Tools to Communicate Urgency to Diminish Social Impacts on Water and Land

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Abstract

Impacts on water land and natural resources from distinctive consumption and production patterns were assessed by using several water and ecological footprint techniques. Typical consequences and comparison graphs of social groups from several countries were obtained. These figures provide a comparison basis to orientate public policies and priorities for environmental and water education strategies and programs. "New water culture" is a recent term which denotes a much needed cultural shift towards more respectful and concrete actions which seek real sustainability, contrary the usual merely rhetorical sustainability. One of its main points is to hold back long "haulings" of real and virtual water; that is, reduce or eliminate unnecessary water transfers among river basins and long and environmental inconvenient commercial shipping of its derived commercial and industrial produces. Nowadays the general global situation is of overshoot, unsustainability and anthropogenic climate alterations, so an important assessment is to compare if accumulative voluntary reductions (probable) on individual consumptions and production patterns, could be stronger and higher than the demographic and ideological pushes on the contrary sense. That will give a better idea of the feasibility of having any important success, or which other measures besides appealing to voluntary measures, ought to be implemented.

KeyWords: water footprint, ecological footprint, overshoot, social awareness, degrowth in consumptions and demographics.

Introduction.

In many geographical areas there is tangible evidence that several countries and the planet in general are in a situation of "overshoot" and unsustainability, as can be seen in the following two graphs produced by the Global Footprint Network. These graphs show that anthropogenic activities, represented by the ecological footprint of an average citizen (*considering habits and numbers of rich and destitute people around the world*) have exceeded the regeneration biocapacity, or pollutants absorption, provided by natural territories and the planet in general. That is, in many places we are living from "loans from the future" and over-exploitation, not from the production and regeneration capacity from our own territories.

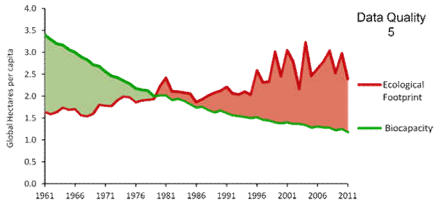

Figure 1. Overshoot per capita in Mexico, since the seventies

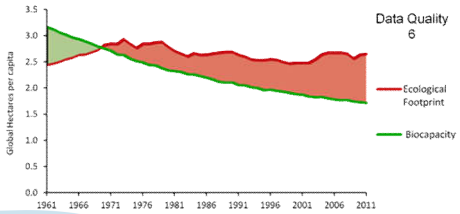

Figure 2. Global overshoot since the sixties.

There are indirect and direct ways to measure the use of tracts of land, water volumes, amounts of energy and pollution generated by producing the goods demanded by societies at each planet's location. A correct approach is to define where demands for products and magnitude occur (*i.e. where consumers are and how much they request*), and then determine the origin of those agricultural, fishery, industry, forest products, and which of those on their turn were inputs required to manufacture or extract others.

To assess impacts of consumption and production patterns on the environment (*air, water availability, territories, loss of biodiversity*), different valuable tools and research groups (*networks*) findings are available to any student and to the public interested. Therefore groups like the Water Footprint Network, the Global Footprint Network, the World Population History and several others freely offer tools and statistics, fairly comprehensive, to assess variations of the parameters under analysis.

Aim of the work.

The purpose of the work was to exemplify and consolidated figures and quantitative statistics which compare consumption patterns in some regions of interest within and outside the Mexican Republic.

Another objective derived from the above, was to contemplate if voluntary, feasible, reductions in demand for products or their manufacturing inputs, could offset the persistent contrary trends, towards larger population, greater consumerism and occupation of natural territories.

Methodology

a) Numerous searches, calculations and comparisons about social impacts of different consumption styles in some countries were conducted.

b) The calculations and figures used came from publications and studies from reliable sources dealing with water and ecological footprints topics.

c) Feasible changes (*voluntary in principle*) in social habits of consumption or manufacturing processes were proposed, that could reduce environmental impacts. That is, with the previously obtained figures and comparisons, the chances of significant changes of encouraging less harmful and stable (*reverse the current instability and overshoot*) situations were identified.

d) Some possible communication, motivation and education strategies to encourage the above were spelled out. That is, awareness campaigns were proposed that could influence some social sectors and producers to change their habits or processes, or their aggressive pursuits of profit or indifference towards the environment.

e) The prevailing demographic and mass production trends, in the opposite direction to the desired reduction (*subsection c*), were studied (*supported by literature and tools on purpose*). That is, scenarios where population growth and wasteful consumerist ideology, accumulation, denial or environmental indifference continue were suggested.

f) Positive and negative scenarios, in qualitative and quantitative forms, were confronted in order to glimpse if there is hope of reassuring changes, derived from performing campaigns only appealing for voluntary changes.

g) If the previous is not positive or encouraging, propose other more restrictive, compulsory, measures aimed towards the same goals of balance and sustainability.

Results

Comparative calculations were generated, customized mainly to typical Mexican socioeconomic or cultural sectors which contrast (*quantitatively and qualitatively*) different consumption patterns and chances of changes in them, and the effects of potential trade agreements favourable towards sustainability and climate change mitigation. Some results are exemplified in the following table.

Table 1. Water and ecological footprints, regarding consumption habits and income in Mexico and United States.

Type of person or family (if applicable): **Identifying code**	**Identifier parameters or variations**	**Total Water Footprint**	**Water Footprint only due to food**	**Ecological footprint**
		m^3/year –capita ¨* (or family)	**m^3/year . capita** * (or family)	**Global Hectares gha**
Mx-CM-AN	Mexican, medium class, “normal” consumption and nutrition	2,480	2,212	4.7
Mx-CM–AVeg	Idem, but **vegan**	1,496	1,228	3.3
Mx-CM–A>Carn	Idem but strongly carnivorous	4,516	4,248	6.8
USA-CM-AN	USA citizen, medium class, “normal” consumption	1,329	1,030	8.9
USA-CM–AVeg	Idem, but **vegan**	1,093	793	6.6
USA-CM–A>Carn	Idem but strongly carnivorous	1,923	1,623	12.4

Fam**3**-Mx-CM-AN	**Family** Mex. **3** members, medium class, "normal" nutrition,	7,440 *	6,636 *	14.2 *
Fam**5**-Mx-CM-AN	Family Mex. **5** members, "medium" income. "normal" nutrition	12,400 *	11,060 *	21.4 *
Fam**5**-Mx-CM-AVeg	Family Mex. **5** members, "regular" family income, "VEGAN" nutrition.	7,480 *	6,140 *	14.4 *

The following table shows the high contrasts in virtual water used in different **countries** to harvest or produce some common foods in the Mexican diet. It shows, with colours, which country has the highest water productivity and which the least (*in cubic meters of water per ton of product*). It's just a brief sampling of nations, and surely there are others, not shown here, with higher or lower values than these. Additionally, in the last column annotates the global average productivity according to WFN (*WFN promoted by Chapagain and Hoekstra*) which is the original source of the data.

Table 2. Water productivity (*virtual water content = W.F.*) in some commodities, by country and world average value (*m^3 / ton of product*)

Product	Mexico	USA	China	India	Australia	Brasil	World Average
Rice (processed)	3,257	1,903	1,972	4,254	**1,525**	**4,600**	**3,419**
Wheat	1,066	849	**690**	1,654	1,588	**1,616**	**1,334**
Corn (maiz)	1,744	**489**	801	**1,937**	744	1,180	**909**
Soy	**3,172**	1,869	2,517	4,124	2,106	**1,076**	**1,789**
Beef meat	**37,762**	13,193	**12,560**	16,482	17,112	16,962	**15,497**
Chiken meat	5,013	2,389	3,652	**7,736**	**2,914**	3,913	**3,918**
Egg	4,277	**1,510**	3,550	**7,531**	1,844	3,337	**3,340**
Milk	**2,382**	**695**	1,000	1,369	915	1,001	**990**

The table above should be taken with caution, because not only the annotated water volumes are important; and not necessarily the highest figures are those of greatest environmental impact. For example, a "green" (*rain*) virtual water is usually much cheaper and environmentally appropriate, than a "blue" water (*irrigation, dams or extracted from underground*). Besides, fertilizer, pesticides, and energy used to produce each item count a lot (*pollution as "grey water" and other footprints such as CO_2*). Normally rain-fed agriculture although apparently uses more water, that come from natural precipitation and usually require fewer inputs.

When computing the footprint of an individual, we should consider where he comes from (*that region or country*), the products he consumes and to which "colours" of water correspond. It was found that several calculators available on Internet, do not distinguish those issues. For example it is clear that the typical consumption footprint of a Mexican must not be derived from the values for Mexico listed in Table # 2 above, as for example most of the corn or meat consumed here is imported from USA, since there they are produced with lesser water amounts.

Computations showed that the ecological footprint of the average Mexican is greater than the nation's territory biocapacity divided between its 117 million inhabitants. Meaning that the territory and water are insufficient, and Mexicans increasingly depend on other regions of the planet, which definitely is contrary to an alleged national sovereignty.

Social communication strategies to influence cultural changes were proposed. Their purpose would be to promote understanding of environmental issues and of the accumulative stress of millions of users, as well as strategies to

reduce individual and group consumptions, besides modifications in trade agreements which could involve less transportation and lower ecological and water footprints (*considering their "colours" or economic and environmental impacts more rigorously*).

Some interesting isolated results obtained using the internet WFN calculator, were for example:

- The water footprint of a Mexican is higher (about 84%) than that of a USA citizen, for equality of income, sex or eating habits.
- The W.F. of a Mexican, even with null (zero dollars) level of expenditures (income) exceeds by 15% that from the world average (i.e. 1,423 against 1,243 m^3 / year).
- The water footprint of a Mexican is greater than that of a Colombian (about 53%) for the same type of income, sex or eating habits.
- For a level of 10,000 USD annual expenditures per a USA person, his W.F. does not exceed the world average W.F. of 1,243 m^3 / year.
- For a Colombian to have a higher water footprint than the world average, his level of personal expenditures should be on the order of $ 5,000 USD.
- If the W.F. of an average Mexican is close to 2,000 m^3 per year (ref. Agroder), then that type of consumption, according to the WFN "QuickCalc" is equivalent to a level of personal expenses around. USD $ 5,000 per year.

Conclusions

The environmental impact assessed as ecological footprint of the average Mexican is greater than the whole country's biocapacity divided among its more than 117 million inhabitants. Therefore its own soil and water are insufficient (overpopulation, over consumption, overshoot) and must increasingly rely on other countries, or reduce their numbers.

Even in the very idealistic and unlikely case that the entire current population reduced their consumption by 30% (*something really difficult of reach*), it would not compensate the population growth which some institutions (*CONAPO, UN*) forecast, which is the order of 35% for the next 30 years. Neither that would remove them from the current unsustainability. That is, all efforts would lead to the same or worse problems (*including climate change*), but with still more millions affected. That is, the severity of the problems will increase unless society or politicians finally accept the need for measures, unfortunately, more drastic and compulsory for all, that those promoted by the consumerist, free market and "laissez- faire" ideologies.

The joint ecological and water footprints of water large family, even if it were vegan, is greater than that of non-vegan small family. That is, population growth will "swallow" (*finish*) even the most sacrificed, bold and strong attempts to reduce impacts on climate change and other footprints. If in a small family someone becomes vegan, or all together reduce their consumption by a certain percentage, there will be greater environmental benefit that that which a much sacrificed large family could attain.

Demographic stability will allow greater welfare for all and improve water conditions, also protecting ecosystems. The combination of reduced water footprints with a stable human population will permit better and healthier food for all.

Some possible public policy could be:

- Subsidies and incentives for national crop foods, regionally sustainable; and taxes (price increases to discourage consumption and waste) to meat and other products with high demand for water or soil, especially if produced unsustainably or require a lot of transport and fossil fuel processes.
- Promote initiatives to collect, record and data integration and benchmarking (Conagua) on water footprint. That will render better statistics and encourage efficiencies.

- Promote education and culture programs for legislators and officials at all three levels of government, with clear and forceful numerology on environmental, water and energy footprints of policy options. Stress the risks of increasing dependence and local unsustainability. Also promote consensus and business, political, academic and social agreements on the best feasible strategies.

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