

## **SUSTAINABILITY OF AGRICULTURAL LAND USE IN BRAZIL: colonizers myths and indigenous science**

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**Abstract:** *Land use in Brazil is sustainable when the land is perceived and worshiped following traditional indigenous science that enhances crop diversity coupled with maximum biodiversity. Caboclo's family agriculture based in the concept of roca is an inheritance of this tradition know-how. The unsustainability of the man-land system arises when agricultural practices follow colonizers myths imposed by modern Agriculture science and technological packages. This later approach is already the rule and is devastating the land at the expense of the next generations. Equilibrium may come when we recreate our myths by using indigenous traditional science.*

### **INTRODUCTION**

*I have learned we can only advice upon request or in case of life and death...  
...I have learned we better be kind than right...  
Shakespeare*

Like most, if not all social/environmental issues this is a concrete problem that cannot be tackled in strictly objective terms because we belong both to mankind and the biosphere. We are subjects of the Earth and we have evolved from Her by complex processes we only partly understand but that somehow is recorded in our essence in similar ways that the Earth's history has been recorded within rocks. Neither Earth nor land should be treated as objects even if the widely used science of Descartes and Comte says so. As we have concrete feelings and responsibilities towards the topic of our study, we cannot be hypocrites, pretending to ignore them in our science while keeping them to our private life. There is no neutrality in science and reason must dialogue with senses. Therefore, we shall depart from cartesian approaches. Rather, we'll be taking an approach with a great deal of subjectivity and care for the object of this

study. We hope we make sense. In the background we are using the teachings of remarkable academics that have departed from positivist science. From E.Morin (*La methode, Mes Demoins etc*), we have learned that the approach to knowing complex systems must include a balanced proportion of wisdom, poetry and love. From F.Capra (*The turning point, The web of Life, The Tao of Physics*), we have learned that modern science and oriental wisdom are compatible. From H.Maturama & F.Varela (*Autopoiesis, The tree of knowledge*), an elegant approach to natural systems. From R.Carson (*Silent forests*), indignation against the exterminators of music of the land. From L.Boff (*Ecologia, grito da Terra, grito dos pobres; Etica do cuidado*) we learned a coherent cosmic and ethic vision of earthly problems. From L.Margulis (*Symbiosis*), L.Margulis and J.Lovelock (*Gaia*) that Gaia is alive and making a bet that symbiosis will overcome competition. From C.Sagan (*Pale blue dot*), to embody Earth in the heart while viewing her from the furthest limit. From E.Wilson (*Consilience*) a reinforcement of transdisciplinary approaches. From C.Jung (*Man and its symbols*), from J.Campbell (*The power of myths; Myths to live by*) and J.Hillman (re-visioning psychology) the insight to re-vised this paper, from C.Furtado (*O mito do Desenvolvimento Economico*), reenforcement. From M.Bubber (*I and You*) and E.Levinas (*From Existence to the Existing*), the obvious; from T.Roszak (*Voice of the Earth*), that we all need ecopschoanalysis. From R.Eckserley (*Environmentalism and Political Theory*) that echo-anarchy is viable and from G.Bachelard (*la formation de l'esprit scientifique*) that science needs wonder to expand itself. Many others helped us going across disciplinary barriers and cliffs that separates the sciences from humanities and philosophy; information from overall knowledge and wisdom; and the various sciences among themselves. As geologists, we fed at source books. Heraclitus, Aristotle,

Hutton, Vernadski, Cloos, van Hise, Teilhard de Chardin taught us Earth is a changing rock-water-life system of interlinked processes with a long evolutionary history (4.5 billion years). Its evolution purpose cannot be described in mathematical terms. Yet, we can observe it in wonder and record it with all our senses and science. Mountains and flowers, rivers and forest, music and love accompany us in a concrete voyage. Still we are using the same science to develop technologies to destroy them. For we want to make money and use all the energy we can, in spite of the fact we have just arrived in the planet. We want to be masters of Nature and forget she herself is managing us. Before us, species that devoured their habitat were discarded by the Earth's system. We think and feel that as a species we are at peril if we keep misusing and abusing our common land. We feel it is time for a moratory of our destructive actions, a time for building a new economy and ethics. A time for reflection and reorganize our relationships with land and nature. Is it possible to treat them with care? We know it is but what is preventing us from doing it? Myths?

In the light of all this, we shall examine the sustainability of the use of agricultural land in Brazil. But as we write, the echoes of Chief Seattle's address to the president of the state of Washington, the *Carta dos pajés brasileiros ao presidente Fernando Henrique* and the Earth's Charter, we helped to write, remain with us. We are both scientists and farmers and we will give our advice. We do it because we are concerned with the fate of our land. Also, we were requested and this is a matter of life and death. We hope to be kind but also right.

## **ECONOMY, ECOLOGY, ETHICS, MYTHS AND SCIENCE FOR MAN-LAND SYSTEMS**

*One that keeps more than he needs is a thief*

(Ghandi)

Throughout this presentation we use the word **economy** as it is normally used in natural sciences, with the original greek meaning: the organization of the relationships and exchanges within the house we inhabit (the habitat). The term is derived from *oikos* (house = the common system we live in) + *nomos* (organization, law) and it merges into the closely related words: **ecology** and **ethics**. Ecology (*oikos* + *logos*) is used *latu sensu* as the science of the house and *strictu sensu* as the science of the relationships within the house. Ethics is derived from the fusion of two greek words: *ethos*, our physical and biocultural house and *εthos*, our repeated behavior that keep us within the ethos and sustains it. Our ethos is, therefore, not only the home for our physical existence on Earth but on the World we believe, beyond which, nothing exists. Except mythos – the house of the hidden psyche?!

Mankind is simultaneously a dependent and an independent part of the Earth's system that granted us free will and self-organization (autopoiesis). Maturana and Varela have presented comprehensive integrated neuro-physiology studies of life systems, which help us understand our complex relation mechanisms with ourselves and with other autopoietic systems, as the environment. We have, thus, countless options on which to build our fate. We can, for instance, follow the present scientific debate of North America and Europe and make a choice for our evolution from the myths of Gaia to the science of our selfish genes (Barlow, 1998). But whatever our choice be, we must observe the limits of our behavior in the use of land and people, if we want to survive. There are limits to how much we may use and accumulate from the system. To perceive such limits requires we integrate vast amounts of loose information of every discipline into knowledge, fragmented knowledge into wisdom, theoretical wisdom into

love and love into the practice of caring. To do this we may need to be silent and in the silence of the land find the missing music. We need to go deep and re-criate new myths to live by.

In order to keep our ecology alive, we must obey basic economics and ethics when dealing with ourselves (deep ecology), our kind (social ecology) or the land we belong (environmental ecology). The first law of thermodynamics helps us clarify the constraints to the economic exchanges in our land-man universe. It says that each system has a property called its internal energy, which is fully conserved over all systems. It also says that the sum of all exchanges must be zero. This means that in an integrated cyclic system like the soil sphere (pedosphere) on which we are living and where all other spheres (biosphere, atmosphere, hydrosphere, lithosphere, noosphere) coexist in dynamic equilibrium, the sum of all energy changes must be also zero. From this we conclude that there is no such thing as an economic growth for every part of the system and that to keep the system internal equilibrium we must share whatever the system has. In an equilibrated system where all men grow their own food and energy, drink from fresh water springs and still hear the full concert of life there are no economic gains, no income, no GNP increase. They are rich not for what they accumulate but for not having what they don't need. If, however, they polute downstream by building a bottle factory, they will take the good water from both nature and neighbour. They will have an income by selling the bottles to the unpoverished and will buy aluminum foils they don't need. They will have the illusion they are rich. Such illusion economics that is now globalized can only grow for some at the expense of others, as Gandhi had recognized more than half a century ago. If G-7 citizens have a growing economy and can use 90% of the world's available energy, they are doing it only at a very high social and environmental debt with the rest of the world. Economic

development commands our behavior. Has not the present crisis that challenges the survival of mankind arisen because the poor rest of the world wants to use that credit to live like them but if they do it, we will all collapse?

It seems clear to us we can only coexist on economic terms with both society and environment when our exchanges over all systems are kept in balance. Most natural systems have buffer mechanisms that restore its original properties after changes take place. But if one part of the system takes away or interferes with another part beyond the point where the system is no longer resilient, the whole system will become unstable and will have to reorganize itself. In the new organization process, that part will either readapt itself to the new reality, developing new qualities to become even a new species (may be, then, an actual *Homo sapiens* will emerge) or it will be reabsorbed by the system and become extinct. In the language of the vice-president of the United States, Al Gore (1994), *the present system is a Faustian bargain. We get short-term gains at the expense of a long-term tragedy. And there is reason to believe that the short-term can be very short indeed.* But as we need building a new economy system to reorganize the common house to sustain the physis demands of the majority of people, we also need a shelter for the new principles and values that should command our behavior on defining our new existence in world. Ethics and Economics are not isolated from each other as a material house place us in the imaterial home.

Following the UN Conference on Environment (1972), different sectors of Government and Society of 179 nations started permanent discussions on values and principles for an Agenda for the next century to face the vicious cycle of poverty and environment degradation. A consensus for the **Agenda 21** was achieved at the UN Conference in Rio de Janeiro (ECO

1992) but not for the declaration of ethic principles known as **The Earth Chart**. Thus we are growing under the flag of **sustainable development** of the Agenda 21 but keeping the myth of economic development, of consumption. Even if the Earth Charter is officially approved in the Rio +10 Conference to be held this year in Johannesburg, we will be still living in the ethic vacuum between theory and practice. We hold many conferences on environment but poverty and forest death keeps on rise, as the gap between the few rich and rest of the world (see data from the Worldwatch Institute). We write, talk and discuss with scientific coherence about the sustainability, the responsibility and the precaution principles (see for instance Bartholo et al., 2000). Yet, with all our nice science and philosophy we are unable to celebrate these principles in the concrete reality, and out (of the speech) of the mind. We are unable to lead society to disobey its present myths (we own the land, we can have ever-growing economic development). We are unable to have science to work for all the people and for all the land and disobey the outdated scientific myths of the survival of the strongest and that men are machines that obey their selfish genes (Dawkins, 1997). And myths are very powerful indeed. Once they catch us, they condition our life much more than science, as they work in the level of the inner self rather than the mind (Campbell, 1988).

Five hundred years ago the science and technology of the Europeans, masters of nature, won a war against the myths of American people, brothers of Nature. The colonizer behaviour has, since then, destroyed both people and nature, because of the way he farms. This led to the environment crisis of nowadays. And in this war, we will all lose (Serres, 1996). Therefore, it is imperative to make an exegesis of our hidden knowledge, from instinct to myths and think things over, so as to find a way out. Because this is a crisis that is related to our unsustainable

behavior (Gardner and Stern, 1996) we had to dig some of our species deeper and more meaningful myths, closer to our origins and beyond modern imaginarium. They were there where they should be: among those who for thousand years have been practicing sustainable development. They were there, lying as the bedrock of their science and know-how.

## **SUSTAINABLE LAND USE IN THE CERRADO: THE RO**

*The Xavanti depends of the Cerrado and the Cerrado depends of the Xavanti. The animals depend of the Cerrado and the Cerrado depends of the animals. The animals depend of the Xavanti and the Xavanti depends of the animal. This Is the Ro. Ro is everything to the Xavanti hunters: the Cerrado, the animals, the fruit, the flowers, the herbs, the river and everything else. We want to preserve the Ro' Through the Ro'we shall guarantee the future of the new generations: the food, marriages, the rites and the power of being Xavanti. If the Ro' is well we will continue to be Xavanti. The hunter walks through the Ro and learns to love it. Women learn to love it because marriage depends of the Ro and they go to the Ro to pick fruits. In the old days the Ro was like this: there was the village, around the villages, fruits, around the fruits, hunt together with spirits, and around them, more and more hunt always together with spirits. The spirits helped to discover the secrets hidden in the Ro: where the strenght of the hunter was, where the hunt was, where there were snakes and other secrets. The hunters would catch the hunt the furthest away from the village, thus the hunt run towards the village. Afterwards the hunters would go in another far away place. Thus, the offsprings were always growing and had forgotten the tragedy of the hunting. Further than that there was only the sky and that other village where the dead inhabits. But today the youngsters are not learning to love the Ro', they don't ever trek, they don't hunt, they don't even know how to take care of themselves. They want to plant rice and soya beans. The new generation wants to buy food outside and they forgot that the food comes from the Ro', not from town. The Xavanti women, however, they keep on loving the Ro' because they know that only as long the Ro' exists they can get married and get their daughters and sons married.*

Adao Top'tiro (medicine man)

Thiago Tseretsu (chief)

(Translated into Portuguese by Hiparidi)

The above statement is a masterpiece of ecological wisdom hold by the Xavanti nation of Brazil. It contains the positive universal urobure symbol of a self-sustained cycle that is represented by a circular snake feeding on itself. It has the same elements contained in Chief Seattle' speech, whose origin remotes to matriarchial Paleolithic times (Campbell, 1992, p.34). And, though not as poetic as the later, it brings back the importance of the feminine love for Nature as a natural strategy to secure the sustainability of the next generations.

It is just amazing how it contains the innermost core of the sustainability principle that is implicit Agenda 21. According to Campbell (op.cit., p.39) “ uma coisa que se revela nos mitos e que no fundo do abismo, desponta a voz da salvacao. O momento crucial e aquele em que a verdadeira mensagem de transformacao esta prestes a surgir. No momento mais sombrio surge a luz ”.

The Xavanti were always hunters and lived as nomades along the Atlantic coast by the time of the Portuguese invasion. For four centuries they scaped from the colonizers until they were contacted in late 40's in Mato Grosso by president Vargas's *march to the west*. They were given tractors and forced to plant rice and soya beans as in enclosing farms. The hunt has vanished and they became impoverished.

### **SUSTAINABLE AGRICULTURE LAND USE: THE ROÇA.**

*Eu vim, eu vou. Da roça eu sou.*  
Sabedoria cabocla

Traditional people almost anywhere in the World still have relicts of a paleolithic inheritance of matrilinear days of nurturing and caring for the land. For thousand years they have made feasts for Earth goddesses, such as Pacha Mamma, Demeter, Gaia, Isis etc that were responsible for sustaining their lives, providing them everything from food to timber. These seasonal feasts would start and remind them of conservation practices to keep the land fertile.

In Andean South America, a highly sophisticated and productive agriculture of potatoes, maize and tomatoes has been sustained for thousand years by Pacha

Mama's soil-rejuvenating volcanic eruptions and terrace soil-conservation practices. Elsewhere, where the soil has been leached out of most nutrients, like in the Amazon and the Cerrado biomas of Brazil, traditional indigenous science is centered at keeping maximum species diversity. It is based on the perception of the natural world and its most subtle changes (Suzuki & Knudtson, 1992). The Guarani people of southwestern Brazil and neighbouring countries, for instance, recognizes 14 different words for green changes that were never experienced by the colonizers. In their equivalent of the Ro they grow an incredible variety of food plants in interdependent or consortiated mosaics that contains next to everything. This is their roca-de-toco. The roca-de toco is done at the right weather, at certain seasonal conditions and according to the phases of the moon by precision slash-and-burn technics that follows the accumulated traditional know-how that keeps biodiversity resilient. Self-sustained Caboclo farming drunk at this ancient source and so does permacultural approaches and much of family agriculture settlements. Most Indian nations of central Brazil, like the Kraho we have visited, still have this wisdom and the rites that keep it alive. They live for them. But because their wisdom has been so long dismissed as superstitions by dominant white science, its full content is being lost in the memory of the vanishing elders. Pedro Penon, 94, is one such wise man. Once, his people were nearly dying of hunger but to the Fundacao Nacional dos Indios astonishment he would not allow hunting at the central taboo area of their reserve. Fernando Schiavini, one great Brazilian indigenist, said he only understood years later why such apparently mean command was guaranteeing the sustainability of the next generations. The source had been protected. Hope is present when the young scientists of Empresa Brasileira de Pesquisa Agricola, a recent Kraho partner, humbly listen to that ancestral voice of the land. Hope is present when instead

of making bombs, North American scientists (like D.Suzuki) spreads out the Kayapo science on how to nurture Nature and its people in a garden.

### **HIGH TECH SUSTAINABLE LAND USE: the unsustainable scientific myth**

*E porisso que branco n-ao entende quando indio fica triste durante muito tempo*  
Seig-Seig Indian (quoted by Martins, 1978)

*Our technological civilization is speeding toward a violent collision with nature and we are threatening the ability of the Earth- our home - to support life as we know it*  
Vice President Al Gore, 1992

Chemical fertilizers, herbicides, fungicides, pesticides, transgenic seeds, and the lot that composes the technological packages in use are products of our scientific-technological-economic self-supporting system. So is pollution and destruction of people and land. The system is based on economic success, which is based upon increasing efficiency and productivity. It is measured by rates of return and projected net profits. The system is for dominating nature, **our** home, not to perceive Her just as home. The myth is in the language, in the word that precedes action. We are here because we want to transform the free energy we receive from the sun (light) with the free energy we receive from the Earth (rock-fertilizers) into biofuels (Fyfe, this meeting). Sure we can do it, Brazilian science and technology already did that with Proalcool programm. Sure we can imagine better plants and ways to do it with elegance and efficiency. But what will happen to the land and the people? Would the water be cleaner, would all the people celebrate life? Do we really need more energy? No! Things will get worse because our myths remain. We are devouring all the energy, land and people we can. Because we cannot stop it, we are living collectively like Ericson who cut the trees of Artemis and could not stop devouring all around him, even his beloved daughter and at the end his own

self (the negative urobre universal symbol). Like Artemis syster, Persephone, we are enjoying being raped by Hades while eating all the pomegranate seeds we can, unaware of Demeter' suffering and unaware of the reason we were taken from her (the young mother Earth). We are enjoying the polis hell unaware of the silent spring around us. Our Psyche wants the beauty of Persephone to have Eros but is not prepared to deal with Pandora's technological packages. In our innocence we love like Pornea sucking all the milk Gaia can give but without recognizing she will let us die and will try new children. At this time of crisis we cannot let science without conscience rule us all. It is necessary we de-construct our scientific myths so we may expand our conciousness. Survival instincts and insights of the collective conscience are elements of indigenous science that may help us reconstruct a science that will keep life's web sustainable. This paper was written as the authors were opening the embryo of an ecovillage in southern Goias. In this meeting space we are experiencing new myths to live by. Indians leaders are coming and you are all invited.