

Productivity and The Environment: The Need For Standard Measurements and Communication

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ABSTRACT

Productivity science applies equally to the world of industry, commerce, business, and to the world of the Environment, though significant differences must be recognized as a basis for action.

In any type of production, inputs are separate from the outputs. In the environment, taking Einstein's definition as "everything that is not me", the outputs are just another input. In order to minimize inputs and maximize outputs, we must be able to identify and measure them, using standard units. In every society such units have existed, but a global economy where the environment is interconnected as an open system, this requires a new measurement to be accepted. However, units, once in use, possess a resistance to change that must be recognized, while new ones take time and effort to become accepted.

In the Economy, inputs are relatively limited, well known and only partially interconnected. In the Environment, the phenomena are much more complex and their effects on the environment operate on a longer time scale. Environmental degradation - a minus in the productivity of the environment - results from everyday actions of billions of people in pursuit of positive goals which collectively become environmentally unsustainable. Several obstacles which are peculiar to the Environment must be overcome. Goods and services are products of jobs, and jobs are a major societal objective per se. Progress is defined in terms of "more of everything", while happiness and self-satisfaction remain imponderables.

The Author argues that we should be developing a Standard Environmental Damage Unit or EDU. This would permit society to better monitor the environment, and extract more benefits at lesser cost to it, hence improving productivity as well.

Human behavior needs to change. This can happen by leveraging political, commercial and economic forces at all levels. Technology is also key. Mobile audio media technology could help deliver appropriate, timely, geolocated and very targeted useful information and messages that could reach billions of people in real time. These interactions could be in any language, be easily understood, potentially well received, and with a strong immediate actionable impact.

Harnessing people through technology could thus help environmental sustainability goals, generating better environmental awareness, and reduce irrevocable damage that the EDUs could help closely monitor.

In a complex modern interconnected world obsessed with measuring everything it is surprising to find that the environment still lacks a key overall measurement tool.

A common measure of environmental degradation is needed. The next challenge for a productive society will be to develop a cross-system of points, or Environmental Damage Units (EDU) capable of showing, at a glance, the relative impact of human activities on the environment, thus providing another important tool to help in our struggle to achieve Sustainable Development Goals (SDGs).

1. Measures and currency are essential for any society. They persist over time and new ones take time to be accepted. Every society needs weights, measures and currency to function. To indicate value even cowry shells were accepted. In ancient Athens, handfuls of six metal bars called ?????? were used. This was the origin of the Greek drachma (literally a

handful, a grasp), no longer used in Greece since 2002, but still remembered in the dirham, (didrachma, mis-spelled), the present currency of several Arab and Muslim States.

The drachma was replaced by the Euro. Almost 500 million people in the European Union use this currency every day, but few would recognize the origin of its name in the myth of The Rape of Europa, the maiden seduced by the god Zeus in the form of a bull. After her the Continent was named. (1)

Ancient measures are still used in our everyday life. When we enjoy a 360-degree panoramic view, or take a 180-degree turn, we are using the base 60 numeral system originated with the Sumerians in the 3rd millennium B.C.

One hour is still divided into 60 minutes, and each minute into 60 seconds further divided in order to keep pace with the increased speed of everything we do, from measuring the top speed of downhill skiers to inter-planetary voyages that depend on incredibly precise definition of the second defined as "the duration of 9,192,631,770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the caesium-133 atom (at a temperature of 0 K and at mean sea level)".

For centuries thousands of different weights and measures were in use in Europe alone.

In 1790 the metric system was introduced in France, the meter being one tenth-million of the Earth quadrant passing through Paris, of course. Only a revolutionary National Assembly could impose such a drastic change. It meant throwing away and replacing the weights and measures in every village and household of France, but who was going to argue with the guillotine.

It took 200 years for the metric system to become compulsory in the European Union, and only after Ireland obtained some Derogations to it allowing for the use of measurement such as miles and yards as well as the foot, inch, pint and troy ounces. (2)

Many old units remain widely in use. We still order beer by the pint, sell oil by the barrel, cereals by the bushel, weigh precious stones in carats (the seeds of the carob fruit, carat in Arabic), measure sea depth in fathoms (OE outstretched hands) and vessel speed in knots, race horses over furlongs (a furrow-long, a Medieval agricultural measure of length). Meanwhile, many un-scientific units remain use, such as "a pinch of salt" or "a hairbreadth". Others are purely local, if more colorful. In Venice, Italy a very short distance may be indicated in local dialect as "una pissada de can" meaning "a dog's piss".

Our calendar is also steeped in ancient history. The months from September to December, literally the seventh, eighth, ninth and tenth month of the year, retained their name even after the start of the year was moved from March to January leaving them two months out of step. And the days of the week are still named after Roman gods.

2. Productivity measurements rely on common units.

Now to productivity. Productivity as a ratio of output to input is a neutral term: the choice of output is a political decision. In order to enter the equation, both inputs and outputs need to be measured in standard units easily understood and conveyed.

Today many prices world-wide are still quoted in US dollars, a mis-pronunciation of the Austrian thaler, from the name of the Bohemian Joachimsthal, or Johan's Valley, where silver was mined from the 16th Century.

The price of a K2 Black Panther tank (\$8 million) and that of an average mountain bike (\$400) so 20,000 mountain bikes the cost of a tank. This does not mean that they are interchangeable, once a tank always a tank, but the comparison helps decision makers.

In the realm of the Economy the QRS Catalogue now lists up to 100 million products. We can remove one product and almost nothing will change world-wide. But if we allow one species to become extinct, we do not know for sure how the web of life will respond. How do we measure this in any case?

Some inputs are visibly limited. Others were considered practically limitless, like the sand of the deserts, until the shortage of quartz sand from China impacted the production of microchips in Taiwan which limited the production of cars in Germany and the USA. It takes a second for a resource to go from limitless to limited then unavailable.

But the road that led society to start measuring resources and then ecosystems was long and winding. It first required states to question their geography. They started by measuring their territory, then more recently their ecosystems and currently their degradation with an array of instruments/units.

In the past distances were measured in days' walk, a mile being Mille passus (1000 strides) of the Roman legionnaires. The App. on our smartphones that counts our steps is nothing new. In China it was the li, but the same distance was shown as being longer if the road went uphill, shorter if downhill, as dictated by experience and common sense.

Two hundred years ago modern States felt the need to measure their territory, and it all happened within the same decade. Louis XVI asked his Royal Astronomer Cassini to produce the first Carte Géométrique de France (1750-1815), finding it much smaller than was previously believed. In 1802 the British Raj carried out the Great Trigonometric Survey of India noting all its natural and man-made features. In 1804 the 8000-miles Lewis and Clark Expedition provided the first information on the Louisiana Purchase, the lands West of the Mississippi, bought by the U.S. - sight unseen - for 15 million dollars.

Having measured their territory, only recently did the countries begin to measure their ecosystems, now that satellite images and computing capacity enable us to try our hands at natural capital accounts.

Canada piloted a census of its environment to create a National Register of Canada's ecosystem. Successive US Administrations tried the same, recording the changes in America's stock of natural resources and quantifying losses in order to develop a single statistic alongside GDP by the year 2036. (3)

These initiatives are putting numbers to the environment, as a hospital might count the diseased without showing the cause of death. When dealing with the Environment the true cause is rarely mentioned. The elephant in the room is us, the people.

3. The Environment and human needs.

We tap the Environment to meet human needs. Mahatma Gandhi said the Earth can satisfy man's need, but not man's greed. There lies a vast area falling between these two, and needs evolve over time. Basic ones such as shelter, clothing and transportation have had strong environmental impacts.

For thousands of years mankind sheltered in caves or under overhanging cliffs.

The First Nations of the Great Lakes region and eastward built wigwams with an arched framework of poles overlaid with bark, mats, or hides, all bio-degradable materials. Today, the Chicago skyline is one of the world's tallest easily ranking among the most imposing.

In East Africa indigenous tribes built thatched-roofed, plastered mud houses, using them as homestead. Today, in every African metropolis, a sky-scraper is often the first building that comes up on what was before wild savanna. The rate of change has accelerated beyond recognition. (4) When we first arrived in Kenya as a team to set up the new UN/UNEP office HQ in 1973, Nairobi had a few hundred thousand people and could be crossed by car in 30 minutes. Today it takes

sometimes hours to get to the town hall. The metropolis will soon reach 3 million souls, not counting another 1 million probably living under the census radar.

All this has a cost. Only when stones, cement and steel came to be used in construction did we alter irretrievably almost 75 per cent of the earth's surface and were forced to think in terms of Creative Destruction.

Space is the resource whose disappearance as a result of urbanization is the most measurable. Its availability has become the constraining factor in the provision of proper housing to millions.

Population density in cities has reached alarming proportions. The list is headed by Manila with a population of 43,000 per sq.km. immediately followed by three more cities in the Philippines(5). But the true image is obtained by looking at their most densely populated districts. There we find Cairo's Imbaba District topping the list with a population density of 177,000 per sq.km.(6)

Perhaps people are getting used to having no space. After all in Hong Kong nanoflats of 128 sq. ft. are for sale, or cubicle homes of 25 sq.ft. Le Corbusier must have foreseen the problem in 1951 when he designed on the French Riviera Le Cabanon, measuring 3.6 m. by 3.6 m., since declared a UNESCO World Heritage Site.

With more than half the world population now living in cities, when we teach youngsters to "protect Nature" what does "Nature" mean to them? The house pet? The occasional tree-lined street? The crowded beach of their short vacations? Or the invasive species found in Rome with million strong flocks of starlings that smother cars with their droppings and wild boars roaming the Eternal City to feed on the abandoned garbage?

If this is "Nature", they may be right to think that anything man-made is better.

The garment industry also depends on the individual choices of millions of consumers. Driven today by fast fashion, new lines are released every week, when historically this happened twice a year.

This industry is a great consumer of water, releases from 25% to 35% of micro-plastics in the oceans, produces 60 million tons of garments of which 60 billion pieces in the USA alone are discarded within a year of being made. But it employs 300 million people globally that work.

And if living and clothing ourselves has an impact and is complicated, travelling is even worst. On public transport during rush hours the number of people inside the carriages often far exceeds the EU norm for the transportation of live animals.(7) The rush hour in Tokyo with the white gloved pushers squeezing passengers on trains is an extreme travel experience not to be missed - unless you are claustrophobic.

The consumer economy pushes us in the direction where more goods are chasing customers, planned obsolescence requires continuous replacement, 340,000 vehicles of 1976 becoming 1.4 billion today, with two more entering the road every second.

Approximately 1.3 million people die each year as a result of road traffic crashes which cost some countries up to 3% of their gross domestic product according to the WHO.

The problem is that we are too many growing too fast. The world population grows at a rate of 2.6 per seconds according to the World Bank, 2 billion when I was born, 4 billion when I took my first job, 6 billion when I retired from the U.N., 8 billion as I am writing this page.

This growth is untenable especially if we look at it from the perspective of the environment.

When people take part in the Economy they are called consumers, in the sense that they buy goods and services.

But in relation to the Environment, they are consumers in the literal sense, as defined by the Concise Oxford Dictionary: to consume = completely destroy, reduce to nothing or reduce to tiny particles; use up (time, energy, etc.).

It is time to involve people on the positive side of productivity of the Environment, in larger numbers than are now active as "environmentalists". We need to be better informed and motivated, through better communication. The use of mobile audio media technology could render everyone a participant in the sustainability equation.

Human behaviors need to change. This can happen by leveraging political, commercial and economic forces at all levels assisted by delivering appropriate, timely, geolocated and very targeted useful information to billions of people in real time, in any language, via technology. This will have a strong immediate actionable impact.

Harnessing people through technology could help SDGs, generating better environmental awareness by reducing irrevocable damage that EDUs could help closely monitor.

4. Environment is a global issue.

Once our ecosystem is measured, damage to it must also be measured covering sources, pathways and sinks.

At present each element is counted differently: some in square kilometers, some in parts per million, some in kilometers per year, some in simple numbers.

Carbon footprints have been calculated for construction, shelter, food, clothing, mobility, manufactured products, services, and trade; whilst forest loss is examined in hectares; loss of biodiversity by number of species; desert creep in km; soil erosion by the RP methods; plastic in the sea in tons/sq.mile (with the Great Pacific Garbage Patch too large to measure); litter on beaches in the number of items per 100-meter stretch of beach, (712 items on average on the Atlantic coast); Wind force on the Beaufort scale 0-to-12; Hurricane force on the 1-to-5 Saffir-Simpson scale; Rainfall in mm; hail on the Torro Hailstorm Intensity 0-to-10 scale; pollution of the sea and of the air in parts per million; the melting of glaciers and icecaps by changes in their gravitational pull; noise in decibels 20-to-140; light in lumens and so forth....

How can we find a common measure of environmental degradation when there are so many contrasting measurements and scales?

Furthermore, degradation of the environment is the result of millions of individual actions, good in themselves, but taken together harmful to the environment. Environmental degradation is rarely the result of intentional, malevolent actions.

Small, everyday actions, harmless in themselves, when multiplied by the 8 billion actors, day in day out, are hurting the environment like the Chinese Lingchi, the death of a thousand cuts. Using a 2-ton SUV to take children to school, a faucet left running, a vacation taken on the other side of the globe. It is all done for a good reason: convenience, labor saving, hygiene. Taken together, they become unsustainable, since it is the people who, through billions of everyday actions, exceed the Earth's carrying capacity.

It is up to people to limit the damage by changing behaviors and lifestyles. But in order to achieve this, we must be individually involved through better communication. This again requires a common measure of environmental to succeed. Without it, how can we communicate and reward solutions and common efforts to solve problems that regard all of us. We must be able to measure change with a global outlook.

The first steps towards this global outlook took place not long ago.

A proposal by Sweden at the UN General Assembly in 1968 (for comparison, the The American Society for the Prevention of Cruelty to Animals (ASPCA) was founded one century earlier, in 1866) led to the convening of the UN Conference on the Human Environment - UNCHE in Stockholm in 1972.

I shall be forever grateful to the Canadian Maurice F. Strong who asked me to join the secretariat of UNCHE and the newly established United Nations Environment Program (UNEP) in Nairobi in 1973. With forward looking vision and the passionate effort of a then small team of people, we managed to push the Environment to the top of the international agenda, at a time when many languages lacked a word for it.

Back then, there were words for ecology, nature, flora, fauna, wildlife, the atmosphere, etc. but none to indicate the environment as a whole, taking Albert Einstein's definition of the Environment : it is everything that is not me.

In Italy in 1972 the dictionary carried only two meanings for the word ambiente, environment:

- An enclosed part of a building, which could be vast or small, luxurious or poorly lit, and so on;
- An association or group of people similarly engaged - which could be applied to finance, politics, or the underworld.

And when a new government department was set up to deal with the matter it was called Ministry of Ecology, later renamed Ministry of the Environment (Ambiente), then again Ministry of the Ecological Transition.

Despite many victories in this field, it has been an uphill struggle. Putting aside political will power and access to proper financing, we must find a way of developing a common measure of environmental degradation to start solving global environmental problems together.

The next challenge will be to develop a cross-system of points, or what we could call Environmental Damage Units (EDU), capable of showing at a glance the relative impact of human activities on the environment.

We must devise a single way of defining and measuring how we are ruining our home, planet Earth - if we want to start saving it together.

Endnotes:

- (1) Iliad XIV vv. 315-316 and 321-322. Ovid Metamorphosis II 833-75
- (2) Council Directive 80/181/EEC of 20 December, 1979 on the approximation of the laws of the Member States relating to units of measurement.
- (3) Looking beyond GDP: The Economist, 17 September, 2022.
- (4) The indigenous rondavel - a case for conservation: Steyn, Gerald, 2006.
- (5) Ref: www.worldpopulationreview.com
- (6) Ref: data.worldbank.org/indicators/EN.POP.DNST
- (7) Council Regulation (EC) No 1/2005 of 22 December 2004 on the protection of animals during transport and related operations and amending Directives 64/432/EEC and 93/119/EC and Regulation (EC) No 1255/97 (OJ L 3, 5.1.2005, pp. 1-44).