Biodiversity and Sustainable Consumption

A qualified analysis and unqualified suggestions

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A qualified analysis and unqualified suggestions

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(with input from the ALARM SE Team)

All we do is talk, but "by deliberately changing the internal image of reality, people can change the world."

(Willis Harman)

The Northern Alliance for Sustainability, ANPED, January 2008.

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Introduction

What biodiversity implies for sustainable consumption and thus what sustainable consumption can do for biodiversity is an issue neglected so far in both, the biodiversity and the sustainable consumption discourses. Consequently, this paper cannot offer a checklist, let alone a consumers guide to biodiversity friendly consumption. Instead it is intended to be a first step in a longer journey, first comparing the place biodiversity and consumption hold in the overall sustainable development discourse. Then it focuses on the known reasons for biodiversity loss, based on recent research results from one of the world's major biodiversity research projects (ALARM, see Settle et al. 2005), and asks how they could be influenced, in particular by sustainable consumption. Whereas the former, science based analysis is the qualified part referred to in the title, the latter, due to the lack of knowledge on this specific link, is the more speculative, and in this sense unqualified part of the paper.

Nonetheless some important conclusions can be drawn: sustainable consumption can contribute to biodiversity preservation, but to be effective the view on consumption has to be broadened. Furthermore, both biodiversity protection and sustainable consumption face some joint institutional obstacles which suggest that a collaboration of agents from both fields could yield synergies helpful for both sides.

Sustainable development, consumption and consistency

Sustainable development, at least in policy circles, is all too oft reduced to its environmental dimension, and this in turn to enhancing eco-efficiency or resource productivity. This is an artefact of the political discourse; the initial work by the Brundtland Commission (WCED 1987) is cited most often incompletely. It defines sustainable development as "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs. I contains within it two key concepts:*
1 *The concept of "needs", in particular the essential needs of the world's poor, to which overriding priority should be given, and*
2 *The idea of limitations imposed by the state of technology and social organisation on the environment's ability to meet present and future needs.*"

Thus environmentalism alone cannot sufficiently address sustainability (also not in a sustainable consumption context), and even less so can a focus on eco-efficiency. This has two main implications: *first*, that environmental "limits" in the quest for sustainable consumption are always dependent on social organisation and technology, and that needs must be met, i.e. that there is not

only a maximum for sustainable consumption, but also a minimum to resource availability, necessary for leading a dignified life (Spangenberg 1995). *Secondly*, as for the environment, and for biodiversity as a part of it, it does not matter how much wealth has been created while destroying it: what counts is absolute, not relative impacts (constituting the need for either a decrease of consumption or an absolute decoupling of consumption and environmental impacts). Thus efficiency is but one aspect of sustainable development, and must be complemented by other organising principles.

For this behalf, but with a strong environmental bias, a trinity of orientations has been suggested and frequently discussed, namely

- *Efficiency,* motto "don't waste",
- *Sufficiency,* motto "don't squander" (the role of socially unsustainable underconsumption is hardly ever addressed in this context), and
- *Consistency* (low entropy generation) motto "don't disturb".

Sustainable production is most often focussed on efficiency.
Sustainable consumption most often refers to sufficiency.
Biodiversity is most affected by consistency, but also by sufficiency. For the latter aspect, a contribution of changing consumption patterns to biodiversity preservation could be a focus on "least entropy consumption", including a reduced size of material flow cycles. For the former, a new debate is needed and criteria have to be defined, which will most probably go beyond the current sustainable consumption discourse.

Bioscience analysis

To feed such a discussion with hard facts and scientific analysis, it is helpful to have a look at the state of research regarding the loss of biodiversity. Building upon this analysis, it is possible to develop first and provisional ideas how sustainable consumption could help overcoming these challenges. For this behalf, the DPSIR (Driving forces – Pressures – State – Impact – Response) scheme developed by the EEA is helpful. Its application here is not based on the recent report of the European Environment Agency EEA on biodiversity indicators which also applies the concept (EEA 2007), but on research results from ALARM, one of the world's largest biodiversity research projects[1]. Basically, the DPSIR scheme looks as in figure 1, available from several EEA publications (see EEA 2001).

[1] ALARM is an Integrated Project funded by the European Commission under grant number GOCE-CT-2003-506675, see www.alarmproject.net and Settele et al. 2005

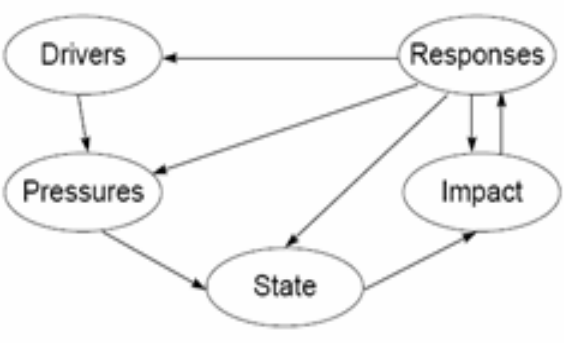


Figure 1: The DPSIR scheme (EEA)

Its basic principle is to illustrate that there are Drivers in the societal processes which cause specific Pressures (specific concrete interventions) on the State of the environment, which in reaction to them is changing (the Impact). This provokes Responses (policy decisions, consumer behaviour, etc.) aimed at mitigating or moderating the changes.

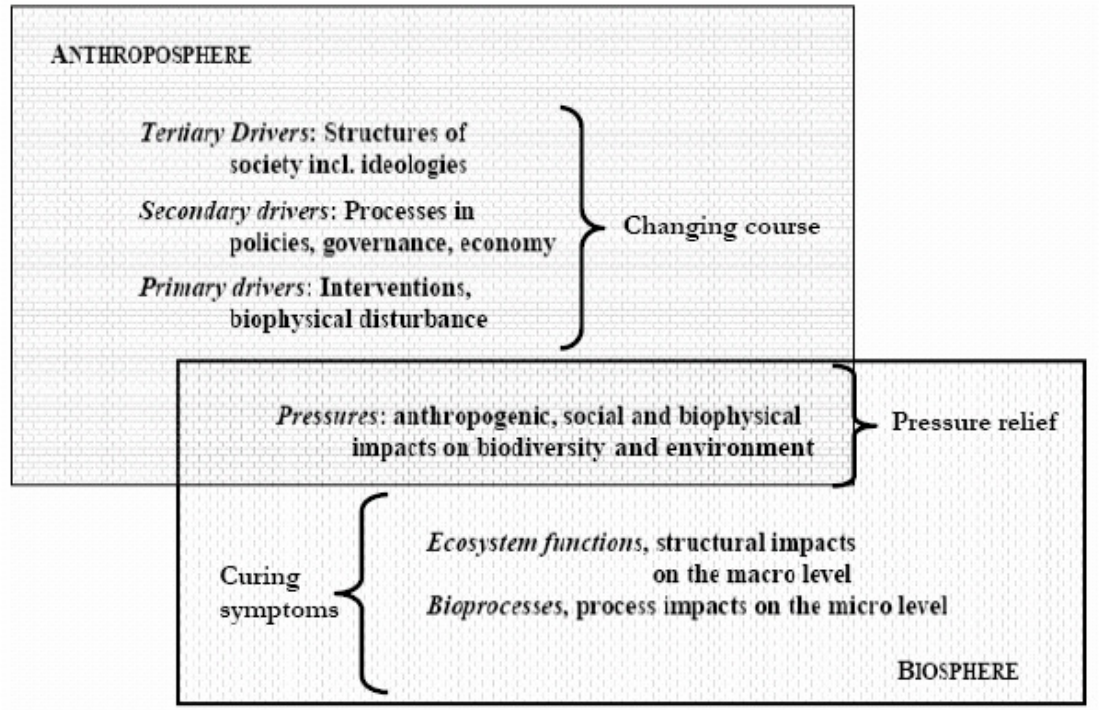
To reflect the challenges of biodiversity loss, however, a few modifications are necessary (Maxim et al. forthcoming). On the one hand, there are feedback loops: all elements interact; for instance, Impacts are changes of the State (I → S), the vulnerability of the system, a State variable, determines which external influences become effective Pressures (S → P), and so forth (Maxim, Spangenberg 2008). In particular there are Responses to each D, P, and I (usually not to S: not the state itself, but state changes trigger reactions of the socio-economic system). On the other hand, the Drivers are so manifold that to deal with them properly they have to be disaggregated. A useful way to do so is to distinguish primary Drivers, reflecting the decisions causing Pressures and the organisations implementing them, from secondary Drivers, the processes and policies which are the basis for the specific decisions, and finally tertiary Drivers, the orientations and values underlying the processes (Spangenberg 2007).

The distinction between organisations, processes and orientations is well known from political science: all three are considered to be institutions, and thus institutional change is required to preserve biodiversity (North 1990). In the same way, it can be shown that it is these three levels of institutions which need to be changed for consumption to become sustainable, and that in Agenda 21 and elsewhere it is the orientations which are most frequently neglected, a factor undermining the efforts to change policies for sustainable consumption, and their outcomes (Spangenberg 2004).

The DPSIR structure, modified as described above, permits to present the research results in an easy-to-digest way, as a series of more or less causal effects to which agents react (politics, but also consumers). This is an oversimplification, as the biosphere and the anthroposphere are both complex evolving systems with an open future, and their interaction is no less complex (see figure 2). Thus the description provided is not a scientific analysis in itself, but a simplified way of presenting the results of such an in-depth analysis. To make it operational, bioscience analysis have to be combined with policy and economic analysis, and Responses have to be derived for all D, P, and I effects (as mentioned, usually the State as such does not trigger Responses,

while changes of the State, i.e. Impacts, do so). However, deriving Responses is no scientific but a political undertaking, for which science can only provide information for all agents involved about what is going on and which measures might have what effects. Then a collectively binding decision needs to be taken, which should be based on public discourses. It can be enforced by different means, from administrative measures to value and behavioural change In particular as far as Responses include changes in consumption patterns brought about by changed consumer preferences (orientations) and behavioural routines (mechanisms), and not only enforced by a changing legal environment, such discourses are an indispensable condition for lasting change.

Figure 2: Biodiversity DPI – towards R



When applying the DPSIR scheme to biodiversity, *Impacts* refer to the biosphere. There are

- *Micro level impacts*: most famous is the loss of species (extinction, red lists, see e.g. WWF et al. 2000), and
- *Macro level impacts*, i.e. the loss of or damage to ecosystem functions (Millennium Ecosystem Assessment 2005).

The latter are also described as ecosystem services, but as this economic connotation has many setbacks, like the implications of commensurability and substitutability, in this text the term 'ecosystem functions' is preferred (Spangenberg 2007).

Responses to the impacts

Developing Responses on the level of Impacts obviously does not address the causes; it is a strategy aiming at moderating the symptoms, not curing the problem (see figure 1). However, such strategies can nonetheless be of high importance. If the risk to biodiversity is imminent, and measures addressing the root causes would be too time consuming to provide timely results, combating symptoms is the order of the day. The *traditional response* to in these cases is to protect nature from human use, hoping that the resilience of the system is sufficient to manage a recovery process, which is indeed often the case (Hyvönen 2007). In this concept, nature reserves are to be as large as possible, left without human influence, and contain many species (European Union 2004). The optimal location for a reserve is often determined economically. The result is a dichotomy of landscape use, with increasing intensification in particularly fertile areas and preservation in marginal ones. Although this approach has proven insufficient over the last decades, it still has its merits and sustainable consumption should pay tribute to them, e.g. by respecting the red lists of endangered species as items not to consume, keeping the CITES rules for international trade in species, in particular by not buying endangered species as pets or souvenirs, nor for aquaculture or decorative purposes.

This traditional approach failed in two respects, first not delivering the expected results, and secondly by undermining the social sustainability of the local populations now excluded from using the protected area. Therefore it was further developed into a modern approach of participative ecosystem management *with* the people, including concerns for livelihoods and social sustainability (see e.g. IUCN CEM 2006) for descriptions of the methodology and case studies). The approach can – if necessary – still include protected sites as core regeneration and biodiversity hot spots, but focuses on sustainable use, ecosystem connectivity, a liveable country side and revitalised agro-areas. Sustainable consumption can contribute to such efforts for instance by a preference for local, organic food consumption and fair trade goods (however, sometimes there are trade offs between local, organic and fairly traded), by spending holidays in the country side, by buying other local products beyond food, by sustainable tourism, in a nutshell: but spending money in areas where ecosystem management is practiced, without violating the framework established for this behalf.

Pressures

In biodiversity research five important groups of Pressures have been identified leading to Biodiversity loss (in this order):

1 Land use changes;
2 Biological pollution (invasive species, GMOs);
3 Climate Change (the future top issue);
4 Chemical pollution;
5 Pollinator loss (an intermediate).

Sustainable consumption can and should contribute to reduce these pressures. For instance, the negative effects of *land use change* can be reduced by stopping the permanent increase of living areas and the strive for single houses, substituting them for flats (owned or rented) in compactly built areas, thus avoiding land fragmentation and stopping urban sprawl. Revitalising city centres and improving public transport are also important, but less in the hands of consumers (Lorek, Spangenberg 2001).

Regarding *biological pollution*, besides a boycott of GMOs, invasive species can also be addressed by consumers. The key idea in this respect is to contribute to avoiding invasions by minimising the international transport of objects organisms can use as vehicles by travelling in them or attaching to them in order to get a lift. This includes not only minimising one's food miles, but trying to consume "low mileage" for all products and their parts, and by avoiding own travelling (Fuchs, Lorek 2002). Container transport has decreased cost and carbon associated to bulk material sea transport (supplying to and exporting from the inland is of more environmental concern), but it has also massively enhanced the risk of unintended imports of invasive species. Introducing enhanced phytosanitarian controls throughout Europe, on the border and inside the Union, even where this partly restricts the free movement of goods in the Common Market, is one measure governments could take immediately. Such controls would conform to the WTO rules – which the same governments should consider to change, introducing the right to consider the production processes as part of the product quality, for the benefit of social and environmental sustainability in general and for biodiversity preservation in particular.

For *climate change*, energy is the key issue (IPCC 2007), and it is known for some time now that the three areas in which households can contribute most are housing/construction, nutrition, and transport/mobility (Spangenberg, Lorek 2002), whereas fashion, clothing, cleaning and cosmetics are marginal from an environmental point of view (although they have considerable symbolic value). Consumption options regarding the former three fields have long been discussed; some of the most provocative have been speed limits of 100 km/h on roads, 200 km/h on rail and 400 km/h in the air (turboprop planes are the most energy efficient), or to have no holiday trips shorter than three weeks – that means substituting frequent short trips (including the bow cost

shopping flights) for four weeks holidays only once a year. Four weeks, plus some nice days or weeks spent regionally with biking tours and the like is also the best recommendation from a health point of view (if you are European and enjoy five to six weeks of holidays – if you are American or Japanese begin by not working instead of taking your holidays). Since the Internet consumes as much energy as global air transport, and an avatar in "Second Life" as much as a real person in Brasil, living more in the real and less in virtual worlds is also one measure to be taken.

Chemical pollution refers not only to toxic chemicals like pesticides or heavy metals, but also to the volume effects e.g. of fertilisers (nitrogen overload is one of the most important reasons for biodiversity loss in agricultural areas). Whereas most of these chemicals are covered by the new EU REACH chemicals policy approach, others are not, like endocrinous disruptors (pseudo hormones), i.e. those substances which are effective in very small doses and emerge as a side or degradation product of other chemicals. Consumers can play a role not only by contributing to reduced material flows through conscious shopping and waste separation, but also by either stopping gardening or using no garden chemicals (private gardens receive the highest dose of chemicals compared to all other agricultural areas), taking less pills and not flushing medicine and chemicals down the toilette. Another step reducing the production and release of toxic chemicals and heavy metals is not to buy new electronic equipment, and instead – if necessary – buy reused and upgraded electronic devices.

Finally, *pollinator loss* is a major concern, as most fruit and vegetables are dependant on or at least their yield is positively influenced by animal pollination (bees, butterflies, bats, …). Protecting pollinators requires changes in chemicals policy (taking pollinator toxicity as one criterion for chemicals approval under the EU REACH and comparable international regulations), and a kind of land use planning which preserves nesting and forage areas for pollinators, enhances the diversity of flowering near agricultural areas and throughout the landscape, and improves the connectivity of undisturbed spots (Klein et al. 2007). Consumers can hardly influence these measures (except in their roles as citizens and voters), but can increase the demand for them by buying organic food, and eating more fruits, vegetables and in particular honey instead of meat and sugar (a major contribution to health policies, by the way). Meat consumed should be of local origin and from semi-natural keeping.

All these Pressures are the result of multiple, interacting forces, and for any causal treatment the Drivers behind each pressure have to be identified. For the primary Drivers, the results of our analysis are just listed as bullet points below, without suggesting sustainable consumption Responses. This does not mean that they are not needed, but demonstrates that they have not been elaborated yet. For the shortlists of secondary and tertiary Drivers some possible reactions are suggested, not necessarily the most effective or easiest to implement ones, but selected to provide food for thought and further debate (like some of the suggestions for Pressures relief).

Primary drivers: Land use change

- Customer demands: transport, food, leisure, biofuels, settlement patterns (single house), increased traffic, changes in modes of transport, urbanisation and urban sprawl, more leisure mobility.
- Forestry & agricultural practices: abandonment of fields, aforestation (commercial, agro-social forestry), breeding objective “high yield with high input”, intensification of agriculture, fragmentation, infrastructure development.
- Expanding infrastructure networks (roads, railways, canals, reservoirs), urban development, mining and waste disposal.
- Water availability and temperature stress.

Primary drivers: Biological pollution

- Invasive species and GMOs: resulting in genetic contamination of nurseries and germoplasm, developments in biotechnology, use of non-indigenous organisms for soil improvement and combating earlier invadors, available technologies for species management.
- Changing modes of transport and related pathways: increasing traffic volumes, air transport, size (incl. ballast water) and speed of commercial shipping, new routes.
- Climate change: Increased habitat range of introduced organisms from temperature increase and changing precipitation patterns.
- Agriculture and forestry: Abandonment of fields, aforestation (commercial, agro-industrial forestry), introduction of new species for agriculture and forestry, fauna management.
- Importation of raw materials (e.g. timber) and (ornamental) plants, importation of non-food animals for aquaculture, exotic pets, aquarium bait, research and food animals.

Primary drivers: Climate change

- Increasing extraction/use of fossil fuels, in particular lignite and coal consumption.
- Use of fossil fuels for heating, transport and electricity generation for households and industry, freight transport, increasing trade due to global sourcing and globalised consumption patterns, industry producing GHG emissions other than CO_2.
- Urbanisation, sprawl, leisure mobility, air transport.
- Forestry and agricultural practices (e.g. deforestation), intensification of agriculture, in particular animal breeding (methane, N_2O), biomass/biofuel production, land use practices, landscape planning.
- Waste management, meat consumption, rice paddies (all cause methane emissions).
- Radiation-cum-pollution ozone formation, temperature-related nitrogen emissions from soil stocks.

Primary drivers: Chemical pollution

- Intensification of agriculture (pesticides, fertilisers, methane, N_2O, methylbromide), pesticide use against newly arrived pests, pesticide use (POPs and non-POPs), fertiliser quantity and quality (Ni, Cd in sewage sludge, Cd in PO_4 fertilisers, etc.).
- Waste treatment and management, mining (in particular heavy metals), contaminated industrial sites.
- Emissions (e.g. heavy metals) from fossil fuel burning in low- technology power generation.
- Fuel-related transport emissions.
- Biocide use by consumers.
- Production patterns of the chemical industry (types of products: systemic pesticides, “life products”), delocalisation, quality of the expertise on risk published by industry, status of innovation, solvent use, labelling, consumer information, chemicals in consumer products (also low dose, see e.g. endocrine disruptors), industrial chemicals, PDBEs.

- Relationship between EU chemicals registration rules and other countries (US, WTO), enforcement of harmonisation in the EU, long-distance pollution (directly or through product trade).

Primary drivers: Pollinator loss

- Climate impact on species distribution, increase of habitat generalists, specialists decrease.
- Landscapes: Fragmentation, exploitation, restoration of open cast pits.
- Intensification of agriculture: Application of pesticides, in particular synthetic insecticides, nitrogen fertilisation, loss of breeding and forage areas by “cleaning” landscapes, no hedges, trees, ponds etc.
- Introduction of non-native pollinator species, introduction of GM crops, distribution of invasive plant species facilitated by humans.
- Insufficient inspection of imported bees.

Primary drivers: Conclusion

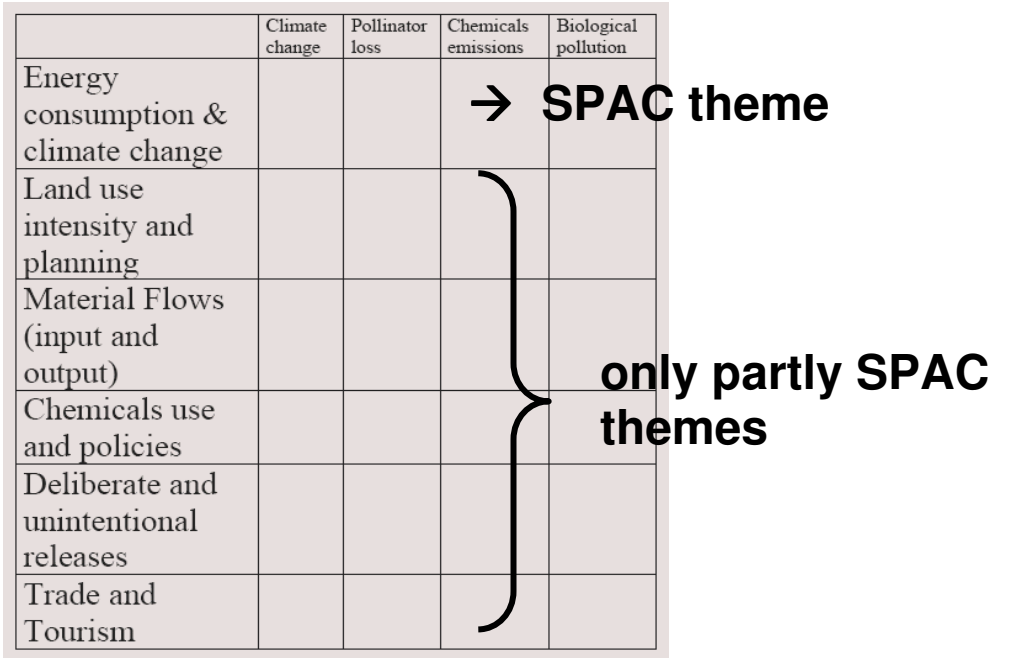
Many, but by far not all of the primary Drivers of biodiversity loss can be, and even less are addressed by sustainable production and consumption campaigns and policies (SPAC, discussed here with a focus on the consumption part). Others refer to the institutional setting and the priorities set in different policy domains (a citizen, not a consumer issue). A systematic analysis of what consumers and/or citizens can do, and what are the responsibilities of the public and the private sector, is still lacking, but the list of primary drivers may provide a good starting point for debating this.

The secondary Drivers

Given the broad set of primary Drivers, their complexity and mutual overlaps, it is not only a challenge to derive the secondary Drivers from analysing the primary ones, but even more so to classify and systematise the secondary Drivers. Rather obviously, different classifications and typologies are possible, and thus any kind of systematisation cannot but be somehow arbitrary. The best possible classifications would consist of separate and independent categories which exhaustively cover the primary Drivers)

For our analysis we have chosen a science based hierarchy of six categories, based on the *physical* basis of biological processes and thus of biodiversity (energy, material and land), the *chemical* disturbances and the *biological* factors (invasive species and GMOs). The systematisation helps to identify distinct secondary Drivers (which nonetheless cause overlapping Pressures) which permit to allocate all the primary ones to one category, and which are associated with specific policy domains. Interestingly, most of these categories are only partly addressed by sustainable consumption (SPAC) strategies and policies – only for energy and climate the more recent public debate may have caused an exemption (see figure 3).

Figure 3: Secondary Drivers and SPAC coverage



Sustainable consumption reactions to these secondary Drivers might include the use of green electricity, but not of biofuels in energy consumption. The reason is that while bioenergy can be an important source of heat and power, bio-ethanol and bio-diesel production are the least efficient and environmentally most damaging option for biomass use available: bio-fuels is the choice of bio-fools (Giampetro et al. 2006; Barbir, Ulgiati 2008).

Standard recommendations like buying organic, FSC and Fair Trade help regarding land use, but should be complemented by buying from diverse landscapes. A second way of consumers exerting influence could be not to use landscape fragmenting infrastructure elements, be it high speed trains, motorways, or skiing tracks.

Material flows are not only reduced by increased production efficiencies, but also by sustainability design – most resource consumption of the artefacts we

live with happens in the use phase, but is determined in the design phase (the same applies for energy)(Charter, Tischner 2001). Taking this into account, lean consumption does not imply buying less solid goods, but hunting for (partly new) 'antiques', i.e. goods which are worth and suitable to be used for a long time and which deliver reliable services over this extended period (having a Picasso you don't throw it away because it is not this season's fashion, right?). Quality is often an indicator for improved sustainability (but less so the price), and having equipped oneself with quality goods not only enhances the quality of life, it also changes the consumption pattern as it makes more sense to replace quality goods beyond their lifespan with new ones than to stockpile new gadgets all the time.

In the chemicals category, it is noteworthy that expertise, credibility and transparency are crucial immaterial factors. Making use of the right to know conventions ("trust is good, control is better" *as a bottom-up principle* applies to many aspects of citizen – business – administration relations). Citizens rather than consumers could also join campaigns for liability laws, and against exaggerated confidentiality.

For the biological factors, ending GMO consumption is in the hand of consumers (provided an effective and reliable labelling scheme is in place). That active import of foreign species is out of bounds needs no discussion, however it should be highlighted that this refers not only to pets and ornamental garden plants, but also to sports like fishing (target fish and bait are imported) or hunting (partly as foreign species are used, partly as cultivating high population levels prohibits the natural rejuvenation of forests). Consuming fish and game may be tasty and healthy, but it might be rather unsustainable if these *caveats* are not respected. Beyond the 'active', also the 'passive' import has to be taken into account. It includes all the organisms using ships, roads, planes or canals as means of transport and immigration and happens whenever we consume exotic goods or buy goods with a long production chain. *Miles matter*, not only food miles! Finally, as cultural and biological diversity are strongly correlated, buying authentic goods from local cultures instead of those designed for a global market, and for that behalf streamlined and simplified, can support both kinds of diversity.

The tertiary Drivers

Tertiary Drivers are the orientations guiding individual and group behaviour (and policy development), and thus the keys to a change in consumption cultures. They address individual wishes, what people would like to have and be, the collective embeddedness of such wishes (family, colleagues, per groups), and the opportunities they have. The interaction of these elements constitutes the capabilities for change as clearly described by Sen (1999). With an eye on their relevance for consumption, two of the tertiary drivers to be addressed are:

- Habits, aspirations: increasing income disparities, the wealth of the super rich and the celebrity cult lead to unsustainable aspirational lifestyles (the "luxury fever")(Fischer-Kowalski, Haberl 1997).

- Values, attitudes, ideologies: as long as the dominant policy paradigm equals well-being and increasing consumption, and as long as qualities do not count, calling for change will be a cry in the wind (Sanne 2001; Rees 2006).

To overcome these obstacles to sustainable consumption, measures are necessary which definitively go beyond the usual sustainable consumption debate. They might include (but not be restricted to)

- *Call for income redistribution*, e.g. by an income tax of – say – 90% for the very rich (the US standard just 30 years ago);
- *Promote less life-long income*, and thus less consumption, by supporting longer holidays, shorter working weeks and earlier retirement.

- *Oppose competition and markets* where cooperation and social networks are more appropriate, oppose growth ideology and policy.

- The French debate on "décroissance" – rather badly translated to English as "degrowth" while in German there is no word for it – may offer an opportunity for such debates. The first international Degrowth Conference in Paris, on April 18th/19th will show it.

Conclusion

Biodiversity suffers from unsustainable consumption, but even more so biodiversity and sustainable consumption *suffer from the same institutions*. The sustainable consumption debate, in order to accommodate biodiversity issues, must be broadened as compared to its current state. At least as much so, the discussion about biodiversity policy must no longer be restricted to the levels of nature protection efforts, thus addressing the symptoms but not the causes. Instead, to be effective, it must address the hierarchy of drivers. Doing so would automatically force the biodiversity discourse to include human behaviour and consumption, leading to an integration of the two so far separate discourses, with benefits for both of them. With such extended discourses, and by exploring and exploiting their overlaps, common ground would emerge permitting mutually supportive collaboration of agents from both fields, not least in the NGO world.

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