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Chapter 1

Epistemic and Conceptual Orphanhood in the Sustainability of Agroecosystems

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Additional information is available at the end of the chapter

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Abstract

The main problem in the analysis of sustainability of agroecosystems is precisely the lack of definition of both concepts. Above all agroecology has used the concept of agroecosystem in a nominal, ahistorical and atheoretical way; when it is possible to observe it as a system and at the frontier of complex systems. Thus, agroecology does not use, for example, the Thermodynamics of non-equilibrium, Theory of Catastrophes, Complex Networks, Theory of Chaos, among others. It is time to prompt agroecology agroecosystems out of the darkness of closed systems and bring them to the frontier of science systems. The objective of this document is precisely to make the field of agroecological studies expand towards the use of the theory of autopoietic social systems.

Keywords: sustainability, agroecosystem, complex systems, Episteme and doxa

1. Introduction

The concepts of Agroecosystem (AES) and Sustainability were born orphans of a science, because even though Agroecology proposed the agroecosystem as a unit of study and built it considering that the concept Agro contains agriculture (it does not generally study agriculture in its entirety, it does not consider farmers or their management, without involve market, or social consumption), that Eco constitutes an ecological perspective of agriculture in terms of its structure and the relationships between its parts and the system, even though this idea does not contain in its theoretical tools- methodological those offered by systems theory and in none of its four generations of change, was never located epistemologically, or theoretically founded and therefore conceptualized without extension and intension.

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The concept of AES, still diffuse, led from the seventies to the eighties the study and transformation of agriculture with good prospects; unfortunately international and transnational organizations with support from the government of economically and politically dominant countries -among many other institutions- introduced the concept of sustainability, it is intuited that this was developed, more in order to divert attention over the catastrophe provoqued of exploitation of the resources around the world. This showed the tacit acceptance that something failed in the design and operation of the neoliberal development model. Related to the above, we can see that even though the objective of conceptualizing the AES required to clarify its structure and functioning, but above all its objectives. This did not happen and today, despite the prostitution of its use and the epistemological, theoretical-conceptual and methodological lack of definition, the term sustainability represents what was wanted: nothing.

In reference to the above, Luhmann [1], at the end of his life, took a pessimistic position with respect to the manipulation that the neoliberal model has promoted in a marketing way towards the individuation of consciousness and functional systems (human beings, institutions, companies, organizations and countries) in such a way that group spirit, solidarity and social compassion have practically disappeared. In perhaps his last writing, he hinted at his position regarding the impossibility of achieving something that could be called sustainability. Luhmann [1] wrote the following: "… Today the problem is much worse than before. We can continue with our habits and return to moral demands, which will be as justified as ever, but who will listen to these complaints and who will react to them if society cannot control itself? And what can we expect if we know that the same success (in economic and financial efficiency) of the functional systems (Institutions, companies, sectors and governments) depends on their indifference towards the social and environmental problems of the world? How could we expect the inclusion of all kinds of concerns within the great social system?"

Therefore, the purpose of this document is to help agroecology, as a science, to expand its epistemological, theoretical and conceptual perspectives, towards the approach of the theory of social systems of Luhmann [2] and the second-order, cybernetics of Heinz Von Foerster, backed by the quantum perspective of Ervin Laszlo.

2. The problematic

From an agroecological point of view and even when the knowledge it generates must be valued positively, it is operated with the type of closed systems, where the influence of what happens in the higher systems is not observed. A simple example can be considered, if in the coffee growing areas of Brazil there was an erratic frost, the grain volume would be lower in the world and its price would grow; all this could generate more income for intermediaries and coffee growers in the regions dedicated to this activity in the state of Veracruz (Mexico) without having done anything to achieve it.

Thus, in general, agroecology does not observe the farmer or peasant, as the cybernetic controller of the properties it manages and this prevents considering that the size of the plot

(represented by an agroecosystem) is the size of its decision making capacity (per share). Or omission). This, if you want to investigate the management of the plot and the controller's reactions to the economic, political, cultural and social interferences of their superior systems. In the 'systemic thinking' approach, we are trying to think and do science beyond reductionism (closed systems) according to Casanova et al. [3] allowing us to evolve towards other more encompassing forms that account for social complexity.

Even from the point of view of systems theory (remember that the AES is a system before anything else) there are aporias of the systems approach that it is necessary to recognize. Gharajedaghi in Systemic Thinking: Walking the change or change the way of Herscher [4] states that *"… a synopsis of the main theoretical traditions reveals that, while the analytical approach remained essentially intact for almost four hundred years, systemic thinking has already passed by three different generations of change (today the fourth already dominates).*

"The first generation of systemic thinking (that of operational research) dealt with interdependence, in the context of mechanical (deterministic) systems. The second generation of systemic thinking (that of cybernetics and open systems) dealt with the double challenge of interdependence and self-organization, in the context of living systems. The third generation of systems thinking responds to the triple challenge of interdependence, self-organization and freedom of choice, in the context of socio-cultural systems." The fourth generation still did not appear clearly, but this refers to the study of complexity in systems, which is where systems theory transcends a social vision, with other languages and methods (*Luhmann, Spencer Brown's* Theory of Form, *Heinz Foerster, Aldo Mascareño, and Carlos Maldonado*, among others). This makes it one of the main contributors to the frontier in science, along with neurosciences and quantum mechanics.

To begin, we must consider the principles of Bertalanffy's Systems Theory [5] (although is recognized the Aristotelian fundamental contribution that "*The whole is more than the sum of the parts*"). According to Arnold and Osorio [6], the perspective of the TGS It arises in response to the exhaustion and inapplicability of the analytic-reductionist approaches and their mechanistic-causal principles. It follows that the key principle on which the TGS is based is the notion of the organic totality, while the previous paradigm was based on an inorganic image of the world.

As a scientific paradigm, the *General Systems Theory* (TGS) is characterized by its holistic and integrating perspective, where what is important are the relational functions and the superior systems that emerge from them. As a practice, the TGS offers a technically adequate environment for the interrelation and optimal communication between specialists and specialties, thanks to the construction of a common language. Under the criteria of Arnold and Osorio [6], in a broad sense: "… *The General Systems Theory is presented as a systematic and scientific way of approaching and representing reality and, at the same time, as an orientation towards a stimulating practice for transdisciplinary work forms*."

Arnold and Osorio [6] define, nevertheless, that: *"… it is convenient to notice that despite its renovating role for classical science, the TGS has not yet managed to influence -in the fundamental- the Cartesian mode (subject / object separation)."* Thus, part of their problems is both the definition of the status of reality of their objects and their concepts, which is now debatable according to

Arnold and Osorio, as the development of an analytical tool suitable for the linear treatment of systemic behavior (causality scheme).

One aspect of high relevance is the location of systems theory in general epistemology. In this respect, Arnold and Osorio [6] consider that systems epistemology refers to the distance of the TGS with respect to positivism or logical empiricism. On the other hand, Bertalanffy, referring to himself, says: "In philosophy, the author's formation followed the tradition of the neopositivism of the Moritz Schlick group" later denominated The Vienna Circle, but his interest in German mysticism, historical relativism of Spengler and the history of art, together with other unorthodox attitudes, prevented him from becoming a good positivist [6]. This is a good advantage for agroecology, considering that the Theory of Social Systems Autopoietic (Border in the study of the Systems) has not yet managed to integrate the materialistic conflict and contradiction into its ideology.

Finally, agroecology has not been able or has not wanted to reinforce itself epistemologically and this is counterbalanced from the Hermeneutics, with adequate conceptual interpretations. In this regard Goode and Hatt [7] pose. "Science abstracts from reality and examines certain aspects of phenomena and not the totality of the phenomena themselves. In truth, separating any phenomenon from that with which it is related constitutes a fact of abstraction. Since science attempts to investigate certain sectors or aspects of reality, using them to interpret them as an abstract system of thought, it should not be surprising that, in order to communicate their findings, each of the sciences uses terms or concepts that are their own. Now, we use these concepts to represent the phenomena or aspects of them, which we are investigating. Therefore, when a proposition is formulated, the concepts are used as symbols of the phenomena being studied. However, because we are dealing directly with only the concepts, it is clear that the concept can be confused with the phenomenon of what is supposed to be a symbol."

This is a common mistake named objectification. It is often forgotten that concepts are logical constructions created from impressions of the senses, perceptions, and even complex experiences. The tendency to assume that concepts actually exist has led to many failures. The concept is not the phenomenon itself; that is, these logical constructions do not exist outside the established frame of reference. The incapacity to recognize this difference is what has been called the fallacy of objectification, that is, abstractions are treated as if they were phenomena. Finally, we will say that facts as concepts are abstractions then they have only meaning in a frame of reference within some theoretical system, Goode and Hatt [7].

We can now understand that the agroecosystem is a concept and is not a plot under cultivation. We must understand that the agroecosystem is a representation, of a cut of the agricultural reality, it is a model, an abstraction that the scientists create to understand the agricultural reality (See **Figure 1**).

The notion of doxa is as old as Greek culture, but it was Plato who gave structure to the epistemological comparison between science and opinion; which is inspired by the myth of the cave. Plato accepts that the human being is intelligible and sensitive, but that if he cannot leave the cave, his reality is proportional to what he sees (body, desires, imagination in the shadows he observes on the wall). If he does not have the capacity to think, he can only have will. But if you leave the cave, learn to think and probably come to have beliefs through the

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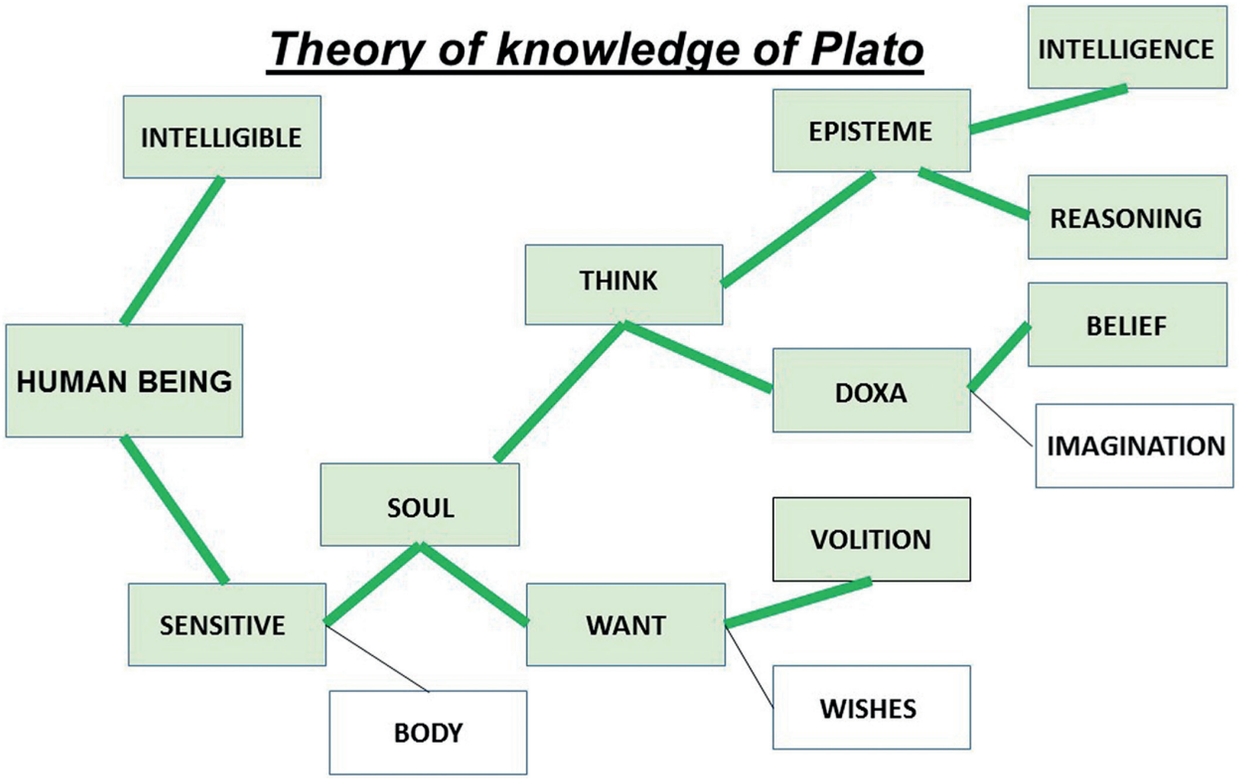


Figure 1. Theory of knowledge of Plato. http://historiadelafilosofiaparacavernicolas.blogspot.mx/2015/ [8].

DOXA (*The Reality, The everyday*)	**EPISTEME (*Science*)**
• Nature;	• Ecosystem;
• Happiness;	• Sustainability;
• Electric System;	• Plausible System;
• Mechanic System;	• Plausible System;
• The Agricultural;	• Agroecosystem;
• Installation;	• System;

Table 1. Distinction between philosophy of science and orthodoxy.

doxa. When the human being learns to think and creates epistemology, based on it, he can do philosophy and science.

The agroecosystem, as can be seen in **Table 1**, is a representation, a scientific model of a doxic reality. Inclusive, the words or the doxical terms, when using them in the dialog, in the writing, in the poetry are only symbols of real objects. When a message is written that says: "*Please stow the chair that is in the yard*" the word chair is not a real object, it is a symbol of the real chair, if it should not have been sent wrapped in the message the chair in discussion. If I say that I bought four melons: Would I have to bring them in my hand when I referred to them? Or I tell my brother who lives in Canada that I have a new girlfriend: Should I send her to Canada before talking on the phone with him?

A clear example of the above is the orthodox word, is an adjective that means that it complies with traditional and generalized norms in an institutional or regional (cultural) scope is something legitimate, something right or true, which is followed by most of a community, but it is not scientific. Heterodox is something that is not orthodox, therefore, it is something little used by the community. A heterodox is someone who is not satisfied with the dogma and beliefs of a particular religion, or with the ideas or practices of a cultural doctrine and generally accepted, but that is not science either.

This is one of the main problems in the training of researchers in the sciences related to agriculture (Natural Sciences) that affects their relationship with General Epistemology and impedes them, due to their super specialization from being located in any of the epistemic traditions, in some of the currents, either Galilean or Aristotelian.

In the first instance, integrating this knowledge allows the researcher to create mental structures, to locate himself in a precise epistemological line, to identify the theory or theories that best contribute to understand, interpret or explain the phenomenon that will be studied. In this line of thought we can build really plausible hypotheses, design methodological processes that will be practically "theory in action."

3. Epistemical and conceptual analysis

From the epistemological perspective we could rely on Mardones and Ursua [9], who begin their reflection with the following: "… *If we look at the panorama of the philosophy of science, or reflection on science and what it has that to be considered as such, from the height of its history, two important traditions are distinguished; the Aristotelian call and the so-called galileana.*" They are two perspectives of science or two different approaches about the conditions that an explanation that wants to be called scientific has to satisfy. Both traditions have their roots and representatives in the Greek world. In order to locate the agroecosystems in an epistemological position, we must base on which of the two has its origin.

Mardones and Ursua [9] state that: "*Nothing happens in the cultural and human world overnight. The ideas are incubating slowly or more rapidly, under the influence of social, political, economic or religious events*." And they add that the conception of the world, fruit of the new way of looking at it, which is already visible in men like Galileo or Bacon, is not so metaphysical and finalist, as *functional* and *mechanistic*. The new eyes of modern science are eager for power and control over nature, society and the economy.

Thereby, the center is no longer the world, but the individuation: the human being. For this reason his empiricist look reduces in object to the human being and nature for his needs and utilities. Thus, in argues of Mardones [9]: *"This pragmatic interest, mechanic-causalist, that is not going to ask anymore already by the why (Aristotelian)" and "for what" last, but by the "how" more immediate and practical of the phenomena and their consequences, interest that emerge with force in the century that goes from 1543, the year of the appearance of the work of Copernicus "De revolutionibus orbium coelestium," until 1638, date in which see the light the "Discorsi" of Galileo."* According to Mardones: It will be Galileo then, a typical representative of the new mentality

that changes the qualitative physical explanations of Aristotle, by the mathematical formulations of Archimedes.

In the arguments of Mardones and Ursua [9]*, the beginning of mass production, according to the scheme of supply and demand favored the accumulation of capital and the strengthening of a new urban socio-political class: the bourgeoisie and the Bourgeois State. "Characteristic of this social class will be the taste for a more secular culture, a propensity for concrete actions and their sense of order and the positive." According to Comte, the positive, which is what our popular language has collected in expressions such as "****go to the positive****," that is, **to the useful and pragmatic**. The new science gathers this objectivist interest, in accordance with the attempt to dominate the human being and nature, pointing out a technological attitude of knowledge* and its applications.

The "new science," according to Mardones [9], which replaces the science Aristotelian, *will consider as scientific explanation of a fact that which comes formulated in terms of laws that relate phenomena determined numerically, that is, mathematically.* These explanations will take the form of causal hypotheses, but causally it will have here a functional connotation in a mechanistic perspective. The touchstone of the value of causal hypotheses will be determined by experimental analysis. It will be the comparison of the hypothesis with the consequences deduced through the observation of reality or experimentation which will tell us an explanatory value, the human, social and cultural, the historical-critical, cannot be scientific, it is an art, like physicists will say.

In an acute synthesis, Mardones and Ursua [9] define: *"… We will now understand why, speaking in a very broad sense, the confrontation can be expressed in general terms and this can be expressed in terms of causal explanation versus teleological understanding or, as we will say more ahead (Erklären: Explanation) against understanding (Verstehen)."*

3.1. Concepts of sustainability and agroecosystem

The concepts have been—almost always—poorly constructed (especially in agricultural research), there is no intentionality or clarity in its content. As an example, the concept of Agricultural Development (linked to the Agroecosystem concept and contributes since economically perspective to define Rural Development) fails to define what "*development*" is, even though since the [1973] Weitz [10] in Rehovot, Israel, politicians and scientists from all over the world, agreed that any development is "*a process of change*."

Hence, in the Agricultural Development who changes? O Who should change mainly? Should it be the farmer? Who is the protagonist of that level of development and who must change based on his historical-social determination and the identity of his territorial appropriation. It is now necessary to ask: what should change? Well, mainly in his attitude and behavior; towards what? Logically, towards the management of your plot (Agroecosystem in the design and monitoring evaluation phase) how will it do it? Maybe you could do it in a planned way (Diagnosis, Strategy and Evaluation) and why do all this? In order to fulfill its social responsibility in an optimal way, the land was given, in some cases also the water, the bank financing and perhaps an agricultural insurance, to produce the food, raw materials and environmental benefits that the society and its family demand, but also to improve their quality of life. And who would lead this process? We could say that the Law for Rural Development which defines

the municipal authority to coordinate it, although nothing prevents this from being done by an organized group of farmers.

We could now build the concept based on the previous ideas. *"The Territorial Agricultural Development (DAT) is a socially and historically determined process and main contributor in the economy of Rural Development (Major System). The DAT is a process in which through changes in attitude and planned behavior of farmers in the management of AES produce optimally, ecological, economic and social, food, raw materials, quality of life and benefits environmental factors that the market and the population demand. Conducted by Organized Farmer Groups."*

Certainly, the concepts are dynamic and flexible. Other elements of a higher order could be inserted in this conceptual construction, which would give greater strength to the concept and Territorial Agricultural Development; as it can be the introduction of empowerment in the organized group. A brief definition of this empowerment indicates that what is sought first is Social Empowerment (Large and strong organized group); then build an Economic Empowerment (Installation of efficient and capitalized companies) Finally, seek political empowerment, first at the municipal level; later in the state and federal deputation. The latter to keep your project in time without external interference [11–13].

3.1.1. Sustainability

To date, there is a large number of definitions of sustainability, developed without addressing a minimum methodological structure. Generally, there is no major system that contains the concept under construction. Its structure is not described (parts that compose it) nor its function (relations between the parties) except its protagonist and its objectives. The authors in this sense could make a simple definition could be built but with the necessary quality to walk towards a plausible concept.

Should Sustainability be local or global? Nowadays it would seem that the answer is that it is local: My sustainable experiment, the sustainable radishes, and sustainable shoes; in short, today everything is sustainable. Imagine that Australia is totally sustainable (whatever that means), but the rest of the world is not and suddenly (exaggerating) the sea level rises 40 m, flooding its main coastal cities. Australians would say: but why, if we are sustainable. Indeed, they are, but not others. What does this tell us? Well, sustainability must be considered on a global level, if it does not work. There must be dynamic balances between the economic, political, cultural, social and environmental dimensions; depending on the quality of the resources that are managed.

Thus, we can say that: *"Sustainability is a political and global process (upper system) where what must be sustained and support itself is the life of the Human Being and all the living on the planet, through a rational management of social and economic processes and that along with a management, also rational, of nature, the human being ever scope the happiness, whatever that it may."*

3.1.2. Agroecosystem

As it indicated earlier, the AES is first of all an epistemic tool (theoretical-methodological) that we call System, as a model of a part of the empirical reality. Then *"the Agroecosystem is a representation or model of a cut of the agricultural reality, managed by a cybernetic controller (farmer*

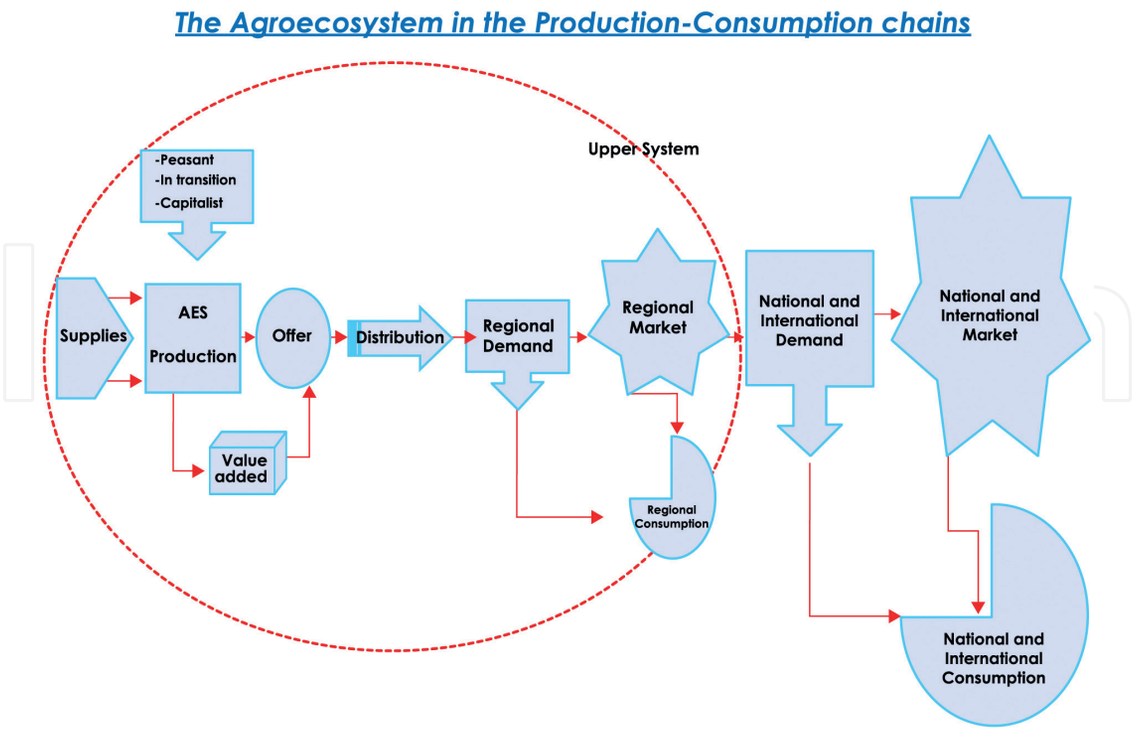


Figure 2. The agroecosystem in the production-consumption chains.

or peasant) to produce and satisfy -in an optimal way- the social needs and demands of the market. Conceptualized as an organized totality (that is why it is a system) in which the elements are not separable and, therefore, should not be studied separable." In addition to the linguistic and epistemological clarity that this approach provides, is that being the AES a model, multiple simulations can be designed in much less time and with lower costs. Unlike the development of controlled experiments in the field that will surely take much more time and financing.

In **Figure 2**. The Agroecosystem (AES) is defined as the initial and main link of the Production-Consumption Chains. In the AES the first level of supply of agricultural production is activated (fresh or with added value) and the distribution processes begin to satisfy the estimated demand, the regional, national or international market and therefore consumption. In this apparent and simple process occurs the most important phenomenon of social reproduction: Consumption - to live - inexorably depend on the AES and in that same process the AES also depends on consumption (family and social) to survive. This constitutes what the higher system of the AES may be committed to by its social responsibility: Feeding society.

4. A new agroecology

With everything and how valuable Agroecology is, it certainly should not remain static and enclosed in its box forever. The agroecological leaders in the world could perhaps be integrated to new approaches to study the Agroecosystem. One of them is that of complex systems with cybernetics of second order and therefore with researchers at the observer level of those who observe [Researchers who study farmers observing their agricultural processes (Agroecosystem)

has the great advantage that the observer of second order (the researcher) can observe himself in the same observational process].

Criticism about the biological-ecological approach is by no means new, since 1980 Dr. Efraím Hernández Xolocotzi [14] stated that the principles derived from ecology should be checked, as soon as possible, without forgetting: *That the essence of agroecosystems, is the management of natural resources by man and that studies with an ecological focus, have disparaged, precisely, the presence of man.*

Therefore in the design of a new agroecology should consider the previous advice of Hernández X. and the following theoretical criticisms. Muench [15] stated that the tendency that has predominated over the interpretation of the Agroecosystem is that which considers the technique abstracted from the whole system of social relations; performing an isolated examination of it and establishing a rigid relationship of cause and effect between the technique and the socio-economic instances of society; defining the technique as an independent variable and the economy as a dependent variable. Thus they come to the conclusion (although they do not specify it) that social systems are determined entirely by changes in technique and need to adapt to it.

Faced with the avalanche of criticism that progressive scholars make to the aforementioned tendency, Muench [15] himself expresses his position about it: *"… Before the development of irrational forms in the production of satisfactions carried out by the tendency described above, arises, as a weak humanist defense of resources, another tendency of the conceptions of the scientific research of agriculture. This tendency is born from the field of natural sciences, specifically from ecology, from where the concepts and basic categories for the method of study are taken."*

The most important contribution of this conceptual tendency - to say of Muench - lies in the fact of demanding an integral analysis of the agricultural phenomenon; however, an important basic error is made: a social phenomenon - agriculture - is analyzed through a method proposed by biology and ecology. Taking as a fundamental concept the ecosystem and applying the method of study designed for the study of natural ecosystems, for which the concept of agroecosystem is elaborated, which is nothing else than an ecosystem where man intervenes as one more organism in the trophic chain, Muench [15].

Pablo Muench [15] concluded: "*Obviously this conception leads to an analysis of agriculture outside the historical development of society, without making a clear distinction between human work and the other elements of the production process; it does not assume the importance of the unequal development of agricultural processes with different social production objectives; they interpret the efficiency of agricultural systems apart from concrete social conditions and deny that production systems have greater material conditions, developed by society in their historical process, than the conditions imposed by nature. To consider agriculture in that way is indisputably wrong.*

In addition to the above, the concept of Agroecosystem was managed without constructed it, even methodologically, and logically this has led to diagnose it without knowing it, to design it and operate it without theoretically knowing its structure and operation, and finally to evaluate it without applying the minimum elements of the theory of systems.

Regarding the reality status of systems and therefore of agroecosystems, the fourth generation of systems, that of complex systems, introduces a highly clarifying idea for a potential new

agroecology: Systems are not things, but those things we see them or rather we want to see them as systems. That is, we use the filter of systems theory to see reality, not because systems exist in reality, but because we want to see it through that filter, which is epistemic and therefore theoretical; as we could see reality with any other filter, with a positivist or dialectical approach, perhaps religious -if we would like to do so- in recent times it is said that reality is not objective, it is undoubtedly an interpretation of the human brain, there in his dark room, guided only by the deceptive senses.

With regard to the above, Herrscher [4] President of the International Society for the Systems Sciences, the leading entity of systemic thought in the world, receives a basic question: What is a system? And he replies: *"Almost everyone will tell you that it is a set of elements interrelated with a common goal … But in reality we are the ones who do it system: when looking at it, seeing it as a system, when deciding to consider it as a member of a category that has certain properties marked in his theory." His interlocutor answers him with another question - Is it to say that all things in this complex world are systems? - Properly Herrscher points out that: "… 1) systems are not 'things', but there are things that we decided to treat as systems, and 2) that not even all of them are 'things'. There are artifacts like a car or a plate that we call mechanical systems. There are biological systems: living organisms like the dog and the cat that we have at home, or like each one of us or, specifically, our bodies. There are organizations like your factory, or like our families, or like our government or our country (which is not the same) that we call social systems. And there are systems of ideas, beliefs or behaviors, such as ideologies, religions, and cultures."* Science is correcting itself, because we see here that Herrscher is still considering doxical elements as epistemic (mechanical systems, cats, dogs, etc.).

Herrscher [4] concludes by saying that "*The condition of the system is not an intrinsic quality of the thing - but an attitude or appreciation of each one. For those who consider, based on a theoretical approach, that in reality there are things that are related to one another that tend to the formation of a human being in an articulated and meaningful way it is a system."*

Garcia [16] in his classic book "Sistemas Complejos" confirms what Herrscher said about the reality status of systems as an object of study, he says that: "*A complex system (AES) is a representation of a cut of that reality, conceptualized as an organized totality (hence the denomination of system), in which the elements are not 'separable' and, therefore, should not be studied in insolated."*

In other words, a new agroecology, before studying natural resources and food production must understand and interpret the culture of the social group that wishes to study. To understand their relationship rules, not break them untimely. If the producers did not ask for technical help, it is not that they do not need it, they probably do not want strangers in their locality and they consider themselves assaulted by the presence of individuals, who even arrive with a haughty and arrogant tone.

Do they really want advice of a productive and ecological nature? Probably what they want, although they do not manifest it, is the exploitation of non-agricultural materials. Like lime, marble, stone or sand, circumstances that many times the agroecologist does not see or does not care about. Better still, is to listen unattended demands, such as small dams, roads, electricity or drinking water; demands that could seek the solution to technical or financial problems.

Remind that the problems of farmers, in reality are elements that prevent achieving their objectives. And that those problems and objectives have an owner and these are the farmers. Our problems and objectives should not overcome theirs.

5. Conclusions

In spite of how hard epistemological criticism can be, it must be recognized that the scientific activities developed by Agroecology are of high biological and ecological value. However, if this science does not come out of its closed box and does not attend higher level phenomena, which undoubtedly affect the behavior of Agroecosystems and its Cybernetic Controller, in order to fulfill its social responsibility, it is most likely that AES be considered by other professionals in the dynamics of complex autopoietic systems and be mounted on the frontier of complexity sciences.

When agroecologists or scholars of agroecosystems begin to understand and clarify previously diffuse meanings, agricultural research will advance, not only in knowledge, but also in the dynamic equilibrium of rural activities. But above all in the philosophy necessary to generate new and renewed scientific knowledge that contributes to achieving economic, social (with its political and cultural manifestations) and environmental well-being.

Just to introduce us to the topic, the semantics of the Theory of Social Autopoietic Systems of Niklas Luhmann considers that we have been wrong to consider the Society as if it were the Population. It should be noted that at the beginning of each social group, complexes of relationships were created in the processes of appropriation and adaptation of the groups to their environment, which also built identity. This complex of relationships, as the generations pass, becomes a collective memory and then a social memory. That social memory in this historical moment is no longer concrete but abstract, imbued in the processes of identity-and although it is now abstract-it determines the behavior of social groups. The social and collective memory is reproduced in time (it is autopoietic) that generates a culture that translates into specific traditions and behaviors. When it matures and is regulated, this social memory (Culture) generates Civilization and Society (orderly social relations as in the social division of labor), which is reproduced in time and based on it individuals, institutions, companies, governments and countries build its autopoiesis, and although it is maintained in abstract conditions, the traditions and concrete behaviors, also remain as collective memory.

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