

'Hosting Capacity' vs 'Capacity To be Hosted':
Emergence and Maintenance of Sustainability.
The living systems keystone solution: **ARMSADA**
Associations for the Reciprocal and Mutual Sharing of Advantages and DisAdvantages.

Pierre Bricage
pierre.bricage@univ-pau.fr
IASCYS Secretary General

According to the first report (*a 3 years work of 150 researchers from 50 Countries*) of the 7th session of the Intergovernmental Science-Policy Platform on Biodiversity and Environmental Services **IPBES**, this week in Paris, France, Europe, all Earth living systems are endangered by Man activities! **“We have lost the link. We become foreign to the Natural world.”** (Wangari Maathai). How to open our eyes to tomorrow?

What can we learn from studying the functioning of living systems?

Every living system is made of 3 entities: actors, a Whole, and interactions between actors and actors and their Whole. The system's *ecoexotope* (its external space-time of inhabitation) is furnishing a *'hosting capacity'* to the system's *endophysiotope* (its internal space-time of functioning) which survival is depending on its *'capacity to be hosted'*. Both must be in adequacy. That implies limitations and adaptability to limits changes. There is only one solution: systems merging into new system-of-systems, new blueprints, in which all partners and their Whole are sharing advantages and disadvantages, in which they are both winners and losers.

Whatever the system-of-systems, number growth X and mass growth Y are correlated and limiting each other according to a power law $XY=K$. When the number of parts of a pie is increasing, we know that the size of each part is decreasing. That is a well-known economic law: when quantity Q increases, quality q decreases, $Qq=C$. So, sooner or later, **“It will be very difficult to maintain the supply of food and raw material.”** (James Lovelock). If we want to survive, **“We need to reconsider both our relationship with Nature and our relationship with ourselves, with our society.”** (Edgar Morin). Everywhere Man species is able to increase the hosting capacity of its ecoexotope of survival. It has be done, and is still going on, more and more. But there are never advantages without disadvantages, and *the greater the advantages, the greater the disadvantages*. Man species activities are increasing more and more climate change. Drought and pollutions in air, waters and soils, are increasing. Domestic plants and animals species are endangered. And Man species is endangered too. But things are not changing. **“Conflict between Man and Nature has been increasing to an extent likely to undermine the very foundations of Life on Earth.”** (Mikhail Gorbachev). Man is a very endangered species! Can we do something about that? Matter and energy are used without limits by Man species, to produce more and more men, and only for Man species survival! **“We have to understand that we are approaching a bottleneck.”** (Edgar Morin). Can we do something to slow down this process?

How are all living systems functioning since billions of years?

Do look for example at viruses. Viruses are predators which eat bacteria as preys. But when all bacteria are eaten, there is no more matter and energy and no active living system to produce any virus. When there is nothing else to eat, the viral species will disappear. It is a *'who wins loses game'*! How to escape from this *'who wins-loses game'*? Living systems-of-systems developed **ancestral alliances** that emerged after predator-prey struggles, like the viruses-bacteria struggle for survival. They allowed mutual survivals of the antagonistic enemies by their merging into a new Whole, *a new blueprint*, an **ARMSADA**.

pierre.bricage@univ-pau.fr

But only when they both simultaneously lost the capacity to kill the other one.

“For one to survive, the other one must survive first.”

Do look at a lichen. The body of a lichen is the body of an ancestral free living fungal species. Into this body, a population of an ancestral free living algal species is hosted. The fungal partner furnishes a hosting capacity to the algal guest which owns a capacity to be hosted in adequacy. The endophysiotope of the fungus is the ecoexotope of survival of the endophysiotope of the algal cells. It is a great advantage for the algal cells that are protected against drought, viruses and bacteria by the fungal body. But it is a great disadvantage for the fungus which must take a great part of its matter and energy to allow the survival of the algal cells. But, sooner or later, fungal filaments are catching algal cells and they eat them. Now it is a great advantage for the fungal part and a great disadvantage for the algal one. ***All that is an advantage for a partner is a disadvantage for the other one and reciprocally. There are never advantages without disadvantages. The greater the advantages, the greater the disadvantages. Both are winners and losers too. It is not an association for mutual benefits, but an Association for the Reciprocal and Mutual Sharing of Advantages and DisAdvantages (ARMSADA). If benefits, they are for the Whole, the lichen. And for the Whole to survive, each partner must survive first and reciprocally.*** Mass growth and number growth of both the parts and the Whole are ***long lasting as long as they are supported by every partner and supportable for every partner and the partner-of-partners too.*** Only reciprocal rewards stabilize cooperation. But win-win situations don't exist. You can never always be a winner. Sooner or later, you will be a loser too. Sooner or later, the greater the advantages, the greater the disadvantages.

Anthropo-Systems versus Wild Systems: antagonism towards ago-antagonism?

ARMSADAs are everywhere; ***in all living, past, present, and future blueprints:*** endogenous bacteriophages, endogenous retro-viruses into the nucleus of cells, plant cells endogenous compartments, legumes nodes, lichens, ecosystems. Man species was able to enter into ARMSADA deals with plants and animals species at the origin of agriculture. But the deals were broken with industrial mass producing technologies. The *HOSTING capacity* was carried too far, without limits. So, the *capacity to be HOSTED* decreased to the worst, because ***HOSTINGxHOSTED=k***. Man controlled anthroposystems have the most productive capacity, with a very low latency, but the least biodiversity and only 1 keystone species: Man. Their health is highly poor with only a local autonomy. Wild ecosystems are ancient, with a high biodiversity, a high resilience capacity. They are robust; as ARMSADA they are experienced in life survival, but they have enough production only for their own, not for Man which is usually an invading species. Limits and limitations are controlling all the partners growth, in mass and number: ***HOSTINGxHOSTED=k***. All living ***systems-of-systems*** are ecosystems in which partners are making “E PLURIBUS UNUM”, “IN VARIETATE CONCORDIA”, “UNUS PRO OMNIBUS, OMNES PRO UNO”. Matter and energy processes are open in ***Take-Make-Waste-Recycle*** ways. In their Whole, ***partners are linked together for the best and for the worst.***

The endogenous viruses, into our genome, are ***constrained dangers*** that can be freed when our cells are endangered, like the symbiotic hosted bacteriophages are released when their hosting bacterium is endangered. These ***un-controlled, de-controlled*** dangers induced damaged cancer cells proliferation.

A forest is an ecosystem in which dangers, like caterpillars of butterfly species, are damaging trees, eating their leaves. It is also ***a who wins loses game***. If too much leaves are eaten, trees will die and the butterfly species will disappear. Through forests evolution a balance arose between predators (the caterpillars) and preys (the trees). A sufficient biodiversity is needed for the survival of the forests as a Whole, ***enough but not too much: “meden agan”***. When the hosting capacity is increasing, usually by making from the forest a field of trees, pest dangers increase too.

And a single pest can kill this field of only 1 plant species. If we don't know the forest balance -which is a unique one for every forest-, when engineers are cutting or planting a tree species, they usually don't know what could be the result for the forest survival. Depending only on the local forest structure, that could be *the best or the worst*. The sustainability in economic processes obeys the same laws as in ecologic processes. That is the core of the Taoist worldview. Chinese philosophy describes an optimal balance between *yin-yang* as the ancient Greek did: “meden agan”. ***Excess is always unbalance!***

Excess in mass industrial breeding led to the emergence of more and more new influenza viruses in pigs and hens breedings, with more and more frequent flue epidemics in men. With more pigs and hens to eat for men, there are more and more pigs, hens and men to eat for the virus. By cutting the equatorial wild forests, in Africa or Latin America, Man species induced the emergence of eating man viruses, such as the Ebola virus which ecoexotope of survival was destroyed through forests destroy and which next ecoexotope could be Man endophysiotope.

The trans-disciplinary, holistic, way of education in systems thinking is a key solution to understand that we must change our minds. **“You never change things by fitting against the existing reality. To change something, build a new model that makes the existing model obsolete. (Buckminster Fuller).** That is exactly what Nature has been doing since billions of years, at any time. To survive, every living systems has to enter into an ARMSADA. It is an exam every living species has to pass, sooner or later, again and again. If it fails, even only once, it is eradicated. Currently, Man species is an obsolete model. Maybe the new ARMSADA model is on the way, but without us!

References

ARMSADA <http://armsada.eu>

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