Ecosymbiotic Complementarity and Communal Approaches for the Co-evolution of Sciences and a Dialogue of Knowledges: Reflections From the Andean Indigenous Conception of Territory

Paper for the Compas panel in the conference: Bridging Scales and Epistemologies: Linking Local Knowledge with Global Science in Multi-Scale Assessments
Alexandria March 2004

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Abstract
The paper presents some of the features of traditional American knowledge systems: the sacred nature of mother earth (Pacha Mama), the cyclic notion of time, the mutual and reciprocal relationship between humans, animals, crops and nature, the living astronomy, role of festivals and rituals, and the importance of traditional leaders in land use practices, mutual aid and ritual practices. He explores the central concept of Pacha Mama in the Andean knowledge systems: a sacred time-space that goes beyond the physical and socio-economic domains studied by conventional sciences. On this theme important studies have been made on the use and management of land in agriculture. These studies show the difference of indigenous concepts with those of conventional science. But they also indicate their complementarity in their contribution to endogenous development.
Freddy Delgado will present examples of a Bolivian university to carry out research and scientific education together with traditional leaders, using participatory and qualitative methods. These include new paradigms for science and development within the possibilities of western science. In this new perspective, a multi-methodological and transdisciplinary approach is advocated, which is called **"participatory revitalising research".** The experiences to document, strengthen and revitalise indigenous practices in agriculture, health and marketing strategies will be shared. The exposure of university staff and students to rural life, the teachings of rural leaders on the cosmovisions and traditional technologies, as well as the intercultural dialogues in the universities contribute to a synthesis between western knowledge and traditional Andean knowledge.

1. Introduction

According to some hypotheses, the peopling of Latin America began approximately 30,000 years ago, when climatic chances made the migration from Asia through the Bering Strait possible. It took 8,000 more years for these small wandering human populations to make it to the southernmost region of the continent, in Patagonia, and to spread throughout Central and South America. Those who underwent this Great Journey through the New World survived thanks to their adaptation to the surrounding environment and a learning process in relation with nature. Those who adapted to the Amazon river basin continued living in a hunting-gathering mode, learning the necessary skills to survive in a tropical rainforest. Agriculture appeared simultaneously in the highlands of the Andean mountain range, in South America, and in Mexico and Guatemala, in Central America, around 5,000 BC. The gathering peoples domesticated seeds and began growing them on a trial and error basis. Teosinte, a high protein corn precursor, was grown for the first time in Mexico, while potato was an ecologically early, ecologically adapted crop in the colder Andes. These crops, together with a wide diversity of species and varieties of crops, made up what is now being acknowledged as one of the world's main centres of biodiversity.

Up until 1492, when the Spanish invasion was initiated, the various indigenous populations in these territories had different levels of social, economic and political organization. Among the most outstanding indigenous populations were the Maya and the Aztec in North and Central America, the Quechua and Aymara, in the Andean Region (Ecuador, Colombia, Bolivia, Peru and Northern Chile and Argentina), and the Mapuche in Southern Chile and Argentina. Various ethnic groups in the lowlands still live in the Amazon basin, where the Guarani people are predominant (Brazil, Paraguay, Bolivia and Argentina). In the Caribbean coast, indigenous populations mixed with the descendants of African slaves, brought by the colonial governments of Spain and Portugal.

The invasion of Spaniards and the Portuguese in the Americas has undoubtedly modified the ecosystem throughout the continent, while influencing the way in which indigenous peoples perceive the world. Still today, an important part of the social, economic and political lifestyle of these indigenous peoples, as well as their ways of relating to nature, and to generate and transfer knowledge, are very different to from western cultures, from which over the past 200 years the predominant modern science has originated, closely related to economic development paradigms (Alvares, 1996: 34, 35).

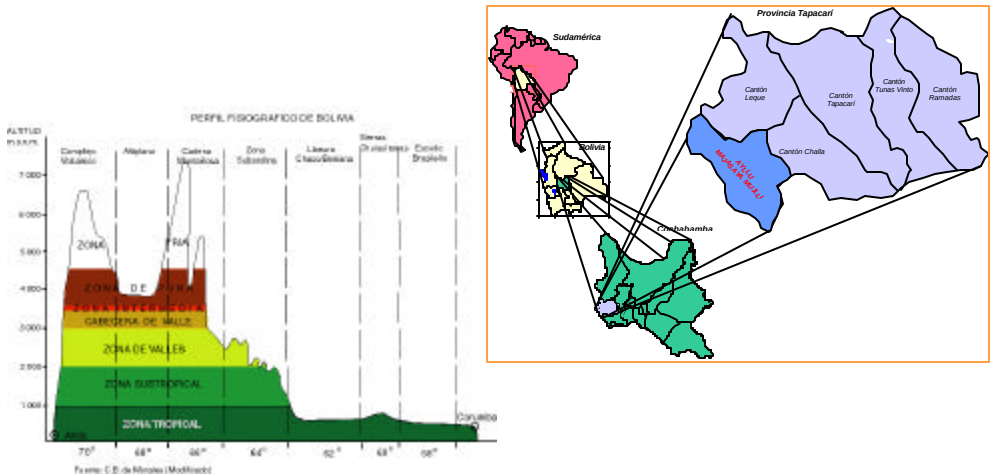
In Bolivia, 63% of the population is considered indigenous (55% Aymaras and Quechuas, and around 5% Guarani amazonian ethnic groups). This large population, which resides both in rural and urban areas, has been neglected for centuries; their participation in national and municipal governments, as well as in the judicial, legislative and executive powers, has been minimal or non-existent. It was only after the 1950's that indigenous people in Bolivia started to have access to formal education and landownership.

Since 1825, the year of independence from Spanish Colonial Government, the population of European or non-indigenous origin has managed the fate of the nation. The predominance of western culture (European since 1532, and North American for the last 100 years) and the Spanish language have been and still are the basic elements of all levels of public and private education. In 1996, however, the Act of Educational Reform, which included bi-lingual education, was agreed upon, though presently the target of more questioning than positive results.

AGRUCO is a University centre dedicated to higher education, scientific education and social interaction with indigenous farming communities, in the field of agro-ecology, indigenous cultures and sustainable development. It is a part of Universidad Mayor de San Simón (UMSS) in Cochabamba, which, with the technical and financial support of the Swiss Agency of Cooperation for Development (COSUDE), has attained its excellence. Its efforts in participatory research and involvement in small development projects in rural farming communities have allowed the constant feedback of experiences with endogenous development into the educational process. Since 1996, it has participated as founding partner in COMPAS, linking scientific knowledge with local knowledge, which has enhanced the exchange between knowledges and cultures in Latin America and the world, also known as intercultural and interscientific dialogue.

The area in the department of Cochabamba in which AGRUCO has been working over the past 18 years, include a large number of natural ecosystems, ranging from the highlands at some 4.600 metres above sea level, the valleys at around 2.500 m.a.s.l., and the tropical lowlands in the Bolivian Amazon region below 1.500 m.a.s.l. (chart 1).

Chart 1. **Physiographic profile of Bolivia**



The ecological variability within the area allows for a diverse and complementary system of production, which is in line with Andean cosmovision as well as the necessity to deal with the risk associated with climatic uncertainties. Main crops in the highlands include numerous varieties of Andean tubers and grains, such as potatoes, oca, papalisa and quinua, cañahua and oatmeal, while in the valleys corn, wheat, barley and vegetables are produced. Coca leaves and fruits are grown in the tropical regions of Cochabamba. The produce is mainly destined to self-sustenance, and, to a lesser degree, to exchange and marketing. However, the marketing contribution of around 50% is fundamental to the food security for Bolivian population as a whole. The breeding of animals is diversified, with llamas and sheep in the highlands, and sheep, cattle and goats in the valleys, and cattle in the lowlands. The Aymara and/or Quechua population carry out their main agricultural activities according to their productive calendar, closely intertwined with their ritual festivities.
I am a descendant of the original Aymara and Kallawaya cultures, born in the city of La Paz, from parents who migrated from the rural area to the city. I was educated in the western tradition, with the good fortune to start my working career as an research professor in the university centre of Agruco, of the University of Cochabamba. Both the institutional and my personal experience are reflected in this lecture, in which I focus on the perspective of a co-evolution between various sciences (modern or western, Aymara, Quechua, Maya, Guarani, Mapuche, Indian, Buddhist, etc.) through a process of mutual learning (Rist, 2002).

Therefore, in the first part of this lecture I will present the institutional experience of intercultural education, based on revalidation of indigenous knowledges as part of a program of university education. I will try to demonstrate the limitations and potentials of higher learning and scientific investigation from a perspective of epistemological aperture and creation of new paradigms. In the second part, I will review our experience and the abundant bibliography on this topic, as well as some of the advances in modern science towards an intercultural and inter-scientific dialogue. In the third part we I am presenting the fundamental aspects of what an Andean science: the principles, objectives, focuses, methodologies, and the social actors involved in the learning process. In this third part, I am comparing the concepts of 'soil', 'land' and 'territory' from the indigenous and from western scientific point of view.

2. Dialogue between Indigenous-Farmer Knowledges and Scientific Knowledge: AGRUCO's Experience as a University Centre

University education in Bolivia, as in other countries in Latin America, has many effects on our youth. The fact that most of the students belong to indigenous communities or Andean cultures, often as direct descendants from Quechua or Aymara parents, do not always imply that they continue to identify themselves with their local culture after they graduate. This is due to the materialistic vision of life within modern science, and more specifically the proposals of the Green Revolution in the 1960's to improve agricultural production, which often provide the basis of higher agrarian learning. There is a marked absence of links between the knowledge provided within university classrooms and the knowledges and concepts of indigenous peoples. The focus on market oriented high-input agricultural production systems often alienates the students more from their cultural roots, instead of guiding them towards endogenous development in their areas of origin.

AGRUCO was created by the University of Cochabamba in 1985, with the initial aim to promote a healthier and less polluting agricultural system to the model imposed by the Green Revolution. Over the years, this objective became more and more adapted to the needs and reality of the farming communities involved. The practical results, concepts and methodologies are now more inserted into the higher education in forest, livestock and agrarian sciences. Presently, starting from the basic elements agro-ecology and local knowledges, the students that opt for this programme receive an integral education focused towards supporting sustainable endogenous development. The dynamic link between the university centre and the rural communities of the department of Cochabamba, has been fundamental in this process of change.

2.1 The mutual learning process as origin of the changes in the programs of higher learning

Agruco's main goal is to support sustainable endogenous development through the revalorisation of local knowledges, cultures and agroecology. Throughout the 18 years of it's existence, Agruco has developed experiences on how to support the process of endogenous development without interfering with the structures, values and specific social contexts of every specific community, and how to include these experiences within the curriculum and university education.

Agruco's process of learning can be divided in three phases. In the first phase, between 1985-1989, our program worked with rural communities on basis of 'agro-biology and organic agriculture', trying to replicate the experiences of the Swiss Institute of Investigation in Biological Agriculture. We concentrated on interrelated systems, such as those existing between soils, plants, water and the association of crops. Over time, however, we came to understand that the agro-ecosystem is the result of the co-evolution between nature and human society, instead of limiting it to a mere natural process.

Therefore, between 1989 and 1995 we implemented an approach from the 'agroecological perspective', working in investigation and extension in an interdisciplinary way. Education and social assistance were provided to the communities involved, in an effort to overcome the distance between research and its application in the field. Our methodology involved participative investigation, the revalorisation of local knowledge and the local decision making models. This implied the search for a reciprocal relationship between 'scientific researchers' and the members of the community. This task did not turn out to be too complicated, because the agro-ecological principles coincide with the fundamental principles of traditional Andean agriculture. Throughout time, however, we found that in the process of handing over more and more responsibilities related to research to the farming communities, we unwillingly continued the conventional and vertical method of 'transfer of technology'.

As we continued to re-conceptualise agro-ecology in a sustainable rural development perspective, we concluded that we needed to better understand the life concepts that underpin the reality of the communities with which we worked. Therefore, between 1996 until 2002 we developed a methodology based on the analysis of material, social and spiritual life of the indigenous peoples of the Andes. Participatory research and intercultural dialogue between farmers and 'scientists' became a central part of our actions. For the first time, we became conscious that we needed more experience and sensibility while entering the indigenous communities. We also analysed some critical errors in this aspect. For example, we would try to meet and work with a community at a time of communal fasting or during a spiritual retreat, without taking into account the importance of this activity for them.

We gradually became aware of the necessity to understand the indigenous concepts of life. We came to learn that respecting, sharing and becoming a part of the ritual in a profound and spiritual way is an important principle in the process of educating professionals with the intention to work in endogenous development. The researcher, as an actor involved in the community, can only support the community's self-management and sustainability when it accepts the Andean concepts of Life (San Martin, 1998). In this approach, since 1996, AGRUCO has also participated as founding partner of Compas, furthering its experience through a dialogue with other knowledges and cultures of Latin America, Asia and Africa.

2.2 Combining higher education with support to rural Andean Communities

Some fundamental actions and conditions allowed AGRUCO to evolve from a university organization with a conventional research and development program, into an organization that stimulates an intercultural dialogue between the scientific or conventional knowledge and the local systems of knowledge. In this process of change, we tried to answer several key questions: First, how can we establish an institutional framework, that allows the harmonious and permanent interaction between the university and rural communities? Second, which are the principles and the main attitudes required in the professional to reinforce the exchange between the community and the university? How can we encourage the technical staff to overcome the limitations of conventional education that prioritises the use of quantitative methods? And, finally, how can we apply qualitative and participative methodologies that are more congruent with the concepts of the indigenous population?

In order to establish the institutional basis for the intercultural dialogue, we had to take into account two basic realities: on one hand, the university which we are part of has an academic program based on modern conventional scientific, neopositivist and quantitative knowledge and values. On the other hand, the native communities have a totally different system of knowledge, objectives and concepts of life. For Agruco, this meant that we had to find an institutional configuration, which would allow a horizontal and reciprocal interaction with the communities. In other words, we had to change the universities', NGOs' and development projects' project-centred vision into a vision that placed the community at the very centre. To

achieve this, it was necessary to stay in the field for a significant amount of time, which implied that, as professors, we had to be in the communities for some 70% of our time, doing research and social interaction, while only 30% of the time were for giving classes. This aspect was not always well understood by the different university groups.

On the other hand, we could not organize ourselves as conventional university departments, in separate units for academic administration, research and extension. Similarly, it was not possible carry out 'individual research', as each professor had to be, at the same time, teacher, researcher and an 'extension or communication professional'. We re-structured ourselves into three interrelated units on the basis of teamwork and trans-disciplinarian education. First we created a unit called 'community support'. This gave the basis for the activities of the other two units, 'participative research' and 'pre-graduate and post-graduate education', which imply activities both at the communal and university level.

The principles which rule the peasant community are based on the common well being as a starting point, which, in turn, is based on the interrelationship between the social, material and spiritual ways of life. The communities and Agruco wanted to create a space of mutual learning. Not be concerted at the individual level, but at the communal level within the community, and within Agruco as a work team. The community work of the peasants and the teamwork of the Agruco professors were also based on another main principle within the peasant communities, which is known as 'reciprocity'. This does not only imply a physical and social cooperation, but also a spiritual cooperation. Over time, these principles have also turned into the conceptual bases of Agruco's internal organization.

The combination of higher education, research and community support allowed the integration of local experiences into the educational and research process in the university. In our case, when we describe peasant technology or when a student carries out a thesis within and with a community, we are simultaneously making a contribution towards participative research, community support and the education of young people. This is a reciprocal process, because the 'scientists' and the students learn to stimulate their social sensibility and to recreate our cultural identity, while the communities also learn by recreating their knowledges and technologies. During the courses for students in the communities, the university professors and the local people all transmit their knowledge, skills, concerns and aspirations, but alternatives can also be sought in cooperation. This has originated the prioritisation of graduate and postgraduate theses directed by Agruco, which were selected with the communities and the municipality (San Martín y Delgado, 1997).

The support provided to the local communities focuses its actions towards the reinforcing community organization and developing as well as managing projects prioritised by the members of the community. These projects are known as Integral Communal Programs for Selfmanagement and Sustainable Development (Programas Integrales Comunitarios para la Autogestión y el Desarrollo Sostenible, PICADS). These PICADS are also the basis of interaction between the communities and the local government structures or municipalities, which, according to the Law of Popular Participation established in 1994, manage decentralised government funds. According to this law, the communities can receive financial support from the Bolivian State through local municipal governments, while successful experiences may be replicated by developing them in annual operative plans.

2.3 The Rural Origin of the University Students to Strengthen Indigenous Communities

After we had been able to overcome the artificial division between research, social interaction and education, we realized that the methods and methodological instruments we used still needed to be revised, because participatory research and action was highly questioned by neopositivist oriented scientists, amongst whom many agronomists. One aspect of great importance in this process was the re-education of the professionals involved: for example, we had to learn to communicate as a trans-disciplinary rather than a multi-disciplinary team. This implied the need to be open to learn different methods of
social and human sciences which pioneered with the use of qualitative methods and a multi-methodological perspective of research, looking for the complementarities between qualitative and quantitative aspects. In Agruco therefore, we maintain a permanent and obligatory process of self-education for all staff, which begins with a 'de-scholarization' phase and an analysis of the experiences of the conventional agrarian extension work.

This type of action or development research allowed us to bridge the distance between scientific investigation and local development. We came to understand that it is possible to overcome the problems of mere technological transfer by openly analysing the contradictions and flaws, carrying out serious efforts to achieve a dialogue on an equal basis with the community. In this process, professionals had to take into account the following questions: how can we understand the reactions and decisions of the community? How can we learn with them about their reality and strategies? What is transfer of technology? Who decides what? What do we all want and what can we offer?

We came to the conclusion that we had to shift from a vertical transfer of technology towards 'guiding and supporting the dynamics of communal knowledge', where research and higher education can enter with a social learning perspective. This implied the need to adapt the contents of the university curriculum more towards to the reality and needs of the population. Our University of Cochabamba UMSS, as a regional state university, absorbs almost 100% of the rural youngsters and around 70% of the urban youngsters that opt to engage in higher education. In the case of careers related to agriculture, 50% of the student population came from rural and farmer origins (Espinoza, 1993). The curriculum of the agronomists was aimed at strengthen the field of agro-industry and business, however, and not at improving the lives of indigenous peasants. Therefore, the proposal was approved as a final educational program as one of the seven majors in the Faculty of Agronomy.

Another important factor, and one that is very stimulating for most of the colleagues at Agruco, was the re-encounter as university professionals with our own cultural identity, since all of us came from Andean rural communities not more than one or two generations ago. This experience of re-joining ourselves with our own cultural roots has been, and still is, our ethical and spiritual basis. This has led us to propose a specialization course and a masters program in Agroecology, Culture and Sustainable Development for graduate and postgraduate students. This space has allowed us to reunite with other professional of indigenous origin, to recreate our cultures through intercultural dialogue and the co-evolution of indigenous sciences.

2.4 Towards a University Research and Educational Program and Intercultural University Research

The programs of education and research begin with our insertion into the lives of peasant communities, the mutual and reciprocal cooperation and learning with the families, and the joint quest for alternatives to reinforce sustainable endogenous development. This insertion into the lives of the communities is at the same time an insertion into their logic, in which life is considered as cyclical instead of a linear process, as normally considered in occidental modern science. In all educational instruments, such as the cards used for the revaluing indigenous and peasant knowledge, a process is included in which we try to revalue and innovate diverse fields, with technology and social organization as fundamental elements. This can be seen in Chart 2. At the same time, this insertion with local communities also allows us to recognize our role as agents or external actors for sustainable endogenous development, not only for that particular community but also for our country Bolivia as a whole, which is essentially multilingual and pluricultural[1].

1) Part of that pluri-culturality is conventional modern science, which, for the case of Bolivia and other Latin American countries in which the process of marketing is not uniform and has not achieved absolute control, as is the case with European or the USA, where these marketing processes, linked to modern science and modern agriculture have had a marked influence in its development. Van der Ploeg has called this process as the 'scientifization of agriculture', which is essentially the systematic reconstruction of current agrarian practices according to the designs of scientific criteria (Van der Ploeg, 1992).

Chart 2.

The process of revaluing local-farmers' knowledge and technology

Daily life in the communities:1) Identification of technology, 2) Interviewing the people in the community, 3) Data systematisation, 4) Validation and complementation, 5) Editing the data collecting note cards, 6) Spreading the knowledge gathered

The process of intercultural dialogue is carried out between the communities and Agruco, in field activities, field workshops as well as in the classrooms of the University of Cochabamba on the basis of research subjects identified by the communities, which can range from agro-ecology themes to matters of policies and organization. The basis of this work is the permanent process of reflection and dialogue between local and scientific knowledge. In this way, the research projects of the graduate university students begins, whenever possible, with the problems expressed by the peasant communities, focusing afterwards on a joint process of looking for alternative ways to solve the identified problems. The postgraduate degree is based on the same concepts. The postgraduate program offers actualisation courses, a master's program in Agroecology, Culture and Sustainable Development in Latin America, and, since 2003, an international course on sustainable endogenous development and biodiversity in the framework of the University Consortium and Compas.

The research program and the projects related to revaluing local knowledge and agroecology are called 'Life in Andean Communities' and have three main areas of interest: plant diversity (including wild flora, agroforestry and soil conservation); anim al diversity (including wild fauna); and cultural and socio-economic diversity (including communal strategies, social organization, alternative community economies and governance and governability). Each field of interest has diverse projects and subprojects, and takes into account general concepts such as sustainability, gender, and empowerment in the perspective of inciding in public policies.

In Latin America, and Bolivia in particular, the indigenous farmers' movement has emerged with strength throughout the last ten years, demanding social, political and economic redefinition of policies. Some answers have been provided, but they are still insufficient. In the field of higher learning, science and technology, the Viceministry of Higher Education has recently proposed fundamental changes, based on the concepts of integrated and multi-cultural education, and taking into account indigenous higher education. In this perspective, together with the indigenous fund and UNESCO, they have initiated a process of dialogue with all social actors towards a more intercultural education. In this process Agruco is considered a successful case, which can help develop policies of intercultural education. This fundamental subject is to be taken into account from the perspective of the University Consortium of Compas.

3. Some advances in modern science in the perspective of intercultural and interscientific dialogue

After over a century of epistemological debates on modern science's objectivity and subjectivity, universality and relativism of its results, the discussion is still finding more and more complementarity between structuralist and non-structuralist positions, among quantitative methods used by neopositivism (which has been the dominating perspective in science) and the hermeneutical paradigm which stems from the actor's perspective, in which qualitative methods predominate.

Over the last fifty years, the openness of this conventional or modern science to argument the scientific validity from other perspectives which do not stem from the only and dominant neopositivist focus which has imposed the use of quantitative methods based mainly on measurement and the experimental method, have allowed to enrich the global society's system of knowledge, which is, after all, the final recipient of all of the contributions of scientific research.

Modern science must continue looking for complementarities or face the risk of isolating itself, in a world which is being globalised not only at the level of openness and being changed by emerging world financial markets, or the vertical integration of businesses that provide material for a consumerist y to take over the food market by producing transgenic seeds and foods, but in a world which is opening up to the knowledge of other cultures and knowledges, and which evidences the biological and cultural diversity of the living beings in the planet, where high tech communication can play a main role in contributing towards an intercultural and interscientific dialogue.

Therefore, it is logical to consider that the contributions of the currents which question neopositivism, called the new philosophy of science, the historicist or theoretical currents, or the 'soft philosophy' of science, have originated disciplines and programs such as the sociology of knowledge, which are fundamental in this process of reflection and which gather more and more adherents in societies with high cultural and ecosystemic variance, and also constitute the 'scientific' option of non western scientific communities and in the epistemological framework of participative research.

The advances in modern science and globalisation, whose objectives should not be the quest for the predominance of the logic of the economic market which has caused so much misery in the world, but should allow for a dialogue between local knowledges and scientific knowledge, accepting the existence of other logics and ways to see the world which allow a balanced relation of society with nature, based on an economy of reciprocity, where social relations are based on mutual help, solidarity and equal redistribution of the natural resources, based on decisions which try to relate the community with the individual and the family.

The advances in this perspective have, logically, had greater repercussion in scientific communities in Latin America, Asia and Africa, stemming from ethnological, ethnohistoric and anthropological participative researches, creating a greater predisposition and eagerness to look for more and more participation of the civil society or local social actors in policies, research programs and projects and development.

3.1 Transdisciplinarity and Participative Research for Intercultural and Interscientific Dialogue

Transdisciplinarity and participative research are two favourable consequences and results of the century and a half of epistemological and methodological debates within the scientific community, which has begun to

recognize and accept the contributions made by the local knowledges of non-western societies (like the Andean society) to universal knowledge, especially for its balanced relation with nature and its integral perception of life, which are fundamental links to be considered in the perspective of an intercultural and interscientific dialogue.

In this perspective, transdisciplinarity is understood as a process of self-formation and action-research oriented within the real complexity of each context, overcoming the limits of disciplinary knowledge, in such a way that research and the recreation of alternatives and solutions are defined without making distinctions as to their specific and methodological knowledge. On the other hand, the contributions of participative investigation, which nowadays has become a sort of world citizen, after a long period of questionings from neopositivist science, attributed to the subjectivity of local knowledges and their non-universal character, currently appear to be fundamental in the construction of options for sustainable development built over centuries of experience in their relationship with nature, within a diversity of ecosystems and cultures which cannot be denied by modern science and western culture, which has tried to impose one single worldview to establish its hegemony.

The methodological focus of participative research and the application of qualitative methods and techniques have been based, in the Latin American case, on the joint construction of knowledges between the scientific investigator or the scientific community, and indigenous or peasant communities, which has allowed for a dialogue to begin within a historical process which recognizes each philosophical and scientific thought as being different, and does not label them generically as prehistoric and primitive or underdeveloped knowledge. Besides, the cognitive and methodological pluralism, specific to some schools in the field of social science, have been fundamental to promote a process of dialogue between knowledges from scientific and Andean paradigms, which would allow a more practical contribution, with reciprocal benefits, proposals for development from the perspective of the local actor.

Therefore, we propose to leave behind the neopositivist perspective of subject-object relationship as a system for the generation of knowledge, and begin a relationship based on a subject which applies the modern western scientific method and possesses a vision that is determined by his scientific education, without neglecting his own vision of life with another subject, which is based on the praxis of its daily life and does not know or apply the modern scientific method, at least not in all of the research, in which a relationship between human beings is established, one that looks for the consensus between scientific knowledge and local knowledges, because our people cannot keep on being the object of study of modern western science.

In this case, the proposals of causality which typecast all sciences would be relativised, proposals which lock it up in a crystal tower and isolate it from the historical, social and pragmatic dimension of what the scientific enterprise should be, as if it were something that is beyond the reach of history, and which, thanks to its method, is independent of the subjects which produce it. This proposal breaks the field of subject-object relations and tries to transcend it with a horizontal dimension in the interaction between scientific researching subject and local investigating subject, which results in participative research, which is different from the classical positivistic epistemology, which neglects the object of knowledge and, on the other hand, places emphasis on how to make it be reflected without distortions; it also considers 'reflexivity as a second vertical dimension within the subject-object relationship' (Lamo de Espinoza, et. al., 1994:48, 49).

3.1.1 Subsuming Theory and Practice in a Transdisciplinary and Participative Research

The importance of accepting that in every scientist or candidate scientist, especially in the southern regions, there is a local, indigenous, peasant knowledge, based on his praxis and personal history, must allow for an open dialogue in which it is necessary to consider two fundamental premises: Equal conditions between the parts that interact, and incorporation and submitting to a sociocultural valorisation of what was jointly researched, in the perspective of enriching local culture, contributing towards the dynamisation of their knowledges and innovative logic [(2)], while at the same time there is the possibility of taking the liberty to choose to modify or reject the scientific results obtained, or to consider all of the results as a social learning process which enriches local knowledges and modern scientific knowledge. In such a case, participative and transdisciplinary research would become the bridge between theory and practice, modern science and Andean sciences. .

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2) The conditions for an interrelationship between researching scientific subject and local researching subject have been taken from the relationship between the external technological system and the Andean technological system proposed by Rist. (1992:14). Desarrollo y Participación. Experiencias con la revalorización del conocimiento campesino en Bolivia. Serie Técnica 27. AGRUCO. Cochabamba-Bolivia, pag. 58.

This proposal would also contribute towards the solution of another one of the main problems of the scientific method, which is the subsumption of empirical phenomena under a given concept, which stems from the principle that every concept defines an area of phenomena to which it undoubtedly applies. Lamo de Espinoza (1994:114), when referring to the neopositivist model, indicates that 'the problem with subsumption is not simply solved by defining the terms with clarity, because in this operation the clarity of reality itself is so important that it must or must not be subsumed. Subsumption relates a concept, for example, and a phenomenon (a word and a reality) and, therefore, an indubitable subsumption is only produced where the phenomenon and reality have been clearly stated, which is even harder to get than pure linguistic precision'. But if this concept is defined with the participation of the local researching subjects, whose approximation to empirical phenomena is greater due to the fact that they live with them, the clarity of reality will be subsumed precisely in the concept, even more when the relationship between society and nature is analysed in matters such as the organization of production or the use of natural resources.

Very clear examples of how a word is subsumed into a reality, a concept into a phenomenon or a theory into practice, can be obtained from different researches carried out in the Bolivian Andes. For example, the concept of money, commerce and market in Northern Potosi (Harris, 1987) and in the Majasaya Mujlli ayllu, province of Tapacarí, Cochabamba. (Delgado, 1999) [3]. In both cases, it is shown that the concept can have different connotations and express, subjectively, a backdrop which does not materially express the concept.

Once again, in such examples, participative research, understood as the relationship between local researching subjects and scientific researching subjects, contributes to improve the relationship between theory and practice with an empirical observation, bridging, as well, natural sciences with social sciences, 'where theory', according to Merton, 'has the mission of not only synthesizing empirical observations in an intercultural context', which means that participative action-research, also called development research, has to know the theory which guides the observations of local researches in order to avoid being misguided (based on another theory), and must also guide and orient them with its own creative and creating logic, under the risk of being reduced to a mere reflection of the methods of data gathering and ordering.

On the subject, Lamo de Espinoza (1994: 120) indicates that 'this reduction of the research to the recollection and ordering of date would impoverish empirical research and vice versa; if empirical research would not produce discoveries, novelties, surprises, it would lack all interest and would be no good to broaden knowledge'. Somehow, this situation has been happening continually in our Latin American universities when experimental design happens to achieve a fundamental importance in neopositivist science, making method and experimental design more important than the conception and the objectives proposed by scientific investigations[4].

Logically, the discoveries, the innovation of knowledges and technologies, the novelties and surprises must be, in first instance, of use to the local researching social group, because they will recreate their knowledges, awakening interest and predisposition to participate in a process of participative investigation, where the researching scientific subject will play an important role in society as a communicator who promotes intercultural and interscientific dialogue, allowing for knowledges from different cultures and contexts to be transmitted so that they may be used by the local researchers in function of their cosmovision and cultural identity.

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3) Olivia Harris in her book on Ethnic Economics, analyses in a very precise way the powers and meanings attributed to money in the northern Potosi peasant communities, demonstrating a very clear cut difference on the meaning of money in European discourse at least since the modern period, which is the value of what is exchanged until it becomes the exchange itself. In ethnic economics, Harris demonstrates that money is neutral, because the cash flow is limited by practical reasons (eg. Long distances from supply centres where money flows), cultural and ideological (eg. the relationship of money with Pachamama, which is related with the silver metal, which is a fruit of the earth, a being which must be thanked). In the Aymara language there is no exclusive word that serves to name money based transactions, which ratifies its neutrality. Delgado (1999) in an article of the ILEIA magazine, analyses commercial transactions, bartering and a very Andean concept called cambiacuy, where he demonstrates that money does not give a gold and material value to the products, but that these are, instead, functional to the social relations between the eventual negotiators, where kinship, friendship, solidarity towards climatic risks of everyone involved determine the useful value of the products and of money itself, in relation with beliefs and rituals.

4) In many Latin American countries, higher education in agrarian sciences has reached points in which scientific research concentrated the efforts in the learning process and the use of experimental designs and instruments (statistics software and others) which were very complex, which turned out to be the main objective of any research that stemmed from a real problem. While the design was harder and less comprehensible to the rest of teachers and students, the research had a greater valorization at the time of evaluations.

3.2 The Participative Research and the New Philosophy of Science for Intercultural and Interscientific Dialogue

Beginning from the first edition of Kuhn's book in 1962[5] on 'The Structure of Scientific Revolutions', the alleged fundamental suppositions of Modern Western science and the positivist methodology are questioned as the predominating focus, questioning the existence of a set of universal rules and methods, denying the linear accumulativity of the knowledges which supposedly had been the reason for which science had been success. This master work, which originated uncountable repercussions and publications, did not only cause a change of perception in the community of western scientists, but also opened up the possibility of recreating the knowledges and technologies stemming from a dialogue between local knowledges and the scientific knowledge which we, at Agruco, have termed revaluing participative research.

In such a sense, we believe it necessary to have a global vision of the Kuhnian model, which has been termed as the new philosophy of science, which allows us to theoretically and methodologically sustain participative research. For this analysis, we have taken a brief and schematic presentation of the model developed by Pérez (1999:29-33) in his book 'Kuhn and Scientific Change', of which we will expand the fundamental aspects:

It is clear that the Kuhnian model stems from the basic supposition that states that 'the diverse scientific disciplines develop according to a general patter,', which follows a series of phases or stages in the global structure, and which allows the continuous evolution of modern science. As it is widely known, this pattern or global structure begins with an initial **'pre-paradigmatic' stage**, in which diverse mutually competing schools strive to dominate in a certain field of research. Among these schools there is very little consensus as to the characterization of the objects of study, the problems which must be solved, the techniques and procedures that must be used, etc. What is characteristic of this stage is that investigations that care carried out by diverse scientific groups cannot produce a cumulative corpus of results, and maintain other societies as objects of study.

This period of schools is over when the field of research is unified under the direction of one common framework of postulates which Kuhn calls 'paradigm', which begins a **second stage, which we can term paradigmatic**, where the researchers come to consider that one of the competing focuses is so promising that they abandon all others, and accept this focus as the basis of their own investigation. This transition only happens once in the life of each scientific discipline and is, therefore, irreversible, creating the first consensus around a paradigm and marks the way towards a mature science.

In this sense, Kuhn uses the term paradigm in two senses: as a concrete achievement which refers to successful and amazing solutions for some problems, which are recognized by the entire pertinent community. These concrete cases of solution or application of a theoretical focus work as examples which must be followed in further researches. Second, as a set of shared compromises which refers to the framework of postulates or basic commitments shared by the community which is in charge of developing a scientific discipline. This frame includes the commitment with fundamental theoretical laws, with postulates from entities and processes, with procedures and experimental techniques, as well as with evaluation criteria.

Therefore, the consensus surrounding a paradigm marks the beginning of a **third stage termed 'normal science'**, which basically consists of an activity of solving a jigsaw puzzle, where the theoretical focus of the accepted paradigm gets more and more precise and is better articulated. This stage is conservative, because the objective is not the search of novelties at the level of facts or theory. The objective is to try to develop, as much as possible, in reach as well as in precision, the explicative and predictive potential of the current theoretical focus. The scientists are rewarded, as Hacking states, 'for doing more of the same', and for doing it better every time.

In normal research, the framework of basic suppositions is not considered problematic or is subject to revision; it is accepted without discussion. The failures in the resolution of problems regularly are blamed on the scientists' lack of ability and not as counterexamples of the current theory. Therefore, in this stage the same rules of the game are used all the time, and this makes results turn out in basically the same direction and make them clearly accumulative. That is why the sense and measurement of the progress within every period of normal science are well defined for the community of specialists.

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5) Kuhn, Thomas (1994). La estructura de las revoluciones científicas. FCE, Madrid-España., pág. 319.

Contrary to its purposes, normal research, with its growing specialization and the extension of its field of applications, leads, sooner or later, to the statement of problems (anomalies) which resist being solved with the conceptual and instrumental tools of the established paradigm. It may well be true that the adaptation between theory and experience is never total or perfect: unsolved problems exist always and from the very start; therefore, the emergence of certain anomalies makes one think that something is wrong at the very core, and that only a change in the basic suppositions will help find a solution. This stage has been **called the crisis stage, where extraordinary science begins**, a phase in which alternative theoretical structures are proposed which imply a rejection or a modification of the statements accepted until then, where an alternative paradigm may spring forth, which seems to offer a solution for the anomalies, and starts to fight to obtain a new consensus.

3.2.1 The Negation of the Linear Accumulativity of Knowledge for an Interscientific Dialogue

A paradigm shift, for Kuhn, is a revolution, because it implies, for example, the acceptance of the fact that all ecosystem is in a state of permanent disorganization-reorganization, that is, a simultaneous advance towards w hat is new and towards the origin. Its a transition of a new way of seeing and manipulating the world, and it can even be said that one begins to work in a different world: the new paradigm gives place to new phenomena and problems, some old problems are forgotten and some solutions stop being important or even understandable.

If this is so, then, with the paradigm shift, from the perspective of an interscientific dialogue, the development of modern science and Andean, Buddhist, Maya, Indian sciences and their disciplines, cannot be cumulative, but dynamic and cyclical. By negating linear accumulativity of knowledge, it is unthinkable to believe in the possibility of obtaining a neutral language, for Kuhn demonstrates its inexistence; this would allow for the search of a cognitive consensus, which would necessarily allow the modern scientific researcher participation from within the society and the stated problem, participating actively in the recreation and innovation of local knowledges with local researchers or researchers from other sciences, opening up an excellent space for a participative research and interscientific dialogue.

Therefore, the investigators of a science dialogue and advance in an inter and transdisciplinary perspective, which would allow the solution of problems, the revaluing and innovation of knowledge, breaching the gaps between rival theories, turning what Kuhn proposes as non-existent into an instance of appeal that overrules paradigms, which means that there also is no set of universal methodological rules that prove that one theory is better than another, an aspect which was studied in his thesis of incommensurability, a thesis that has been very questioned from different postures, trying to prove or deny Kuhn's relativism.

3.2.2 The relativism of the objectivity criteria of modern science

Following Kuhn's relativist perspective, which allows us to sustain that participative research is scientific and that it opens up possibilities for an interscientific dialogue, we question the 'criterion of efficiency of truth or practical efficiency' purported by Maquet, (1991: 341), which indicates that an 'idea is valid when it allows an effective action'. This premise ratifies the strict sense of two criteria of objectivity stated by Mannheim, which are: synthesis of perspectives and better perspective.

Through a very concrete example of the daily life of the peasants in the Bolivian Andes, it can be demonstrated that the criteria of objectivity based on the criterion of efficiency of truth or practical efficiency or effective action are not always possible to demonstrate. This example refers to the decision making process of family and communal matters to determine the time to sow, which depends on various factors such as climatic prediction, the access to different ecological floors, the placement of parcels in relation to the exposition to sunlight and availability of family or external labour. In this case, the decision is not taken on the criterion of synthesis of perspective or better perspective, since the climatic risk caused by chills, droughts, etc., almost always determine the election of three different periods for sowing (early, intermediate and late) of a same variety; these are empirically verifiable. The risk of choosing only one perspective would determine a unique result which would influence in the efficiency, effectiveness and sustainability as criteria for truth, since the idea of sowing in the three stated periods – since the farmer cannot control the weather, because it is an external factor – would allow for an effective action.

Another example, which is very widespread in Latin America, is the analyses of the criteria to determine the poverty maps which, at the same time, are decisive in order to carry out development programs and projects. The predominating criteria are notably influenced by the dominating paradigm of modern economic science, which currently has been overruled by the market economy. These materialistic – therefore objective – criteria such as the criteria of monetary income, does not take into account other fundamental criteria which may also be materialistic, but which are not prioritised by economic science, such as the valorisation of biodiversity or the existing water resources; other intangible aspects receive even less consideration, such as the knowledge which is implied by the valorisation of biodiversity, and spiritual aspects which determine the sacred value of biodiversity are definitely denied.

These materialistic criteria, a result of the objectivity criteria of modern science, are many times in contradiction with the criteria for sustainability, due to the different value attached to the latter, and which are influenced b the dominant paradigm or the new paradigm. Therefore, the criteria for value are not based on the objectivity of the statement, but in the previously existing praxis, which requires a greater flexibility in the management of objectivity and hypothesis, which would ratify the cyclic and dynamic characters of the paradigm proposed by Kuhn, as part of a social learning process and an intercultural and interscientific dialogue.

Afterwards, Kuhn, quoted by Lamo de Espinoza (1994: 496), emphasizes that 'classical elements, such as simplicity, precision, congruence, amplitude, fecundity and other more aesthetic elements, such as elegance, beauty or economy constitute significant values for scientists'. However, the author is quick to state that 'these principles which are meaningful to scientists' do not univocally determine the choice in each concrete statement, since they are values and statements which are not applied in the same way in all cases, and are articulated and understood in a different way in every occasion'.

3.3 Local Traditions and the Sociology of Knowledge as the basis for Interscientific Dialogue and the Development of Knowledge

Lamo de Espinoza (1994) states that 'the growth of scientific knowledge is due more to local traditions than to universal and abstract rules'; this allows us to propose, taking into account Kuhn's conception of paradigm, the possibility of proposing local paradigms and scientific communities (Mesoamerican or Andean scientists) with a holistic and interscientific focus as part of the internalist dimension, which would be interrelated through an intercultural dialogue with other current paradigms, or paradigms in formation, which seek complementarity in a globalised world.

In this sense, we take up what was termed as the essence of the sociology of knowledge, which states that knowledge arises in particular and concrete social conditions, which means that the subject of knowledge is an empirical and historical subject, and that every social form generates its own contextualised knowledges, according to the specific social forms in which they originate. If other social forms consider it a mistake, superstition or fetishism does not affect, in essence, the innovation of knowledge, which is, finally, the last instance of the basis of science.

If all knowledge is relative to a given social form, and if all truth is contextual, truth, the only one that is certain, would result from interaction and not from 'the sum of all partial truths', as is stated by' Lamo de Espinoza et. al. (1994:128). From this perspective, in spite of the critiques made to the different currents of the Sociology of Scientific Thought, it is undoubtedly one of the alternatives for the delimitation of criteria for truth; a radical tendency which arguments 'that even the knowledges of natural sciences must submit to sociological investigation if a realist epistemology is to be constructed'.

The final analysis made my the founder of the Sociology Major of Harvard University, Pitirim Sorokin – though his thought is not considered as belonging to the new sociology of scientific knowledge –, came to the conclusion that there are three systems of truths [6], which belong to three different mentalities, where 'every one has his own

6) These systems of truth, according to Sorokin, are three types of cultural mentalities or supersystems: the **idea-rational**, for which reality is a being that is immaterial and eternal: the truths are truths of faith, and conceives human needs as something spiritual, and their satisfaction through the reduction or total elimination of physical needs, through the elimination of the ego; The **sensory** is oriented by the truth of the senses, considers reality as that which can be perceived with the senses, and is concerned by physical needs, trying to satisfy them altering the outer world. The intermediate type is the **idealist**, which, balancing the ones stated before, orients itself towards the truths of reason.

mentality, his own system of truth and knowledge, and his own philosophy, his own type of religion and norms of sanctity; his own system of right and wrong; his own forms of art and literature; his own customs, laws and codes of conduct; his own predominant forms of social relations; his own economic and political organization; and, finally, his own type of human personality, with its peculiar mentality and conducts'.

The diverse criteria of truths originated in diverse cultures are based, according to Sorokin, 'on empirical facts verified by testimony of our sensory organs'[7]. Lamo de Espinoza's critique on the empiricism purported by Sorokin does not seem fair, because empiricism does not necessarily refer to it as a philosophic current, but as an instrument of evaluation/verification.

Stark (1963), on the other hand, criticizes Sorokin stating that the qualitative character of the object does not allow for quantification, however, much has been discussed on the differences of empiricism and the quantitative method. On the subject, Beltran (1994:36, 37)[8] states that 'the quantitative method is always empirical, but the reverse is not true, because qualitative research is also empirical, as long as it is not purely speculative, but refers to certain facts'.

Sorokin (1956:160-161) further supports Beltran's statement of empirical methods which also originate qualitative research, pointing out that '…it is only through direct empathy, by living together and using intuition to perceive the psychosocial states that one can apprehend nature and the beliefs of the systems of religious, scientific, aesthetic, ethic, legal, economic, technologic and other values, as well as their subsystems.

Without the vital direct experience of these cultural values, they will be unknown territory for our external observer and statistical analyst. Only after we have successfully carried out the mysterious internal act of understanding every system of ideas or values can one classify them in adequate classes, placing different ideas or values in one class or different classes. Only then can one compute them, if they can be computed, and carry out other operations of mathematical or statistical nature, if possible. If not, all of the observations and statistical operations are doomed to be simulacra without any sense, barren and fallacious, of real knowledges[9].'

Mulkay, M. (1976)[10] goes beyond this point in his critique of the ethos of science and the thesis of Cudeos de Merton, stating that 'the desired values and norms of science are only catalogues of legitimisation which are used in many forms, and according to the interests of each particular situation, as well as in consonance with the image which science has of contemporary society in general, the State and the economic world in particular. Thus, not only are scientific behaviours legitimated, but the existing opportunities are maximized and the possible advantages are increased.'

However, Mulkay's (1979)[11] main contribution for participative research as a basis for an interscientific dialogue is determined in 'the importance which is given to the understanding of the rules according to the subjective meaning which the social actors themselves give them, given that norms have their origin in social interaction, they adapt to different situations which generate and present a component of indetermination and flexibility'.

If we accept that the origin of norms is carried out in the interaction between modern scientists and scientific researchers from other sciences, or local actors, then the importance of understanding the rules will be greater in a concerted and participative research, the ethos of science being an ethos that is innovative in terms of knowledge

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7) Sorokin, Pitirim (1937). Social and Cultural Dynamics. American Book Co., Nueva York, pp. 67. En: Lamo de Espinoza, E. et.al. (1994:135, 136) La sociología del conocimiento y de la ciencia. Alianza Universidad, Madrid-España, 2d. ed.

8) Beltran, M. (1994). Cinco vías de acceso a la realidad en: García Fernando M., et.al. (1994:36) El análisis de la realidad, social, métodos y técnicas de investigación. Alianza Universidad, Madrid-España, 2d. ed.

9) Sorokin, P. (1956). Fads and Foibles of Modern Sociology. Henry Regnery, Chicago -USA, pp. 160-161 en: Lamo de Espinoza, E. et.al. (1994:143) La sociología del conocimiento y la ciencia. Alianza Universidad, Madrid – España, 2da. edició.

10) Mulkay, M. (1976) Norms and ideology in science, Social Sciencie Information, Nº 15:637-656 en: Lamo de Espinoza, E. et.al. (1994. 472) La socilogía del conocimiento y de la ciencia. Alianza Universidad, Madrid-España, 2da. edición.

11) Mulkay, M. (1979) Interpretation and the use of rules: The case of norms of science, en T. Gieryn (de), A festschrift for Robert K. Merton. Transaction of the New York Academy of Science, Series II, vol. 39. En: Lamo de Espinoza, E. et.al. (1994:472) La socilogía del conocimiento y de la ciencia. Alianza Universidad, Madrid-España, 2da. edición.

for cultural recreation and social and biological reproduction, leaving behind the institutionalised and formal sense of a community of scientists.

After Mulkay, who was the first one to break away from Merton's normative program of following an interpretative focus, Law and French, quoted by Lamo de Espinoza et.al. (1994:519)[12], indicate that 'it should lead towards a type of sociology of science that is very different, which implies following different methodological and explicative models, as well as constituting new areas of work, since it understands the scientist and its social reference group as an active agent which has to face new cognitive and social situations'.

3.3.1 The processes of social interaction as contributions to the New Sociology of Knowledge for Interscientific Dialogue

As a whole, the traits and the conception of the way in which the New Sociology of Scientific Knowledge approaches its study, are synthesized by Lamo de Espinoza, E. et. al. (1994:520 y 521) in five points that are presented below.

In the first place, according to what is known as the principle of naturalization, which rejects the distinction between context of justification and the context of discovery, this principle underlines, in consonance with what was stated above, the relevance of the sociological lens and the possibility of social sciences to analyse social variables in the modes of production and validation of scientific knowledge with a greater approximation to the reality of the context and to the social actors which participate in the research in which the scientific community is inserted.

In the second place, according to what is termed the principle of relativism, which states that 'there is no universal criteria which guarantees the truth of a proposition or the rationality of a belief, all of the processes of production, validation and change of scientific knowledge, are the result of the processes of social interaction (such as negotiations) between scientists (like individuals and social groups) or between these and the surrounding social environment.'

When this proposition of the new sociology of knowledge is accepted, one implicitly accepts the participation of social actors in a determined context as the producers of scientific knowledge, where the participation of the scientific researching subject is important to provide knowledge with a scientific form, stating its disagreements or agreements logically with the results of the process of social interaction with other actors, as a process of social learning.

In the third place, by means of the principle of constructivism, it is underlined that scientific knowledge is a representation which does not come directly from reality nor does it reflect it literally. Therefore, one cannot even expect an identical interpretation of the same fragments of evidence, because experience is not neutral, but dependent, and it varies according to the social context, learning, culture, etc.

Therefore, from our own perspective, knowledge, and, in a good measure, reality, are considered as being socially constructed. In such a case, it must be emphasized that it is the social actors of each context who construct that reality, in which the social investigator, by means of participative research, can contribute to and influence in the social interaction developed, to more accurately and precisely describe the constructed reality. This constructed reality has a notable influence in the perception of life which each culture has, where what the symbolic and spiritual are fundamental but harder to discuss and analyse.

In the fourth place, starting from the so called principle of social causation, which indicates that scientific activity is not carried out by ideal epistemological subjects, but by concrete social groups conventionally termed scientific communities. These are governed as the products that formulate (scientific knowledge) by means of the same types of explanation used by any other social organization. Therefore, and in the same lines of traditional social explanation for other social forms of knowledge, the scientific knowledge that they produce is, in great measure, a result of the forms in which scientific groups are organized and inscribed in the surrounding social environment.

[12] Lamo de Espinoza, E. et.al. is based on the work of Law, J. Y French, D. (1974) Normative and interpretative sociologies of science, Sociological Review, vol 22, Nº 4:581-595.

We believe that an alternative way to circumscribe to the surrounding environment is through participative research, which, besides producing modern scientific knowledge, can contribute to the recreation and innovation of knowledge that will allow the reproduction of the family and the community through development actions, and develop other sciences and new paradigms in permanent social dialogue and learning.

In the fifth and final place, according to what is termed as principle of instrumentality, which states that scientific knowledge does not differ substantially from other types of knowledge, except for its greater efficacy in solving problems, though this statement is relative in a socio-cultural and natural context such as the Andes, as was said before. But this instrumental and pragmatic function is not strange, since scientific products try to obtain certain objectives and satisfy certain interests.

Therefore, scientific knowledge believed to be true is modulated by carrying out this task which is inseparably linked to science. Even though this pint implicitly denies the neutral rationality of science due to the recognition of certain interests and the search of certa in objectives, it is necessary to consider also the significant contributions of the School of Frankfurt in relation to the criticism made to science, where it demonstrates a way to configure the reigning social dominance, which has been the critical point which has led to the emergence of participative research in the Third World, as a response to the reduced contributions made by science and western technology to reduce inequalities and poverty in the world, and which have, instead aggravated the differences due to their iatrogenic consequences.

3.3.2 Local interpretation and inductivism of the Strong Program as contributions for Interscientific Dialogue

Another current which stands out in the criticism of neopositivism is the one termed Strong Program, which is more radical in its rejection of the objectivity of all knowledge (not only in social sciences, but even in natural and even mathematical sciences); it seriously questions the very regulative ideal of truth, affirming that all truth is a 'social construction, just as any other one' (Mulkay, 1979)[13] .

Through praxis, defined as 'the conception which integrates, into a dynamic and dialectic unity, social practice and its pertinent analysis and theoretical comprehension, to the relationship between practice, action and transforming struggle, and the theory which helps and guides action' (Nuñez, 1989),[14] participative research has demonstrated, in many cases and different contexts and cultures, the difficulty of universalising the results which emerged from scientific knowledge (fundamentally those referred to innovation and transference of technologies), due to its emphasis in methodological management of quantitative techniques, without considering the social factors and the context where they are carried out, and without acknowledging that any science is a human cultural product, it possesses, also, a concrete human purpose and, therefore, implicitly carries the prejudices and classist values present in the scientific class as a group[15].

When all is said and done, the scientific legitimacy of research is confirmed by the tenuous balance between theory and practice, between objectivity and subjectivity, and fundamentally, in its practical utility 'as creating (or recreating) sciences, more than sciences which cover up knowledge, which provide us with different ways to relate natural and social environments' (Park, 1989:164)[16].

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13) Milkay (1979) Science & The Sociology of Knowledge. George Allen & Unwin, Londres-Inglaterra. En: Lamo de Espinoza, E. et.al. (1994:130) La sociología del conocimiento y de la ciencia. Alianza Universidad, Madrid-España, 2da. edición.

14) Nuñez (2989) Educar para transformar, transformar para educar. Alforja, San José-Costa Rica.

15) Villasante, Tomás (1995). Los Nuevos Movimientos Sociales. Una Reflexión metodológica y Praxiológica en: Marxismo y Sociedad. Propuestas para un debate. Muños Moya y Montraveta y Colectivo de Estudios Marxistas, Sevilla-España, pp 13-38. In this article, the author proposes to follow a world current which rose mainly in countries in the south and the periphery, and which proposes the central matters of epistemology and the methodologies of social sciences, referring to participative action research as the praxis of popular movements.

16) Park (1989) Que es la investigación acción participativa. Perspectivas teóricas y metodológicas en: Salazar, María C. La investigación-acción participativa. Inicios y desarrollos. Popular, Madrid-España, 1992. The article belonging to this university professor from the U. of Massachusetts, states, after a critical analysis of science and conventional social science, and starting from an epistemological framework of the Theory of communicative action proposed by Habermas, J., arguments against a great part of the neopositivist criticism made towards alternative research, needing more explicit links between the methodological matter of validity and the theories of knowledge.

The proposals of the Strong Program, by emphasizing the social aspect in which all types of knowledge, including the scientific knowledge, are constituted, contributes with diverse procedures of scientists and the different cognitive operations, which may allow, through its postulates, a significant aperture for interscientific dialogue through participative research, given the emphasis it places upon inductivism, stating that 'only local interpretation social, makes the classifying categories and the theoretical concepts used in scientific practices, understandable and acceptable, oriented towards justifying beliefs that are sustained or the effective resolution of assigned tasks.' (Lamo de Espinoza, et.al. 1994).

Hesse (1974)[17], who provides the bases to the strong program in order to sustain inductivism, indicates that 'any generalizing inference has a previous base in the natural capacity to establish inductive inferences by starting from concrete cases in which the concepts are handled', which is to say 'one can only have access to the way in which the social context and the perceptions interact through study cases, given that the connections which are established between factors cannot be ordained by a universal and de-contextualised scheme', which implies a rejection of the pretence of trying to develop a general theory and limiting all efforts to establish a wide frame which will allow the direction of empirical investigation of study cases.

This wide frame, called theory of interests of the Strong Program, supports that 'every social group presents an array of varied expectation which link the diverse social structures in which they are located. These expectations soon transform into interests that are linked, to a lesser or greater degree, to all types of products (concepts, instruments, etc.) developed by the collective considered, and, in the end, to the social group's own identity or to that of the broader culture and/or society in which it is inserted. Therefore, the interests are socially cued, are distributed throughout the social medium in function of the different positions which the social group occupies in every historical context, and affect the way in which every culture orients and accepts or rejects the knowledge.' (Barnes, B. 1977)[18].

These interests also affect modern scientific life, because its members are inserted in that society, intervening in the specific structuring of empirical observations, in the formulation of evaluations and judgements and, in the end, in the genesis and validation of the beliefs they share and are sustained as true by the very scientists and the society which assumes them or rejects them.

The results of this proposition open the way for the substitution of the classical focus of true knowledge for the socially accepted and consensual belief within a social structure and a specific culture, where an empirical strategy is followed –a strategy which is employed in study cases-, since only their accumulation can shed an adequate knowledge of the singular ways in which the different relationships are established in every historical and particular contexts, which, according to Lamo de Espinoza, et.al. (1994:531), is a utilitarian model, and is instrumental in the social action of the Strong program, and, simultaneously, underlies a utilitarian economic model in which individuals and groups sketch their expectations and attitudes, which they will later transform in interests, and even their satisfaction will be turned into needs. From our perspective, it is not necessarily about material and economic satisfactions, because there are contextual cultural factors involved which many times determine contradictions; for example, a supposed economic-utilitarian model which they would pursue.

Though there have been critiques and responses to the different postulates of the strong program (from the radicalism of Bloor, D, and the softer positions of Barnes, B., Mackenzi, D and Shapin, S), 'there is a more flexible and plural position that rejects the fact that scientific knowledge can be reduced to the social aspect, but which, on the other hand, does not give up its proposition of offering a sociological interpretation of the processes of constitution of those scientific beliefs which are held as true' (Lamo de Espinoza, et.al. 1994:537), which would have to follow the questionings of some basic suppositions on which social science is based in industrial countries.

The inductivism and action strategy of participative action research of case studies coincide with the line followed by participative action research in Latin America, and the Bolivian Andes in particular, because the experiences are local and contextual, and stem from case studies in different levels: from familiar, micro-regional case studies, up to regional ones, characterized by the production of socially accepted and consensual knowledge for action, which can influence in development policies of development at a national level, or initiate a process of

17) Hesse, Mary (1974) The structure os scientific interence, University of California Press, Berkeley-EEUU. Citado por: Lamo de Espinoza, E. et.al. (1994:528) La socilogía del conocimiento y de la ciencia. Alianza Universidad, Madrid-España, 2da. edición

18) Barnes, B. (1977) Interest and the Growth of Knowledge. Routledge & Kegan Paul, London-England.

development based on the participation of scientific and local researchers, where 'interests' are 'negotiated' through an intercultural dialogue which finally validates the knowledge produced, innovated and/or revalued.

However, Beltrán, quoted by Morales (1992: 5), indicates that 'induction is necessary, but not enough for the knowledge of reality; and to a certain degree, all deduction is based on some previous induction obtained from the real world, and which fundaments the suppositions which originate from deduction. As a matter of fact, neither inductionism or deductionism have ever been used in an exclusive way'.

3.3.3 Improved Perspectives for Interscientific and South -South Intercultural Dialogue

Considering these advances from some schools in the western scientific community does not neglect the enormous gaps with the neopositivist supporters of modern science, which are mainly linked to specific interests from transnational industry and commerce, who have promoted and promised a limitless material development. In this perspective, we fully acknowledge and support the questionings and the analysis made by Alvares (1996) on the principles and objectives of science and development in the dictionary of development, first edited in 1992 by Wolfgang Sachs.

On the other hand, the discussions held from the modern or western scientific community on the genesis and universal scientific validity of knowledge is maintained in the same vicious circle, evidencing a stagnation in the arguments of the neopositivist current, making it necessary to open up not only to new paradigms of modern science, but to depart from the analysis of knowledge from every context, every culture and every science, without worrying about the result of its possible a priori validity or invalidity, which baits scientific communities in the West..

The stagnation of modern science, in the perspective of interscientific dialogue, may be due to the prioritised quest for instrumental reason, which, according to Quijano (1982), stems from the relationship between ends and means, where what is rational is useful and usefulness acquires its sense since the dominion of power. That power which is offered by modern science promises a material paradise, which will bring about the end of poverty and oppression; however, it is a promise that has still not been fulfilled, and is losing credibility (Alvares, 1996). The affirmation that scientific knowledge that is supposed to be global explains 'how things happen' (Rist and Haverkort, 2004), trying to universalise the concepts by beginning from logical rationalization, denote a strong materialistic and rationalist tendency, where intuition and other forms of rationality are not accepted: this is the greatest gap for intercultural and interscientific dialogue. It is coherent with the logos – or logical rationale – to start at how things happen, on the basis of measurement and quantification, seeking objectivity above all else, but the objective is referred to the object in itself, and not to our way of feeling and thinking, because we would suppose all of us think and feel in the same way, the object being perceptible only by means of the senses.

If we begin at 'how things happen' (how or in what way), leads us to ask, once we find the answer, why we need this and what will we do with these results. For modern science, this is clearly the task assigned to a scientific community, related to the dominating and utilitarian perspective of instrumental reason, where the very same western societies do not have access to the decision making process, which is carried out by scientists and politicians in permanent allegiance. According to the Spanish language, 'why things happen' is associated with the cause, reason or motive, but, as a final conjunction, it can also refer to 'what do they happen for'. In this sense, the 'why' and 'what for' refer more to the way one thinks and feels and not to the object in itself. The way of thinking and feeling is not an instrument to be used from the dominating power of a circle of scientists; it is more of an opening to establish a dialogue between different ways of thinking and feeling.

These arguments would allow one to state that there is a greater perspective for intercultural and interscientific dialogue between sciences, which have not closed their world vision to dominate knowledge, recognizing, instead, that every knowledge and every science is a part of the existing cultural diversity in the world, and has allowed us to recreate knowledges and construct their own science and technology. In such a situation, modern western science must accept that it is a part of this backdrop of ways on how the world is seen, and part of the cultural diversity which tries to establish a dialogue to further a better co-habitation with other societies, nature and the extra-human.

4. Some basics elements of Andean Cosmovision for an Intercultural and Interscientific Dialogue

The analysis of any research in mountain ecosystems, such as the Andes, is complex due to the characteristics of climatic heterogeneity, relief variability and wide biological and cultural diversity, where risk management is fundamental for the reproduction of life, and is part of a different way of seeing the world, characteristics which make the task hard from western modern science if one does not try to broaden the methodological-theoretical framework and the scientific perspective towards the qualitative and participative, to avoid, or at least reduce to a minimum, 'the unwanted and unforeseen consequences of science and technology' (Lamo de Espinoza, et. Al. 1994: 45), recognized today due to their limitations [19].

4.1 Sacralization of Time-Spaces and the rituals role as principle for the Harmonic Relationship with Nature and Deities

What we find through many researches we carried out within contemporary Andean Communities, for more than 15 years of institutional and professional life, is that the harmonic relationship with nature and the universe has been preserved as a principle, where the conception of life is not only limited to the heliocentric system, or to a geocentric system, but it is considered a system with many points of reference, from which vibrations which determine the tonalities of the total harmony of the universe emanate with its own scale, which considers time and space as a single dimension which is sacralized through rituals to the mother earth (Pacha).

This harmonic relationship with nature and the cosmos, according to the vision of the Andean world, is possible if the human, natural and spiritual world are inseparable: they are in a constant interaction between themselves. The notion with which people have to relate with the natural as well as the social world implies that not only do they develop knowledge and abilities to survive materially, but they also have to carry out their own social activities in order to relate to the spiritual world.

The relationship with the spiritual world is carried out through rituals which create the necessary conditions so that one can connect with nature or the mother earth, or a social or material event which the people want to see happen. Therefore, the rituals are carried out in all of the important social and productive activities. Therefore, the rituals are carried out in all important social and productive activities. In this world vision, a good crop, in qualitative and quantitative terms, does not only depend of the appropriate technologies, but of the rituals which must accompany it. The moment in which the peasants begin to create the adequate physical conditions for the crop, like tilling the soil, they ask the Pachamama or Mother Earth, through a ritual, to contribute creating the optimum spiritual conditions.

Therefore, the rituals are the nucleus of daily life in the Andean culture, especially those rituals related to agriculture at a a small scale. Since the inhabitants of the Andean communities have been and continue to be mainly peasants, their religion has evolved from the agrarian experience. This emphasizes the relationship between nature and society in a certain time-space (Pacha), which is materialized to a productive calendar (agrarian, cattle raising, handcrafts and other activities) and ritual-festive. This calendar allows the synchronization between productive practices with the rhythms and cycles of the cosmos. The European and Christian colonization have not been able to change this: the communities chose to accept catholic holidays which coincided or were very close to their own festivities. Therefore, under the veneer of Catholicism, most of the Andean rituals maintain most of their original sense, though the forms, instruments and products used may have changed.

In the holiday calendar of the peasant communities, there are diverse activities linked to catholic religion or to the traditions with a Prehispanic origin, such as Anata (carnival), uma rutuco or first hair cut (which we commented before), compadrazgo – being the godfather or godmother of the many babies during All Saints' – (which symbolically bonds young women who see the possibility to solidify their relations with other women to whom they feel great affection), festivities which transcend the dogma and structure of judeo-christian religions,

19) There are many examples of such consequences, but one stands out due to its implications at a global level: unsustainability of the development model which was imposed from the west, whose policies of pure economic growth turn out to be anthropogenic, and give origin to a ' catastrophic society', which is the result of the development models based on recommendations of neopositive science.

which, thanks to their long adaptation to the Andes, have been introduced in Andean religiosity, creating their 'saints', part of the pantheon of deities which allow the biological and cultural reproduction of life.

Eliade (1994:41), when referring to the sacred space in traditional religions, indicates that: 'Settling in a territory, edifying a dwelling, a vital decision, as much as for the eternal community as well as for the individual, because it centres around assuming the creation of the world which we have chosen to inhabit. Therefore, it is necessary to imitate the work of the gods, the cosmogony. This is not always easy, because there are also tragic bloody cosmogonies: imitating of the divine acts, the man must withdraw them'.

In the daily work in the Andean farming communities, in their continuous territory, in the fairs and the access to rural and urban symbiotic zones, a certain festive character is maintained that makes the people from these communities deeply religious, because in each periodic holiday they reencounter the same sacred time which was present during the festivity or holiday that took place one year or one century ago, or maybe has been modified, recreated and re-actualised. In other terms, the sacred time is found once more in the holiday, as it took place in the origin, founded by the gods.

The ritual construction of space takes place constantly through the *challada*, which is the payment made to the Mother Earth or the permission to inhabit it. For this reason, this tradition is still carried out today by almost all Bolivians[20], it has transcended the different moments of daily life, but there are moments in which the cosmos, the Pachamama opens up and is more predisposed to having contact with men.

Time and space as a single dimension is synthesized in the Pachamama, which is the sacred representation of the Mother Earth which, for merely didactic objectives, can be stated in three levels or spaces of life.

The natural level, which could be defined as the natural physical space and the ecosystem which considers natural resources (soils, forests, non cultivated vegetation, fauna, minerals). The social level, which can be synthesized as socioeconomic spaces defined as fairs and continuous and discontinuous territories to which the Aymara or Quechua have access within the rural and urban sector, based on community principles of reciprocity and equitative redistribution shared with global society, with nature and the gods or spirits, where the concept of private property handled in western cultures cannot be conceived. The spiritual level can be defined as the interrelation of natural physical spaces and socioeconomic spaces which are carried out through rituals on certain times of the year, based on a calendar which defines the relationship with nature and the cosmos, and which sacralize the space conceived as living, and the time which is conceived as cyclical and anachronic.

4.2 Land and Territory from two different Worldviews

For more than five centuries, in Bolivia and Latin America the reivindications of land and territory, together with civil freedom, have been central matters for indigenous peoples. In 1953, the first Agrarian Reform was carried out in Bolivia, which was founded in 1825. This Agrarian Reform may well have achieved some advances as to land ownership, however, they have not been enough. In the year 1995, a Bill known as Ley Indio, proposed by the Syndicate of Peasant Workers of Bolivia, was presented as an alternative to the Current INRA Law, which was approved in 1996. This proposition stated the following objective: 'the recognition of territory, land and political-juridical institutions which traditionally belong to indigenous and native peoples', which go beyond their regulations for maintaining soils. This same proposed law defines territory as 'the natural basic physical portion of sustenance of the population constituted by a specific extension and geographic depth. The natural unit of territory of the native and indigenous peoples encompasses the soil, the soil underneath, air space and waters (Pachamana: alxpacha, manqa pacha and aka pacha). This soil, continuous or discontinuous, is indivisible'. This definition of territory tries to express, beyond the simplicity of words, the sacred conception of territory, in which the material, social and spiritual are integrated, but, on the other hand, clearly reflect the differences on how the world can be seen according to western science or vision).

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20) Currently in Cochabamba and in many other cities in the country, during the first Friday of every month, a ritual that takes place more at a family level, called K'oada because of the use of an aromatic plant called K'oa, is carried out. In this ritual, people ask Pachamama or the saints and virgins of the Catholic pantheon, requesting good fortune in business, in their home, studies, because in every situation there is a product made out of sugar. It is also a moment to purify the environment and oneself. From the heights of the city, during a first Friday, Cochabamba is living proof that the modern city maintained its spiritual essence, which connects it to sacred time and space.

The problematic of land and territory, from the western science and vision, has almost always stemmed from defining land and territory in predominantly material terms, with emphasis on the conception of private property, when in the Andes the communal process and the logic of eco-symbiotic complementation is the one which prevails, in spite of the long historical process which attempted to de-structure it. The low percentages of legal recognition of land ownership through official titles, in almost 50 years of Agrarian Reform, and the different testimonies gathered from the peasants during many researches carried out by AGRUCO, are examples which allow us to sustain that the solutions which the Bolivian State has tried to implement, under the influence of the western vision and based on modern science, have had very little impact.

This western science and vision is demonstrated, among others in Article 1 of the INRA law, where three objectives are stated: 'Establish the organic structure and attributions of the National Service of Agrarian Reform and the regulations for the distribution of lands: guarantee property rights over the land; create the agrarian superintendence, agrarian judicature and its proceedings, as well as regulate the maintenance of agrarian property'. In Article 3 part 3, the rights of the indigenous and native peoples over their lands are guaranteed, recognizing their customs or traditional rights.

In both mentioned articles, the emphasis placed on the organizational and administrative aspects, as the creation of entities such as the superintendence and agrarian judicature, or the structure and regimentation of the National Service for Agrarian Reform, or the regulation of the maintenance of agrarian property, still does not allow to touch upon the basic subjects referred to the existing peasant and indigenous conception on the use and traditional rights.

Our perception is that the subject of land and territory is treated from two very different logics, the western logic – represented by positive law – and the Andean or Indigenous law – which stems from a cosmovision based on its ancestral relation with nature, cosmos and deities. The origin of this difference seems to be in the conception of life, rights and property. The profound social and spiritual connotation of Andean cosmovision has not been fully understood by the different Bolivian governments, and have been even more ignored in the laws of the Agrarian Reform.

In this instance, on September of 2000, the Peasant's Union of Bolivia demanded from the government, together with 50 other points of discussion, the annulment of the INRA law, with arguments that it was inadequate to the reality of peasants and indigenous people, evidencing that these were not satisfied with the benefits this law was supposed to obtain; the Union also proposed other demands, such as the use of biodiversity and genetic resources which are close to being privatised, to later be reintroduced as transgenic seeds which would cause, among other problems, a greater food insecurity.

This process of reivindications of the peasant movement in Bolivia on land and territory go beyond the simple struggle to obtain land property rights. Due to the importance of the subject, it has been taken into account in specific committees in different congresses of the regional and provincial central headquarters of Tapacari, where AGRUCO has been working for over 15 years (Delgado 2001). From the different acts and resolutions of the congresses, land-territory may be defined as a socioeconomic space which becomes sacred through rituals carried out in specific and defined times, determined by the relationship with the life of the cosmos and nature, which is made operative through climatic prediction carried out by many peasants to determine the ritual productive calendar.

On the other hand, the importance of continuous and discontinuous territory must be reiterated. These sometimes are called 'settlements' (estancias) or 'zones of colonization', which for centuries have become a part of their territories. This concept cannot conceive the idea of private land ownership, and the concept of territory is not limited to a closed physical space, which is one that has characterized the western view of private property, which physically limits the parcel, aynoka or territory. .

On the other hand, the concept of continuous and discontinuous territory which is still latent among indigenous native peoples allow us to affirm that property is limited to the needs of use and breeding in a reciprocal sense: this has been demonstrated by Murra and Condarco (1981) from their ethno-historic studies and many current researches, though every case can follow different historical processes.

The relationship of equal redistribution and reciprocity which is carried out in relation with deities, the cosmos, nature and society, is clearly demonstrated when the peasants and Andean urban dwellers intuitively make offers (we carry out *challas*) to the Mother Earth or Pachamama; in the act of challa, we carry out the ritual act without rationalizing about the ownership of the property or territory: we simply are there and we have access to the Mother Earth in that moment, and give thanks for the food and life She provides us. This act, for those of us who belong to this culture, is carried out without giving priority to who owns the land, house or natural physical space, because the concept of property and the material concepts of natural physical space are transcended. That is why in every reivindication of the indigenous peoples in Bolivia and Latin America in general, land and territory are conceived as a resource belonging to the community, to which one can have access to use on the basis of another general principle: reciprocity.

4.3 The Reciprocity Principle and the Forms of Organization and Relationship between Andean Society, Mother Earth and the Deities

Native indigenous peoples from the Andes are socially linked by the principle of reciprocity: this allows the reproduction and continuity of life at a family and community level. In the Andes there are two types of authorities: the native organization and the syndicate. Their role is a part of community decisions, and follow a logic of reciprocity and intra /interethnic solidarity, with profound spiritual-religious aspects which are not considered or understood yet in full, within the official system of the Bolivian State.

Therefore, the individual role of the authorities, in their different levels, must be minimized, since they must be considered as being simply another instrument to carry out what the community wants and proposes to the syndicate leaders, municipal and government authorities, native authorities and spiritual leaders (council of elders), which many times are not taken into account in discussions and decision making.

On the other hand, the relationship of society with nature, made visible in its inhabitants through kinship and spiritual bonds, creating what is known as the ayllu, which is many times used as a synonym of partiality, town or community, which evidences clearly the versatility of its use. The ayllu has fundamental importance due to its relationship with the concepts of territoriality, socioeconomic spaces or sacred times and spaces which have been mentioned previously. The influence of blood and spiritual ties in the reproduction of community principles and ecosymbiotic complementarity are fundamental for the definition of socioeconomic spaces and sacred time-spaces. In such a sense, it is necessary to analyse the role of the family in the ecosymbiotic complementarity relation.

4.3.1 The Role of the Family and Kinship Relations in Complementarity with the Sacred Territory

Blood and spiritual kin relations which take place within or outside of the ayllu or urban community, –where the family, and mainly the woman, play a fundamental role– are responsible of circulating and transferring the flow of energy, blood and life through the living territory, which may have the shape of an animal. The need to have a permanent cooperation to face bioclimatic and physiographic conditions which are specific to the mountain ecosystems, have made indigenous families extend their blood ties recreated in marriage to other relations, like compadrazgo, which are considered as spiritual kin, and which play a fundamental role to preserve and fortify the community principle and ecosymbiotic complementarity, which is the basis for social and biological reproduction of the Quechua and Aymara in Bolivia.

In this sense, we believe that spiritual and blood kinship – that was and is the basis of strategic alliances for the biological and social reproduction of the community and the ayllu –, is built through friendship, affection and mutual respect, allowing a level of cooperation and solidarity with important spiritual connotations, which expand the limits of the kinship group to include greater ayllus, or, if such is the case, re-structure them according to how nature behaves (droughts, floods, epidemics), and local and external societies.

In this context, we have departed from the supposition that kinship relations help Quechuas and Aymaras and allow them to maintain their access to continuous and discontinuous territories, whether they are new or old, determining territorial ordinance according to community decision and principle. The community principle in force, and which is strengthened in many regions of the country, is the origin of interzonal ecosymbiosis as the basis of productive organization. The access to other symbiotic zones, or, more precisely, socioeconomic spaces, inside and outside of the territory of the ayllu and the region, is a prehispanic strategy which has

allowed, up to today, the access to: territories (continuous or discontinuous, natural resources, food for the body and soul, knowledge and new social relations, which have to do with the intrinsic characteristics within each family's decision making [21].

Andean families, which are the nucleus of society through which life is reproduced, have been characterized for maintaining within them the moral values based on reciprocity and redistribution based on a complex system of relating with society, nature, deities and cosmos, through family and communal rituals which solidify the relationship with the couple, offspring, parents, brothers, spiritual and blood ties, etc.

In contrast to the cultures in the West, the relationship in the couple (man – woman) is not simply born from a physical attraction and a complementation of personalities. Many studies carried out in Andean countries and our own life experiences allow us to conclude that conjugal relations are born out of principles of ecosymbiotic complementarity, which have to do with various factors, such as the socioeconomic situation of the family of each spouse. For example, in the case of peasant communities from the heights of Tapacari, if one is the only daughter, or the daughters are of marrying age, one will prefer a hardworking man – even if he does not have access to land – as a spouse. On the other hand, it is fundamental to take care to not have a close spiritual kinship. If such is the case, the family's socioeconomic situation does not determine the possession of material goods as a priority for future spouses, in other words, for example, marriages between poor and rich families will not be arranged under wealth criteria, but rather from the perspective of eco-symbiotic complementarity that may exist between the families.

Once some spousal selection criteria have been defined under concepts of 'family and community interests' – which apparently have a materialistic vision – have been defined, only then are individual attributes analyzed: the person's capacity of giving to others is evaluated (the principle of giving), since this is a sign that the person will dedicate his/her life to their children, spouse, family, community and ayllu. Spousal wealth is not an important criteria. Finally, the choice of spouse is consulted with the gods (apus, achachilas, virgins) through the intervention of the community's yatiri, or a relative who can read coca leaves [22]. This Andean tradition is used in many different important times in the lives of the families; it is also important to take the final decision. This stage of the process is encouraged by the grandfathers or great-uncles of the families.

The family trees we have developed in different researches in the Tapacari province have shown us the wide weft and weave of relatives to which a new couple enters. The constitution of the new family does not stem from a legal compromise (civil marriage in positive law) or from a public religious ceremony (Catholic-Christian religious marriage ceremonies). However, a series of activities are carried out which have a profound spiritual and social connotation, termed sirwiñakuy, which follows a long process of courtship and recognition of the couple, until it reaches the final stage, in which the union – or the 'hitching' – is consolidated by the 'man's theft of his wife', and later tantasita – 'negotiatión' – and formal request presented by the man's family in order to achieve the union's acceptance.

After the woman is 'stolen', the new family – which looks for the complementarity of characters and spirits, which has been termed *tantasita* [23] or *churisita*, in Aymara, and *sirwiñakuy* in Quechua, is tested in front of the community to demonstrate that they are adults. During the first years, the couple generally lives in the house of the husband's parents, and they still share the activities, lands, animals, etc. After some years

21) For this chapter, we have created 29 genealogical trees for extended families in the community of Japo and the families of native ex authorities and non-structured interviews. We began with Japo because the community had greater disposition and trust towards us because of our long personal and institutional presence in the zone. These trees and interviews have been discussed and validated with heads of family and cross checked with affiliate lists from 16 syndicates, in which the names and places of origin of husband and wife were taken into account (annex 2).

22) In the Bolivian Andes, it is very common to resort to yatiris or callaguayas, which are like spiritual guides or wise people who have the gift to see into the future with coca leaves. For any decision of extreme importance for the family or community, they are the people to seek guidance from. To learn more about choice of spouse and the structuring of the family, we recommend Jiménez (1995). Rituales de vida en la Cosmovisión Andina. Secretario Rural Perú-Bolivia/CID, La Paz-Bolivia. Pgs. 140.

23) On tantasita or churisita or sirwiñaquy, the trial union of a couple to test their compatibilities, which is carried out through the premeditated and agreed upon WkidnappingW of the wife by the husband, is part of every process of conformation of a new family; existen varias publicaciones que mantiene su actualidad para los Andes bolivianos en el que cabe destacar el artículo de: Albo y Mamani (1980). Esposos, Suegros y Padrinos entre los Aymaras. En: Parentesco y Matrimonio en los Andes. Editado por Mayer y Bolton. Pontificia Universidad Católica del Perú. 283-326 pp.

(which can go from one to six or more years), the family which has passed the test of living together as a couple with the family (especially the family of the male spouse) and the community, can build their first house in a parcel given by the parents, and which is generally close to the paternal home. At this time the couple also has access to crop parcels and herds that correspond to them; also, children are also born.

In this stage, which Agruco has termed (for research purposes) structuring of the family, the civil and/or religious marriage ceremonies may occur, in which the couple must demonstrate to the community that they have been able to create a family within the community principles, and that they are ready to distribute their resources within the community through the religious marriage ceremony party, in which abundant food and drink is offered to the entire community. In such a case, the consolidation or expansion stage begins, because the family grows and obtains its autonomy from the paternal family, and assumes the diverse tasks assigned by the community. At this stage, the family looks for its territorial and social expansion through the access to other socioeconomic spaces, and enters an intensive process of production, in which the family labour force is fundamental, and where kinship relations must allow alliances and reciprocal cooperation: these latter have many characteristics and forms, such as the termed ayni, minka, humaraqa[24].

At the time when the children start to look for a couple and to create a new family, we can safely say that a new stage begins, one that is termed as the family contraction or de-structuring, for the family returns to the beginning: this means closing the cycle of family life.

The family trees developed, the life stories of some inhabitants gathered, and our many years of sharing with the community, we have been able to prove that divorce or separation of couples or marriages is not something normal in the families within the ayllu. This may be because sirwiñaquy is also a stage in which the couple's ability to live together is tested, which involves the quest for complementarity of personalities, sexuality and spirituality. If the test should fail, couples in the sirwiñakuy split as if nothing had happened. This means that the community takes no action – and much less criticizes – the broken couples: these are once again considered single and fully capable, morally, physically, socially and spiritually to create a family.

4.3.2 The Role of the Woman in the Family's Ecosymbiotic Complementarity and Access to Land

A study carried out at the intra/extra ayllu between 1998 and 2001 in the Tapacarí highlands (Delgado, 2001), stemming from a census made of each family on the origins of their spouses, shows us that it is almost always the woman who comes from another community, ayllu or microregion. In some 85% of the cases the man remains in his original community or migrates temporarily. This ancient Andean trait has allowed the families from the ayllu – thanks to the improvement of communications and transportation – to have access to symbiotic zones in continuous or discontinuous territories that are more distant, even though the conditions for women are not always favourable, especially when these movements are towards other cities where they work as maids.

In these cases, the fact that women have no right to own land may seem as an unfair system from the perspective of western vision and science, but the traditional norms and regulations in the ayllu have a logical response which benefits the whole community, if we consider eco-symbiosis as a sustainable development strategy. The next testimony can shed light on this situation.

Don Alejandro Poma, current mayor of the Majasaya Mujlli ayllu testifies: *'Ever since my ancestors, we have had relatives in all of the ayllu. My mother was from Uyuni Pataca (Mujlli Huayllas), my grandmother from Huaylla Tambo and her mother was from Challa Arriba. My first wife – who died many years ago – was from Jacha Pampa, and the current one is from Japo. Women have always come from other communities, but have made us love their relatives and places. That is why I know all of Challa very well, and I have relatives and compadres, because my father travelled a lot to exchange products. I have followed those steps and I*

24) On the many forms of reciprocal cooperation in the Andes there is much written material. A research which has studied the ayni in depth is Torrico (1995:213) 'Manejo del tiempo y del espacio para el cultivo de papa en la organización de la producción agrícola de la Comunidad Chullina; La Paz. Thesis for UMSS. FCAPFy V Martín Cárdenas, to opt for the degree of Agronomy Engineer. Cochabamba, Bolivia. This work concludes that ayni is not simply an exchange of work for work, but that it also has spiritual connotations of giving and taking the spirit, and which is also used in sporting activities. Many publications by AGRUCO definen ayni, minka and humaraqa precisely, relating them with the organization of production.

know everyone, but lately relatives don't want to acknowledge each other. That is why I like this family tree, to show to my children.
Women have never inherited land, because there would be no land left for anyone else and we would not have the possibility to have lands in other places. For example, one of my daughters married a peasant from Chiquiruyo, province of Arque; that zone is not very far, it is warmer than Japo and grows good wheat. From my compadres – my co-parents in law – I can obtain the wheat we cannot produce here with the mink'a, and sometimes we can get a little piece of land. They also use to send us their animals so that we may care for them and feed them when it is too dry over there, and in exchange we always get a little something (a calf or wheat). When they wanted us to accept my daughter's and her husband's marriage, his family came to beg us and humiliate themselves so that we may accept her marriage. Then we sent them a lot of clothes, blankets made of llama and sheep wool, and we have given her the small herd she has raised since she was a little girl. She always comes with her husband or we visit her, bringing and taking things or to help each other out at work, or simply to talk about the weather or the new things they have learned'.

This interview shows us the fundamental role played by the woman in the permanence of interzonal ecosymbiosis, which has avoided, in these regions, the problem of mini-tenancy which has happened in the valleys as a result of breaking up the parcels of land through generations of inheritance, and has broadened their alliances with other ayllus and communities, insuring the access to foods that allow the people to broaden their access to food with products from other ecological floors and heights. It also demonstrates a very Andean characteristic, the permanent mobility of the woman to other ecological floors, including other departments within – and sometimes out of – the country. In such cases, the woman assumes the role of maintaining the main nexus with the husband's family's community of origin, since the husband will be in constant movement through multi-tasking and multiple residence.

4.3.3 *Compadrazgo* and Spirituality in Ecosymbiotic Complementarity

During our lives and work, we have observed that – and been active participants in – the naming of godfathers and padrinos imply important ritual acts in the daily life of native indigenous Andean communities. The resulting relationship, called compadrazgo, has a strong spiritual connotation. For example, the naming of the baptism-godfathers of a child – baptism being an originally catholic ritual – has a strong ethical and spiritual connotation, because the choice for the godfather comes from affection. Each act of giving implies the exchange of vital energy, transcending merely material terms or economic interests.

Don Eusebio, inhabitant of Japo, indicates: *'el compadrerío is something very serious. The person with whom we have gotten along is chosen, and we see his or her qualities, so that they may be transmitted to the godson, because it is from his blood which he will receive at the moment in which the holy water is sprayed in the church. We also see this a long time before it happens and some even consult the coca leaf; the decision is made with the wife, since the godfather is like another father. If we are absent, the godson has his godfathers, whom he must respect and serve in everything they ask.'*

Another case of spiritual kinship relations between inhabitants and merchants or friends from other micro regions is the compadrerío of a ritual act called 'uma rutucu', the first hair cut of a child. This is carried out when the child turns one or two years of age. The godfather or godmother must propitiate the act cutting pieces of the child's hair, and the rest of the guests continue the same action. Each piece is an offering of recognition, love and friendship, which the godparent leaves so that the child can continuo on his road in life. The godparent may give domestic animals, clothes or money for the child to use until he's an adult and forms a new family, since at that moment he will take his herd – already grown – which was a gift from the godparent. The rest of the guests must also give an offering according to their affection and possibilities.

The Christian baptism and uma rutucu are many times carried out at the same time, and have a similar connotation, because they are initiations of a person's stage of life. It is said that before this ritual the child is still not a person but an angel. Uma rutucu is a ritual that is still very common in Andean peasant communities and intermediate cities, where most of the inhabitants are merchants. This causes the emergence of an intercultural dialogue between merchants and community dwellers, who apparently come from two different positions and views of reality.

Through these relations of spiritual kinship, some strategic alliances are broadened and access is obtained to other continuous and discontinuous territories which complement those which already exist. This access may be temporary or permanent, and can be a parcel or an urban or peasant fair. The important thing is that this access is made sacred through rituals like challa or koa, which we mentioned before.

Undoubtedly, the kinship relations established by marriage or godparenting (baptisms, marriages, uma rutuco etc.) have maintained the access to lands, loans as well as to natural resources, covering a part of the people's needs. This is complemented by labor insertion in other activities, which we have called multitasks, and which originate another strategy of daily life and use of space, which is the multiple residence.

4.3.4 Multiple Residence, Family Multitasks and Dispersion of the Population in Interzonal Ecosymbiotic Complementarity

Population movements, termed by demographers and sociologists as temporary or permanent migrations, allow us to conclude that aymaras and quechuas can have many residences, due to multiple activities which they can carry out during their lifetime. This is partially determined by the characteristics of the Andean mountain ecosystem and not a fixed residence, such as in cities or other cultures.

The multiple residence and participation and realization of many activities during the daily family life are some characteristics which have been maintained in many regions of the Andes throughout time. This has allowed the continued access to other symbiotic zones to search for food and life security. These characteristics occur within and out of the ayllu. This means that within the community and ayllu a family can have changed their residence many times and have carried out an endless variety of activities. However, the main economic activity is agriculture and herding, which are practice by the spouses, children of up to 7 years –even children have their roles assigned to them in domestic and productive tasks–.

Handcrafts are also another important activity for men as well as women, mainly in the creation of clothes, which many times are sold at regional fairs. On the other hand, men between 15 and 50 carry out all types of non-agrarian activities, exchanging their labour in urban populations or other ecological zones (like valleys) for money or products.

Multi-residence and multi-tasking also imply that the family must have a high capacity to move around and adapt fast to different socioeconomic and ecosystemic conditions, which is an intrinsic characteristic of Andean people, based on their balanced relation with nature.

4.4 The Concept of poverty and well-being from two worldviews

The concepts of 'poverty' and 'development', according to the modern western worldview is based partly on researches carried out from modern science. These principles, once again, do not consider the spiritual life in its relation with material and social life. Quechua native indigenous people term development *Allin Qausay*, or 'living well', which implies not only material well being, but also living in community, having good relations within it, as well as with the natural and spiritual world. Only when a person can meet the demands of the social, natural and spiritual surrounding can s/he reach this level of 'living well'.

In this sense, if someone in the community does not have enough food to eat or cannot sustain his family in a material sense, he is not considered poor but 'lazy' or 'orphan' (huajcha). The concept of poverty is related with a person who, in spite of having achieved a considerable level of material well being, cannot share this with the community, nature and spiritual beings, which helped him to achieve the wealth he obtained. Poverty, therefore, is related to a person who has lost the spirit of reciprocity and the sense of community. Such a person is not seen as being fit for community leadership or for working towards 'development'.

These indigenous concepts of poverty and development are not in line with the concepts used in conventional and official development programs purported by western modern science. As a matter of fact, many laws on the management of natural resources go directly against the norms and functioning of indigenous communities in the area to preserve the said resources. This lack of understanding and these differences perceived between official and peasant organizations have led to many confrontations, suck as

blockades and other forms of protest. Sometimes these are seen as the only way to make the government listen to peasants. Dialogue is still far away.

5. Intercultural Dialogue in Universities

But there is also hope. We have learned that there is a lot of potential within the Andean communities to work towards endogenous development. The indigenous concepts and organizational structure, in spite of the numerous conflicts and difficulties, provide an important base for endogenous development, since they imply cultural values designed for communal well being.

Another potential is found in the continuous experiments and the innovative capacity of the members of the community to include and adapt external practices and strategies into their lives, without los ing their cultural identity. Moreover, recent laws decreed in Bolivia, such as the Act of Decentralization and the Act of Popular Participation, give local communities the chance to negotiate their interests in municipalities and obtain funds for local projects, based on their worldview and their right to be different.

The support in this process by qualified technicians, with an integrated educational background, including indigenous cosmovision, is essential. We are convinced that a university education based on reinforcing the synthesis between scientific knowledge and traditional Andean knowledge is necessary to educate field professionals with the capacity to really support sustainable endogenous development.