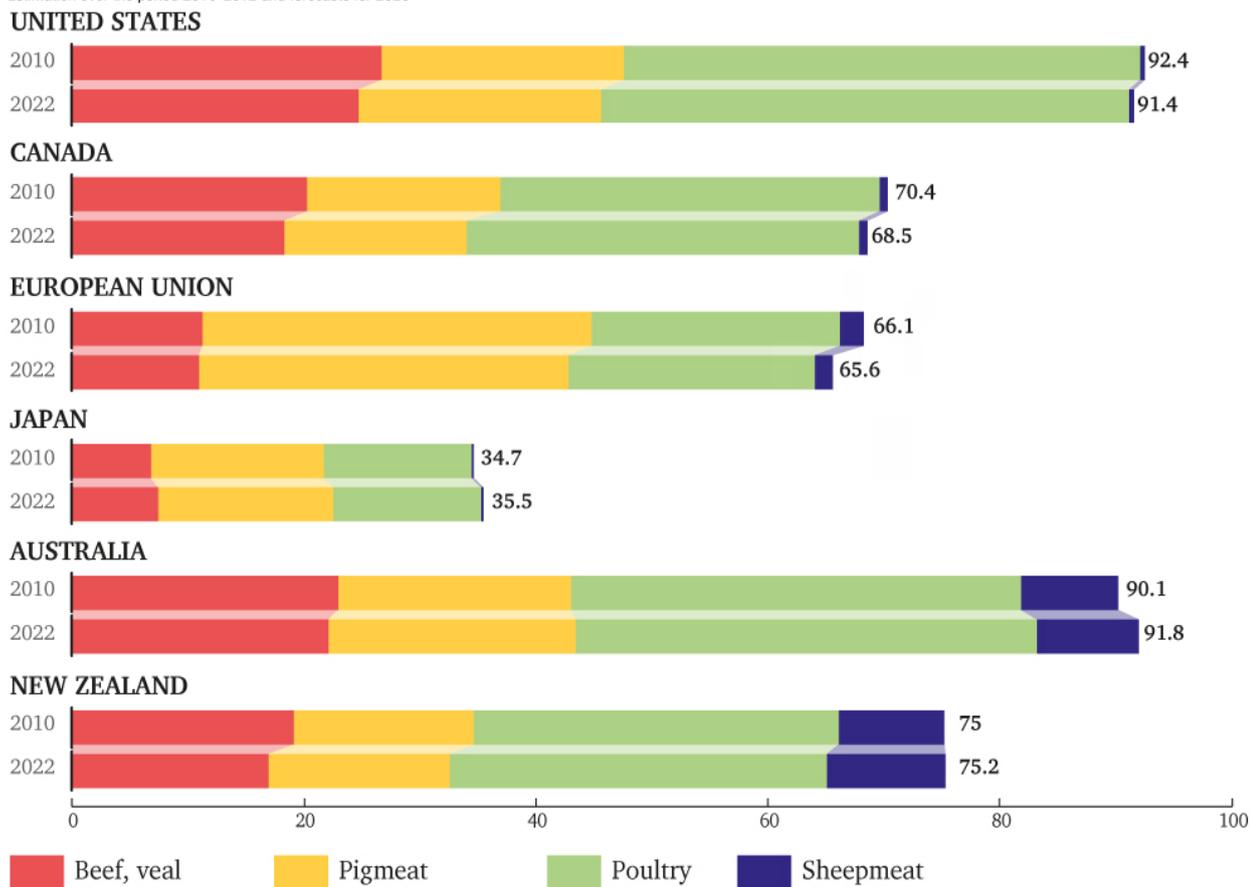
Changes in lifestyle of middle classes

More recently, questions of a socio-economical nature linked to our consumption patterns have emerged as major levers for limiting the impacts of

FIGURE 4 **Wealthy countries are capping their meat consumption**

Meat consumption in wealthy countries (in kg/inhab/year).

Estimation over the period 2010-2012 and forecasts for 2020



Source : Meat Atlas based on OECD/FAO data.

In rich countries, a relative cap, and even a down-swing, of meat consumption before 2020 is forecast resulting from public information and widespread education. But this trend still contrasts with the aspiration in many emerging and poor countries.

our activities on natural cycles. The fight against food waste is a first lever. Post-harvest agricultural and agrifood losses represent between 15 % and 60 % of agricultural production according to the products and the countries. Solutions for reducing them exist but require heavy investment and action on the scale of the whole sector. Even though the studies are not categorical on this point, the reduction of losses and waste is a major vector of change for our future. And lastly, circular economy, which aims at deploying a new economy based on the principle of “closing the life cycle” of products, services, waste, materials, water and energy, is a tool which is evolving rapidly.

Nutritional policies which direct eating habits towards a more sustainable and healthier consumption (less meat consumption, promoting meat production systems which use less vegetable calories) make up a second lever (figure 4). Such actions for controlling the demand and sobriety are a “no regrets” strategy which makes it possible to meet several challenges at the same time: environment, food safety and health. The same goes for all fields: water, energy, transport, etc.

But challenging consumption patterns, in the Global North and South, also leads to a deeper questioning of our societies. The function of consumption touches on personal and societal notions such as

needs, desires, social affiliations, habits, religious, cultural and professional influences, and also on techniques such as marketing and advertising. Therefore, besides economic science, a number of human and social sciences including anthropology, sociology and psychology (individual and social) have to be mobilized in order to understand correctly the mechanisms of consumption and consider the conditions for their moving towards increased sustainability. The legitimacy of this proposal is in itself an extremely delicate issue in societies which give a high value to individual freedom which supposedly includes the freedom to choose among the products and services offered on the market.

Regarding sustainable consumption, there are sometimes strong contradictions between the heavy trends of consumption and the demands or criteria of sustainability (read Armstrong, in APLF 2014, chapter 7). Among the factors which determine changes in consumption, access to the middle class and the increase in its numbers was one of the significant phenomena of the evolution of capitalist societies in the 20th century in the United States and Europe, in OECD countries in general and now in developing countries, whether they are emerging or not. This is currently one of the major societal consequences of the emergence of certain economies, an evolution which is very often desired by public and private actors, whether the political regime is of an authoritarian or democratic type.

Beyond questions of definition and characterization of the “middle class”, an increasing proportion of the world’s population is neither rich nor poor but is in the middle of the income ladder. Even in Africa, where the rapid expansion of the middle classes is still limited, they have progressed significantly and this has contributed to a rise in domestic consumption in a number of countries (AfDB, 2011; AFD, 2011). According to the OECD (2012), the global middle class will rise from 1.8 billion people in 2009 to 3.2 billion in 2020, and to 4.9 billion in 2030. This progression will be driven by Asia, which will represent, in 2030, 66% of the global middle class and 59% of the consumption of the middle classes, against 28% and 23% respectively in 2009. The middle classes of emerging and developing countries are a driver of consumption and domestic demand, but remain vulnerable due to their characteristics in terms of employment (predominant informal sector) and education (low rate of graduates from higher education).

Access to the middle class results in radical changes in the consumption patterns towards the models built in industrialized countries after WW2 based on the access to personal cars and semi-sustainable goods (television, domestic appliances, etc.); the change in diet for a more consistent share of animal proteins and even the access to leisure and tourism services. All of this resulting in a considerable increase in energy consumption, and particularly electricity, by households. In Ghana, the number of car and motorbike owners is reported to have risen to 61% between 2006 and 2012 (AfDB, 2011). The development of shopping centres (shopping malls) in the great metropolises of Asia, Africa and South America illustrate the emergence of these consumption patterns borrowed from the United States. On 16th March 2016, the opening of an IKEA store in Casablanca (Morocco) gathered a crowd of over 20 000 visitors. These models include an increase in the proportion of imported products and encourage global trade (AFD, 2011).

These consumption patterns are supported by the massive use of marketing and advertising techniques which are now used all over the planet. Investment in advertising represented 544 billion dollars in 2015 with an annual growth of 4.4% and peaks for India (11%) and Latin America (12.7%), in countries where the consumption of the middle classes is strongly sustained. In Europe where its growth is moderate, and even decreasing, investment in advertising only increased by 2.6%. The proportion of the increase in investment in advertising attributable to emerging countries over the period 2014-2017 was estimated at 59% (ZenithOptimedia survey, Thirty Rising Media Markets 2014-2016). In this increase, China takes the lead with Argentina, Indonesia and Brazil, and Africa is all but absent.

Doing more and better with less

For the governments of developed or emerging countries, consumption is a major issue which meet socio-political targets: to encourage the emergence of middle classes and more generally give the population material satisfaction as a means of maintaining social peace, political stability and support for leaders. Critiques of the consumer society by sociologists such as Marcuse (2013) or Baudrillard (2009), and the exposing of lobbying techniques, and even insidious manipulation of consumers by Packard

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(1957), Guy Debord⁶ (*La Société du spectacle*, 1967), Hodgson (2003) or Klein (2015), first affected Western countries from the end of the 1960s. To a certain extent, they are currently spreading to emerging countries. Consumers, and particularly those from the middle classes, are thus increasingly exposed to the double bind paradoxical requirement phenomenon mentioned by Bateson (1977): they are encouraged to consume more and more but also to respect principles of ethics, sustainability and even frugality.

In political and institutional terms, governments adopt orientations which save consumption. The action plans proposed are very prudent, and avoid committing to the reduction of harmful products (with the exception of tobacco), or to question eating habits or means of transport. They actually limit their action to expressing non-constraining recommendations, through policies for education, awareness-raising and information using eco-labelling and labels, the promotion of eco-products, to local products, to the reduction of packaging or the use of reusable or recyclable packaging. Even if the usefulness of these policies is certain, they only have a much reduced impact on the reorientation of the consumption or its contents.

In 2008, the European Commission established an Action Plan for a sustainable consumption, production and industry. This is also the spirit of the 2010-2013 French national strategy for sustainable development and the 10-year framework of programmes on sustainable consumption and production patterns (10YFP) adopted by the United Nations in 2013. In the National strategy of ecological transition towards sustainable development, adopted by France in 2015, circular and product-service economy was highlighted. It referred to taxes and the elimination of harmful substances, with no further explanation, and fighting programmed obsolescence. More ambitious in its proposals, the Strategic Analysis Centre proposed, in a note in January 2011, setting up the economic tools and “pricing signals” necessary for a transition towards sustainable consumption, including progressive tariffs for water and electricity. It nevertheless recognizes that “Public authorities are reticent to use the lever of consumption to move society towards a sustainable development”

and highlights the fact that “policies that only seek to redirect production methods are insufficient and produce perverse effects”.

It is clear that governments, and a number of other socio-economic actors, faced with stagnating purchasing power, rising poverty and inequality, and the need to support certain sectors such as agricultural production, are more than reticent to venture into consumption guiding policies. Questions must be asked on the factors and mechanisms which would make it possible to promote and implement policies of real paradigm change.

To conclude, the approach to the issue is less a question of solutions than a panel of social, economic and political tools in the framework of renewed governance. Recent history broaches the question of the abilities of States to initiate a new trajectory of our production and consumption patterns to face up to global and local challenges. At the end of the 1990s, global public goods appeared in international debates, in contexts marked by increasing interdependence between countries and the inability of markets and national policies to correctly manage the global challenges of climate, biodiversity or health. They have put the question of international governance regulations and tools back on the agenda, in a renewed proactive pattern. However, climate negotiations have since highlighted the illusion of international public governance and the need to consider a multi-level governance involving public, private and civil society actors, from the local scale (Aykut and Dahan, 2015). Part of the solution to the evolution of our consumption and production patterns may be found in commons where actors and citizens once again take on the stakes on their territory and look for specific solutions (Bollier, 2014). ✓

6. Guy Debord: “The society of the spectacle is the autocratic reign of the market economy, which had acceded to an irresponsible sovereignty, and the totality of new techniques of government that accompanied this reign.”

REFERENCES

- French Development Agency, *What middle class(es) in Africa? A review of the literature*, Working document 118, December 2011.
- African Development Bank (2011). *The Middle of the Pyramid Dynamics of the Middle class in Africa*.
- Aykut, S. and A. Dahan (2015). *Governing the Climate ? 20 years of international negotiations*, Références, Presse de Sciences Po.
- Bateson, G. (1977). *Steps to an Ecology of Mind* (Vol. 1, No. 2). Paris: Seuil.
- Baudrillard, J. (2009). *La sociedad de consumo: sus mitos, sus estructuras*. Siglo XXI de España Editores.
- Bollier D. (2014). *La renaissance des communs. Pour une société de coopération et de partage*, éd. Charles Léopold Mayer.
- General Commission for sustainable development(2012). *What realistic scenarios for protecting biodiversity between now and 2030?* Note Horizons 2030-2050.
- FAO, WWC (2015). *Towards a water and food secure future*.
- Giraud P.N. (2014). Ressources ou poubelles ? Le Débat, 2014/5, no 182.
- Hodgson, G. M. (2003). *The hidden persuaders: institutions and individuals in economic theory*. Cambridge Journal of Economics, 27(2), 159-175.
- Klein, N. (2015). *No logo*. Éditions Actes Sud.
- Marcuse, H. (2013). *One-dimensional man: Studies in the ideology of advanced industrial society*. Routledge.
- OECD (2012). *An emerging middle class*, The OECD Annual.
- UNEP (2013). *Our Nutrient World – The challenge to produce more food and energy with less pollution*.
- European Report on Development (2012). *Confronting scarcity. Managing water, energy and land for inclusive and sustainable growth*.
- A planet for Life (2010). *Cities. STEERING TOWARDS SUSTAINABILITY*. Focus : Agrifuels – Back to the Fields?
- A Planet for Life (2012). *Development, food, environment: Towards agricultural change*. Chapter 6 (Svedin, U) : Global conditions for agriculture in the “anthropocene”
- A Planet for Life (2014). *Innovation for Sustainable Development*. Chapter 7 (Armstrong, A.) : Are sustainable consumption modes emerging?
- Rockström, J., Steffen, W., Noone, K., Persson, A., Chapin, F. S., Lambin, E. F., & Nykvist, B. (2009). A safe operating space for humanity. *Nature*, 461(7263), 472-475.
- Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Fetzer, I., Bennett, E. M., & Folke, C. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science*, 347(6223), 1259855.
- WWF (2014). *Living Planet Report. “Species and Spaces, People and Places”*.



Anthropocene: The human and political implications of a new geological epoch

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Interview with Christophe Bonneuil, Historian at CNRS and co-author of *The Shock of the Anthropocene: The Earth, History and Us*, (Seuil, Point Histoire, 2016)

WITH STÉPHANIE LEYRONAS (AFD) AND CLÉMENCE LOBUT (AFD) JUNE 2016

How and when did the concept of Anthropocene start and what does it cover?

Christophe Bonneuil: The word «Anthropocene» was used for the first time in February 2000 by Paul Crutzen, who was awarded the Nobel Prize for chemistry in 1995 for his work on the ozone layer. It actually bears witness to the fact that «*The human footprint has become so vast that it rivals with some of Nature's great forces in terms of impact on the Earth system*». The term was then adopted by scientists from a variety of disciplines working together on «Earth system» science.

The Anthropocene is a new era in Earth's history, in which human activities have become a force which is shaping the planet. The word Anthropocene comes from «Anthropos», human, and «kainos», new. It therefore literally means the new age of humans. Under the impact



Christophe Bonneuil (CNRS)

of human activities, Earth has changed geological regime of existence. The extinction of biodiversity and dwindling forests, the change in the composition of the atmosphere, the acidification of the oceans and the modification of nitrogen, water, phosphorous, etc. cycles: our planet has been altered and is leaving the Holocene, a period of a little under 12 000 years since the last Ice Age.

Man's footprint on earth is flagrant: humans move around more soil, rock and sediments than water and wind combined, 90% of photosynthesis is carried out in areas which are more or less managed by humans, the weight of humans and their livestock represents 97% of the weight of terrestrial vertebrates, which leaves only 3% for the other 20 000 vertebrates on the planet, birds, reptiles, amphibians or mammals, the number of large earthquakes has multiplied by 20

in the United States compared to the 20th century due to the exploitation of shale gas and melting polar ice is changing the interplay of forces on the earth's crust to the point of modifying global volcanism, etc. Humans are therefore not only behind climate change, as is now fully recognized, but also behind a geological force which influences both the history of our Earth and natural factors such as variations in solar activity or plate tectonics, for example. The Anthropocene is the sign of our «geological» power and also the sign of our political impotence.

Has the new geological age been recognized scientifically?

C.B.: Despite increasing consensus within the scientific community and in the political sphere, geologists have not yet officially validated it as a new epoch. At the International Union of Geological Sciences, the International Commission on Stratigraphy keeps the official

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chrono-stratigraphic calendar of the 4.54 billion years of our planet up-to-date. The commission created an Anthropocene Working Group in 2009, and will publish its report in 2018, and in 2020 the Union will vote on whether or not to validate the new epoch. But should we wait for geologists before we start talking about a new regime of existence of our Earth? To understand what is happening to us, should we limit ourselves to the criteria of «solid» evidence provided by stratigraphers? The bubbles in ice cores and the composition of the atmosphere may be important markers, in the same way as the extinction of biodiversity, the acidity of oceans and the cycle of water, carbon and nitrogen.

For Jan Zalasiewicz, President of the Anthropocene Working Group, «*The Anthropocene is not only a question of knowing if we can detect human presence in stratigraphy, it is a question of the Earth changing as a system*». This reflects a systemic view of the Earth as a set of compartments: the lithosphere, the atmosphere, the hydrosphere, the cryosphere, the biosphere, etc. which are interconnected by constant flows of matter and energy.

The use of this term is intellectually audacious as we only have a few centuries' hindsight on the Anthropocene, as opposed to the Holocene (several thousands of years) and the Pleistocene (several million years). For specialists from ecology, geology, climatology, oceanography or atmospheric chemistry, who have grouped into this new interdisciplinary field of «Earth-system sciences», there is however no shadow of a doubt: the Earth has changed compared with its

balance during the Holocene. What is happening is not only a global ecological crisis, but also a geological revolution.

What political stories have developed from the concept of the Anthropocene? And how does it enlighten us on our methods of production and consumption?

C.B.: Our methods of consumption were already criticized at the time by Diderot or by socialists like William Morris in the late 19th century. But however old these critiques, they were not capable of diverting the trajectories of our societies. The consideration of the concept of the Anthropocene and the phenomena it covers varies greatly from one political current to another. From a naturalizing vision dominated by international scientific arenas to an eco-Marxist approach, the conclusions in terms of political projects can be radically different. These different outlooks are linked to a more scientific debate on the date when we went from the Holocene to the Anthropocene. Four geo-stories appear particularly interesting to me in as much as they all give us different insight into our methods of production and consumption. They describe distinct moral and political schemes and visions of our societies and invite us by means of specific political agendas to venture down distinct paths.

For William Ruddiman, a paleoclimatologist from the University of Virginia, it was in the Neolithic, 5000 years ago, that humans emitted - through deforestation, rice paddies and breeding - enough greenhouse gases to modify the trajectory of the Earth's climate. The origin of

the Anthropocene was thus agriculture and those responsible the human species as a whole.

A second possible beginning was proposed in 2015 by climatologist Simon Lewis and the geographer Mark Maslin in the magazine Nature. They suggested that our new geological epoch should begin with the European conquest of America. This birth of globalisation was to decimate the Amerindian population and resulted in 60 million hectares of fields returning to wasteland and the forest and a drop in the carbon concentration in the atmosphere of around 279 ppm in 1492 to around 272 ppm in 1610. European colonialization and budding capitalism could also be behind a new geological force. These two scenarii are nevertheless fragile ones: the Holocene probably ended neither 5000 years ago nor in 1610 because the concentration of greenhouse gases, even though it varied at these two periods in time, did not leave the Holocene range of values.

It was only in 1809 that this concentration exploded and exceeded Holocene values to reach 290 ppm at the end of the 19th century and 400 ppm currently. It would appear that the Earth's atmosphere left the Holocene at the beginning of the 19th century. With the massive use of coal, the carbon accumulated in the lithosphere over hundreds of millions years was projected into the atmosphere in the space of a few decades, hence Paul Crutzen's proposal to place our derailment out of the Holocene with the Industrial Revolution, new models of development by colonisation and economic competition.

Lastly, and this is the possible

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4th beginning, some consider that the carbonisation of the atmosphere has taken place slowly and progressively since 1800, with no clear spike and no «golden spike». For geologists to accept a new epoch, they need to search for more precise markers. Jan Zalasiewicz, President of the Anthropocene Working Group at the International Commission on Stratigraphy, considers that radio-elements, which had hitherto been unknown on Earth, and which were jettisoned by the first nuclear explosions in 1945 are a very accurate stratigraphic marker. In this fourth scenario, the fracture is marked by the sheer enormity of the power race during the Cold War which turned the whole planet into an experimental laboratory. The age of waste and the expansion of the mass consumption society.

Can a change in designations bring change?

C.B.: The Anthropocene allows an essential raising of awareness: we are not going through an environmental crisis but a man-made geological revolution. It sheds light on the observation that Earth is currently experiencing conditions which have been unknown for thousands and even millions of years. Human beings have never had to face such a situation. The last time there was such an amount of carbon in the atmosphere as there is currently was during the Pliocene, between 2.6 and 5 million years ago. At the rate we're going, half the animal and plant species will have disappeared by 2100. The last comparable extinction dates back to 65 million years ago, when three quarters of the species including the dinosaurs disappeared

because of a meteorite. Homo sapiens is 200 000 years old: along with our children we must face up to planetary conditions that no human has ever faced before. Leaving the Holocene is not only a geological phenomenon but a new human condition. This leap into the unknown is not due to a meteorite or any other external event, but due to our own development model, which while it claimed to be tearing itself from the limits of the planet, has actually met them head on.

Nevertheless, there is a real danger of this concept becoming a vector of demobilisation, apathy and depoliticization. According to the current classical story, the human species supposedly unintentionally destroyed nature in the past to the point of altering the Earth-system. It was only at the end of the 20th century that scientists actually opened our eyes to this. This is false and depoliticizes the long history of the Anthropocene. It is therefore necessary to politically understand this concept. It could be significant as it challenges the conceptions on which modernity was founded.

Our geological swerve challenges the reliability of our vehicle and the relevance of our map. It challenges our modern visions of the world and our relationships with the Earth. For the philosopher Bruno Latour, the Anthropocene is this “the most decisive philosophical (...) anthropological and political concept that has ever been produced as an alternative to ideas of modernity”. The modern project was to tear history away from nature, seen as resources or environment and separate from man; to free the future of

mankind from any natural determinism. This project failed due to the fact that the disruptions inflicted on the Earth have stormed back into our lives and our geopolitics and refers us back to our attachment through thousands of links to the potential power of the Earth and life.

The concept of the Anthropocene shatters the promises of perpetuating our economic system by modifying it at the margins. Industrial modernity, from renewable and living energies to coal which is an inert resource, has represented nature as a shopful of static resources: this is what the philosopher Peter Sloterdijk criticised as the «kinetic nihilism» of modernity. This no longer works because, by leaving the Holocene, our Earth has shown itself to be shifting. It is also the Descartes ideology of a rift between humans and all the other beings grouped into the all-purpose and externalising concept of «nature» which is plagued by the Anthropocene. Anthropologists Philippe Descola and Eduardo Viveiros et Castro called this very particular Western way of distributing roles and capacities among humans and other-than-humans «naturalism», the Nature/ Culture split. And they highlighted both non-universality and non-sustainability. It is high time we invented or reinvented other representations of the Earth and its beings.

The idea of «Progress» also took a bashing after it swerved away from the Holocene. The Moderns' promise of an intentional society which would do away with tradition and the past has failed and our future has never seemed so dependent on the past. The level of the oceans in 2300

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will not so much depend on the choices of the 21st century as on our own today. The more we move forward on the current trajectory of greenhouse gas emissions, the nearer we will be getting to «too late» and the future will be constrained and narrowed by the past – the complete opposite of the promise of progress as a futuristic wrenching away from the past.

It is also our conceptions of freedom, inherited from the industrial era, which must be rethought using a new form of geology. From Kant to Luc Ferry, our modernity had imagined freedom as breaking away from all forms of natural determinism, and concern for the Earth and nature as a reactionary idea. As Sloterdijk explains, this modern ideology was supported by an «ontology of the side-lines». For example, economic science acts as if nature was infinite. The food and heating and cooling circuits and ecological debt on which our modern edifices of Freedom were carefully hidden away from sight. Work tracing the global flows of matter, energy and waste, today and in the past, shows us how much all cultures, all social orders and all political systems are held together by the organisation of these flows. For example, Tim Mitchell showed that our model of representative democracy was co-built on fossil energy, none too glorious geopolitics and a destructive ecological debt with the rest of the world. How can we then reestablish a new, internally more democratic model which is less predatory regarding the rest of the world?

To live in the Anthropocene is to live in the non-linear and highly unpredictable world of responses to the Earth-system, or rather of

the Earth-history. The Anthropocene is throwing the modern ideology of nature, progress, freedom and democracy into crisis, but the crisis is not only an intellectual one. A world at +2°, and even worse, at +3-4°, to which the voluntary commitments of Countries to COP21 are leading, will most likely be terrible for the large majority of Humanity to live in. For example, subsequent to a historical drought, a million people from the rural population went into exodus towards big Syrian cities between 2007 and 2011 and this was one of the trigger factors of the risings which were to subsequently result in the current war. The influx of migrants due to this war is probably only a small foretaste of future migration crises in the West Africa to Middle East band, the boomerang of our modern oil and climate-killing modernity coming back to strike us right in the middle of 21st century Europe. The UN has announced for 250 million climate refugees 2050 on this same trajectory.

Where modernity promised universal peace between men by dominating the planet, the Anthropocene announces the possibility of barbarity, and even the need for conflict. For Michel Serre's *Le contrat naturel* and for many philosophers 20 years ago, the essential challenge was to reconcile humans and non-humans. It is striking to see how Bruno Latour's latest book, *Facing Gaia*, steers away from this. After having appealed for peace, he calls for a confrontation of the terrestrials, or Earthbound, against the Moderns. The Moderns are also those who believe themselves to be separate from and above nature and they

intend to pursue the process of modernisation believing that the Earth belongs to them. The Earthbound are those who know that they belong to the Earth and are part of this nature which is fighting back: Western city-dwellers committed to ecological transition, post-development or the fight to leave 80% of fossil resources in the soil; the rural and neo-rural population attached to a territory, forming with its occupants a «nature which is fighting back» against concreting, extraction and «modernisation»; common resources founded on systems of rules decreed by communities and which aim at protecting resources. Lastly, we can add to this coalition of traditional and new technologies: agro-ecology, cooperative wind-farms, etc. These coalitions of the Earthbound make up what anthropologist Anna Tsing calls the «third nature», a nature which resists, ignores, subverts and thwarts the second nature schemes of the Moderns.

Therefore, sometimes unbeknownst to the modern conscience of the scientists who address it and their «management» of an earth-system seen from above, the Anthropocene appeals to the mobilisation of the victims, rejects and those who count for nothing in this modernity which has destabilised the Earth.



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Middle-class rise and low-carbon economy

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Homi Kharas, Senior Fellow and Deputy Director in the Global Economy and Development program, Brookings Institution

with Bertrand Charrier (AFD), Lucas Chancel (IDDRI) and Isabelle Biagiotti (Aida | A Planet for life)

How to assess the impact of the huge demand of natural resources due to the emerging of a world middle class on the implantation of the SDGs? Are they contradictory?

Homi Kharas: Broadly speaking, if you look across the global spectrum, when extreme poor move to become near poor, they actually reduce their carbon footprint. That's because the extreme poor tend to do slash and burn agriculture, other very environmentally damaging agricultural practices, and over exploitation of the commons in their area—degraded lands, etc. The poverty agenda is actually quite good in that sense for sustainability. But it's still true that the middle class consumes more resources per capita. So you probably will need a counterbalance for this overuse as the middle class grows. If you think of the world as a whole, you have environmental benefits of moving away or out of poverty; you have a cost in terms of permitting the middle class more access to energy and other

kinds of things; and then we have the roughly one billion or so of people who now are classified as being rich who must adjust their consumption to become more sustainable. All of these will have to be balanced in order manage the use of natural resources.

But huge benefits come from moving people out of extreme poverty because their use of common resources improves. Take slash and burn cultivation, which still exists in large part of the world with huge impact on forests in Indonesia or Brazil for example. The carbon emission reductions are not necessarily about consumption but about their way of life. And if you look at the McKinsey¹ study on the easiest reductions of carbon emissions, you will see that many of them have to do with agriculture. In fact, 60% of least-cost reductions of carbon emissions come from the agro-forestry sector in the McKinsey forecast. Much of that is

related to changing behaviours of poor people and poor farmers.

In terms of finding a balance between resource use by the poor and middle class, the international discussion has profoundly changed. Developing countries are increasingly thinking about their national policies, starting with how to support their middle-class rather than focus on the poorest. There are countries where



Homi Kharas

the poverty agenda just doesn't resonate any more. So even if you are concerned with poverty, you should look at middle-class issues in each country to see if it aligns or diverges from the poverty agenda. More and more the growing middle class is becoming the main political driver for policy reform.

Which consumption pattern do these middle-classes follow? Do they have internal dynamics or do they look upon Western standards?

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H.K.: There is a small amount of status consumption, but one interesting thing that is not understood yet is the growth of consumption of services. People are now consuming far more services, and much earlier, than they did before – not only middle-class people but also poor people. The simplest example is the mobile phone: the amount of money being spent on mobile phones compared to your standard phone is huge. Services are of course much less energy intensive than material things. Part of the question will then be how services develop and if services prove to be a greater claim on people's budget than material possessions. Evidence for this can be seen in China, where the services sector is growing very rapidly and probably much more rapidly than the goods sector.

Is there a policy scope that supports the two objectives – the construction of sustainability and the enlargement of the world middle-class? Do we have to choose?

H. K.: There is nothing – technological or policy – which says you can't have a developed society which is sustainable. Policy needs and tools are different in developed and in developing countries. In developing countries, taxes are not a well enough developed instrument for changing income distribution and making polluters pay – as compared to developed countries. But this simply means the issue has to be approached differently by developing and developed countries.

For example, Japan seems to have many elements of

sustainability: fairly equal, low carbon footprint for its level of GDP, very efficient urban transport, Tokyo is a very dense city, an efficient use of railways, etc. Frankly, if the rest of the developed world looked like Japan, we wouldn't need to have a global agreement on climate change.

Inventing global sustainable ways of living will involve a lot of technological innovation. For instance, imagine a world where in 2020-2025 driverless cars are an available option. Right now the utilization of a car is somewhere between 5% and 10% because cars are sitting for most of the time.. Driverless cars massively reduce the demand for individually owned cars. With more people moving toward urban areas, if you get urban planning right, you will see people moving away from owning cars. In New York City, even with a very cheap price of gas and without the greatest public transport system, bike-ways and alternative transportation solutions have developed. By seeking these alternatives, removing the physical parking of cars, and the development of roads we can free up to 10% of urban space!

How quick we get there, its rate of adoption, etc., are less clear. But when you speak about what an adaptive lifestyle for more sustainability looks like, I believe this is the form it would take. And if it is not driverless cars for households, it will be driverless buses and driverless trucks – using the ability to save on land transport, not so much in Europe where there are good railway options, but in the United States and many other countries without these infrastructures. You can imagine

entire highway lanes with essentially convoys of lorries going across. Convoys like this would save 10% of energy just from the physics of the wind resistance. When you move to electricity away from gasoline, which many of the driverless engines do, you increase also your carbon efficiency. The change in patterns comes with a change in technology. It will happen when you get smart roads.

And lesser technological change may be as powerful. If you can switch from two-stroke engines to four-stroke engines, the amount of carbon emissions by unit changes quite dramatically. If you could make public transport into a middle-class choice rather than a poor person choice (as it is in many developing countries), that could also have huge impact. In Asia, metro systems have increased and are actually profitable simply because of the concentration of peoples, which is very different from systems in advanced countries which require large amount of public subsidies to be constructed and sustained. Hong Kong, Singapore, Malaysia, and China are among developing countries with financially sustainable metro systems.

But we should be clear that the energy consumption of an emerging middle class, who would be in Asia and in Asian cities in particular, will rise. Business-as-usual would mean very large sales of automobiles in these markets and subsequently high carbon footprints. We need alternative technological solutions that will be a better solution to personal transportation needs, while offering far lower environmental and financial costs.

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Finally a large difficulty is securing financing toward sustainability. What could be done to improve the financing of the de-carbonization of economy?

H.K.: My own take on this is that we have to move from project financing to programme financing. I have a bit of a problem with blanket-type messaging like “we would not finance any coal power plant”. I would prefer a country to have a mixed energy strategy with a plan to adjust it over time to align with their nationally declared climate commitments, and then finance that programme. When you look at these strategies, they rarely say we are going from here to zero instantly. There is always phasing.

After the COP21, the first phase is for countries to put in place energy transition strategies and really think seriously and understand what the implications are. By and large, the economics at least were reasonably favourable in terms of renewable energies in many places. With coal and oil

prices going down, it may change, but these prices cannot last very long.

What is now needed is a mobilisation in favour of financing energy transition, but there is clearly a lack of political will and needed instruments. For instance, the United States lacks infrastructure banks to finance the deep de-carbonization of the economy. And if you don't have the United States taking a very strong leadership role on something that is global, you are putting one quarter of the world GDP out of the system, which makes harder for everybody else to make up the difference.

What makes Global or National Public Goods so difficult to finance?

H.K.: There is some kind of short-termism permeating not only public life but also private company boards or philanthropies. Across the board, people are saying if I give you money I want results tomorrow. And I want to be able to see them. In every sector that I look at, I see this

pressure to generate short-term results, which makes it difficult for leaders to maintain any long-term perspective or commitments. For me, it is partly due to the decline of trust in any kind of institution. When you look at polls about “do you trust governments, corporations, the media, etc.”, the only group people still trust to a reasonable degree is religious groups. Why there has been such a decline in trust is hard to say. What can be done about it? – I don't know.

1. *Pathways to a low-carbon economy: Version 2 of the global greenhouse gas abatement cost curve*, McKinsey&Company, September 2013.



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A selection of APFL archives on sustainable production and consumption

Issues of sustainable production and consumption have been regularly treated by A Planet for Life. Energy, climate, agriculture, alimentation - some of the important nexus have been thoroughly covered. Here you will find a selection of essential resources.

AGRICULTURE AND FOOD

- > Pierre-Noël Giraud and Denis Loyer | Pour une révolution doublement verte en Afrique (in french only)
- > Bruno Losch | Agriculture and transition in a globalized world
- > Uno Svedin | Global conditions for the future of agriculture in the «Anthropocene»
- > Food: How are cities in the developing world fed?

AGRICULTURE AND ENERGY

- > Agrifuels – Back to the Fields?
- > Repères | Agrocarburants (2) Mesurer l'impact climatique (English translation coming)
- > Laurence Roudart | Is cultivable land a scarce resource?
- > Charles Baubion | China: Massive projects supply cities with water

DEVELOPMENT AND ENVIRONMENT

- > Ajay Mathur and Manish Kumar Shrivasta | The pursuit of sustainable development in India
- > Mark Schapiro | The expanding search for a carbon price
- > Peter Utting | Pathways to sustainability in a crisis-ridden world
- > Renaud Lapeyre and Constance Corbier Bartaux | Biodiversity conservation and the reduction of inequalities: the Namibian experience
- > Gregory M. Mikkelson, Raphaël Billé and Gilles Kleitz | Economic equality as a condition for biodiversity conservation
- > Anne Booth, Romain Pirard, Ahmad Dermawan, Heru Komarudin | Can agricultural intensification save forested land? A review and case study in Indonesia
- > Michel Colombier and allii | Le développement dans les négociations climat (in French only)
- > Tancrede Voituriez | The trade versus climate conundrum
- > Electricity: the energy of development
- > Energy: which model for tomorrow?

INNOVATION/DURABILITÉ

- > Carlota Perez | Technology, globalization and the environment: is the world ready for a global golden age?
- > Fabrice Flipo | ICT: beyond the myth of the dematerialized economy
- > Stéphane Fournier and Marcelo Champredonde | Agri-food, innovation and sustainable development



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The Fabric of Sustainable Development

After nine years of paper editions, *A Planet for Life* is developing into a digital project. The next contributions to *A Planet for Life* bear on the analysis of the main issues and challenges regarding the collective commitments of Nations, either the Addis Ababa agreement on development financing, the sustainable Development Goals adopted by the United Nations General Assembly in New York or the commitments of Nations on the climate during the COP 21 in Paris.

They are organised around 10 cross-cutting dossiers:

- > Consuming and producing sustainably
- > Ending inequalities
- > Basing public policy on science and knowledge
- > Bad governance: the proliferation of the grey areas of globalisation
- > Global to local and vice-versa
- > Stakeholder participation
- > The global vision of emerging countries
- > Finding the right indicators
- > Financing sustainability
- > Digitalization of society

The topics are introduced by experts from the French Development Agency (AFD) and the Institute for Sustainable Development and International Relations (IDDRI) and commented by international reference personalities proposed by both institutions and their partners, including the TERI. These dossiers are based on previously published articles and on other elements such as maps and charts.



A Planet for Life is published by the AFD and the IDDRI.

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