

Towards endogenous education, research and development

Lessons from Ghana, India and Bolivia

Abstract

The authors have had the privilege to work together for about 40 years.

The cooperation between the two authors started in the 1970-ies with a World Bank sponsored agricultural development programme. Since then cooperation went through different phases. It experienced failures, adjustments, and innovations during which the attention gradually moved away from agricultural production based on western knowledge to ecology to sustainability, indigenous knowledge and endogenous education and research and cumulated in a programme for transdisciplinary sciences and co-creation of sciences.

This conference paper gives a summary of the learning experiences and the main conclusions, with specific reference to Ghana.

The experiences with The Green Revolution, driven by western technologies and neo liberal business model and implemented with its top down method of communication, failed for a number of reasons: It erroneously assumed that western technology was applicable in an environment that deviates from the situation where it emerged. In most cases, the ecology, the economic and social conditions as well as the worldviews and values of the people where so different that in most African countries and rain fed areas on the globe, these programmes failed. The authors were part of this failure and decided to follow a different approach: agro-ecology with a focus on the optimal use of local resources and local knowledge of the people. This approach gave promising results, but again it was learned that the worldviews, values and the way people come to knowledge was not sufficiently taken into account. And, this learning lesson was also drawn in other African as well as in Asian and Latin American countries.

Therefore the authors made in depth studies of the worldviews, values and the knowledge system in communities in 16 countries in three continents. This allowed to make generalizations on the role and relevance of local peoples knowledge and the way this can be enhanced by internal learning, and by exchange between knowledge communities in other cultures. It had led to an approach of endogenous development and co-evolution of, education and research.

1. Action research on endogenous development and dynamics of local knowledge

For more than 30 years the authors have joined hands in action research to enhance endogenous development (development from within). Its programmes covered 16 different countries worldwide: Bolivia, Mexico, Guatemala, Chile and Colombia, Ghana, Kenya, Zimbabwe, Uganda and South Africa, Norway, the Netherlands, India, Sri Lanka, Nepal, Indonesia. It started with ILEIA an international network for sharing experiences of agricultural innovations by farmers. The COMPAS programme set up cooperation between indigenous, community based organizations and development organizations. The challenges were to understand and articulate the worldviews and values of the indigenous people and on that basis to design and test practical ways to strengthen local knowledge. The third programme, CAPTURED, was aiming to develop educational material and research methods for universities for enhancing endogenous development. In Ghana it culminated in a private university MITDS and in Bolivia and India to university programmes with the focus on endogenous development.

The results of these programmes revealed the following:

In the course of decades in all countries, major changes have taken place in the domains of political autonomy, demography, economic and cultural integration, technological innovations, exposure to mass media and degradation of environmental resources. These are leading to an erosion of indigenous cultures, knowledge and cosmovisions.

At the same time, despite the apparent acceptance of the dominant technologies, beliefs and values, below the surface a persistent core of indigenous culture survives and a wealth of indigenous knowledge on natural resource use still exists. Till today this core determines the values and decision making of rural populations.

In many cosmovisions of indigenous communities, people see the reality in three domains: the natural world, the human world and the spiritual world (see Figure 1). People, therefore, look upon farming and health care as activities that simultaneously take place in each of these worlds.

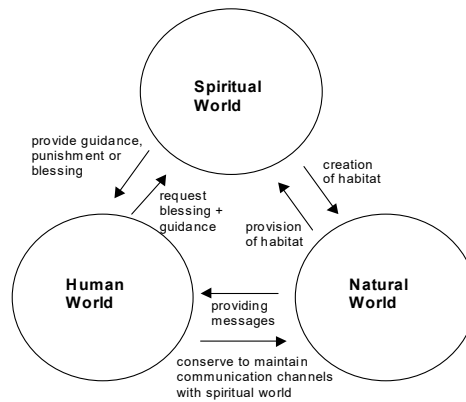


Figure 1. The three worlds in indigenous sciences as observed in traditional cultures.

In many cosmovisions, nature is considered sacred. This finds its expression in concepts like Mother Earth, sacred mountains, rivers, trees and animals. Animals, plants and especially trees are often considered to be linked with the spiritual world and should be treated with respect. This often leads to the need to conduct rituals during agricultural health care activities. Some of these relate to spiritual beings or ancestors.

Indigenous communities organize themselves on the basis of their cosmovision. Many indigenous institutions regulate the use of land, water and biological resources as well as the way farmers and healers learn, teach and experiment. Traditional leaders often combine their political powers with spiritual skills and functions.

Many development activities and conventional systems of education and technology development neglect or reject the importance of cosmovision, culture and indigenous knowledge and suggest the superiority of dominant western science. This western scientific system tends to be less holistic and more materialistic and anthropocentric than indigenous knowledge systems.

Based on these findings the authors started programs for endogenous development education and research not only in Ghana, but also in Uganda, Zimbabwe, Kenya and in India, Sri Lanka and Bolivia and Guatemala. The studies made in-depth analyses of the worldviews and ways of learning in different cultures. They took the position that indigenous knowledge is not simply a collection of know how on methods to survive. It is much more: It is the outcome of a systematic search for knowledge based on a specific worldview, value system and learning process. It is therefore considered as the result of a culture-specific scientific process. The plurality of worldviews and ways of learning has led to a worldwide multiplicity of sciences. And it was decided to learn more about these culture-specific sciences.

2. Trans-cultural notion of sciences

Based on the work of philosophers of science, as Popper, Kuhn, Feyerabend, Nicolescu and building on the insights of indigenous scholars from India, Bolivia and Ghana, we chose the following definition of science:

Science is: a system of knowledge that has emerged and still develops by joined efforts of a knowledge community who share a common worldview. It is based on their specific values and methods of learning and producing knowledge. It uses a theoretical framework that includes their assumptions, general principles, and theories on which the knowledge community that has reached consensus. The knowledge acquired and the resulting science is a product of a social process and is always limited and subject to modification in the light of new experiences, data, information and insights.

On the basis of this definition, we looked at a science as having a certain expression in each of the following basic elements:

- **The Ontology (or worldview):** the way the people see themselves and their relation with the rest of the cosmos: the Worldview or cosmovision.
- **The Axiology (or values):** The moral and aesthetic values of the people.

- **The Gnoseology (or methodology):** Methods for Learning, experimenting and teaching. It is obvious that the way of learning is a directly related to the worldview and values of the people.
- **The Epistemology (or the theoretical framework):** The way knowledge is organized: its logic, theoretical frameworks and paradigms.
- **The Knowledge Community:** The practical way in which experts, leaders, healers, guides and their followers and students carry out research, have peer reviews, debates and discourses on Worldviews, Methods, Theories and Values and agree on accepting or rejecting them.

Indigenous as well as formal -mainstream- knowledge can therefore be understood to be the result of a combination of these five elements. In the past, traditional communities developed their knowledge basically on its own. But since the colonial period, western knowledge was introduced. This latter had and has substantial impact on traditional knowledge.

Inter-scientific contacts

Intercultural contacts can lead to domination and control by the powerful scientific system, and may result in the weakening or disappearance of cultures and ways of knowing of the weaker. But, if the intercultural contacts take place with respect, it can also lead to mutual learning and synergy. The authors have worked together in a research programme under the name Capacity and Theory Development for Universities and Researchers in Endogenous Development CAPTURED. This program did not aim at transfer of knowledge from a superior to an inferior system. Rather it looked for revitalisation of the different ways of knowing by enhancing its own dynamics. It also sought ways for co-evolution of knowing by joint learning and a search for complementarities and synergy between different sciences.

In a process of **co-evolution** each science involved is stimulated to develop and improve its methods and theories based on its own dynamics as well as to interact with and learn together other systems of knowing. In this process, no science is considered *a priori* superior or inferior. Traditional nor western based knowledge is romanticized or rejected. Co-evolution suggests an attitude of critical empathy, that involves the willingness to listen, openness to learn, responsiveness, and the capacity to criticize when necessary (Fay, 1999).

The objectives of inter-scientific co-evolution are:

- To strengthen and revitalize the marginalized sciences;
- To look for synergy and opportunities for mutual learning as identify contradictions and exclusions;
- To question, challenge and criticize each other in order to determine those aspects of the science and value systems that may need modification and improvement;
- To balance the power and financial resource base of the different sciences.

3. Endogenous research and development in Northern Ghana

We will now present the ways of knowing of the Gruni and Dagara Communities of Northern Ghana. The information presented here is based on an interactive and mutual learning process by members of the local knowledge communities and the development staff of an NGO, the Centre for Cosmivision and Indigenous Knowledge (CECIK), the University for Development Studies, (UDS) in Northern Ghana, the Millar Institute for Transdisciplinary and Development Studies (MITDS) and the international partners of CAPTURED in Bolivia, India and the Netherlands. The University for Development Studies and MITDS exposes its students to the real life situation in Northern Ghana. The PhD and Mphil students study the role of indigenous institutions in agriculture, health, informal economies and the governance of natural resources. They focus on understanding and articulating different aspects of endogenous knowledge systems and ways to revitalise them through transdisciplinary and participatory action research.

Participatory action made the actors aware of the strengths as well as the weaknesses of indigenous knowledge, and the roles of traditional political and spiritual leaders.

Exchanges between local knowledge holders and with persons from outside the community took place in the form of intra- and inter-scientific dialogues, cross-visits and peer reviews. Actors took part in rituals, sacrifices and festivals, funerals and market activities. In these processes, the communities were encouraged to articulate their ways of knowing in a systematic way, to determine their own strong and weak points and were encouraged to experiment with ways to improve on them. In this process the first author was initiated and appointed as chief in development by one of

the communities. The second author was appointed as visiting professor in the University for Development Studies in Tamale.

Some weaknesses of our sciences and knowledge community

In our efforts to understand our indigenous science, it is important to accept that they are not without weakness. Our knowledge emerges in an oral culture and has never been written down systematically. Exchange mechanisms and intra-cultural methods for its validation are weak. As a result, perpetuation of some aspects of the sciences that are outmoded or have outlived their usefulness still continue. This limits the growth and consolidation of our sciences. There is more subjectivity than objectivity in the ways we build up our knowledge. This provides problems for generalisation, replicability and up-scaling. For some knowledge there is a monopoly of knowledge, power imbalances in knowledge holders, and hence limited access to information. There may also be a limitation in passing on accurate knowledge and information to women and to the younger generations. Traditional community-based economies are being destroyed by government policies, unregulated privatisation and unfair free trade. Community-based moral leadership, solidarity and reciprocity are breaking down. Corruption and large-scale accumulation of resources is not uncommon. Our education system does not reach all and is skewed away from, or rejects the culture of the people. Research in universities gives very little attention to our own knowledge and hardly contributes to its enhancement. It is rather tending to replace it.

4. Insights in traditional Ghanaian ways of knowing

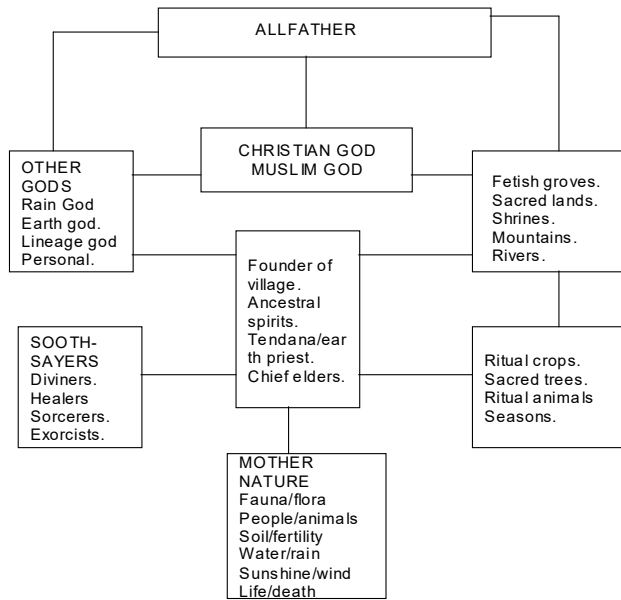
Below we present our understanding of traditional science in Northern Ghana. We formulate it in first person plural to indicate that the knowledge is shared between different stakeholders,



Focus group discussion with earth priest (Tindana) and elders in Bongo.

4.1 Our worldview

We see our existence as part of a wide cosmic reality that consists of a social, a natural and a spiritual world. The natural world provides the habitat for the spirits and sends messages from the spiritual world to the human world. The spiritual world provides guidance, sanctions and blessings to the social world. People therefore have to relate to both the natural and the spiritual world in such a way that the laws of nature and of the spirits are respected. In an effort to present the most important entities that make up our cosmos and to indicate the way they relate, the diagram below was constructed from the various dialogues in different communities.



Existence as perceived by Gruni and Dagara people

The spiritual world

The spiritual world is the most powerful of the three worlds. Spiritual forces express themselves in human beings as well as in animals, plants, trees, waters and other parts of the living and non-living world. Our main spiritual entity is the the *Allfather*, the creator of mankind and the universe. Then we have *deities* of different types: e.g. family gods, water gods, land gods. Further, there are places and identities with an important spiritual significance: sacred shrines, groves, trees, waters and sacred plants and animals. Some persons, animals, plants and locations lend themselves more prominently to spiritual expression than others, and therefore we can make a distinction between normal lay people and people with a *special spiritual position*, and also between plants and animals that may serve as our food and animals that have spiritual significance and therefore can be used to make sacrifices. The *spiritual beings* ensure that life emerges and continues. *Energies and vital forces* determine the degree to which living beings grow, are healthy and/or sick, may die and/or may sprout up or be born again. In this context we differentiate between different *magical powers*: 'white magic' and 'black magic'

The social world

The social world is made up of our ancestors, the living and the yet unborn. The cycle of being born, dying and rebirth is continuous and provides the opportunity for humankind to build up experiences and, in so doing, come closer to the ancestors. Our *human ancestors* have lived their lives in our villages, and through their learning experiences and dedication to the gods and spirits have accumulated wisdom and knowledges which they share with us. In order to be open to their guidance we have to be respectful to them and *consult* them through our *rituals* and *sacrifices*. Some of our ancestors have lived long and wisely and thus have achieved a high position in the spiritual domain, through which they have a good position to guide us. The ancestors, as spirits, have the capacity to communicate with the living as well as with the gods and other spiritual entities, and in this way they can advise us and influence our fate and lives.

Communities make mention of the following persons with special powers or functionalities:

- *Tindanas*: These are considered to be the son of the spirit of the land. The first settler made a covenant with the spirit. They obtained the right to use the land and in return would make sacrifices and pay respect to the gods. For this reason land use is governed by the Tindana.
- *Healers*: Persons with skills to cure and heal. This entails the use of spiritual, social and material forces. Healers may combine trance, magic sacrifices and the use of herbs.
- *Spirit-mediums and soothsayers*: Persons who have the capacity to see beyond the natural and social reality. They can see the reasons why things are happening and are thus often consulted to find out why fate has taken an unexpected turn; e.g. why an accident happened, or a person has died.
- *Village elders and chiefs*: Chiefs preside over a council of elders and rule the community in matters related to family affairs, receiving visitors, peace and conflict management.

The natural world

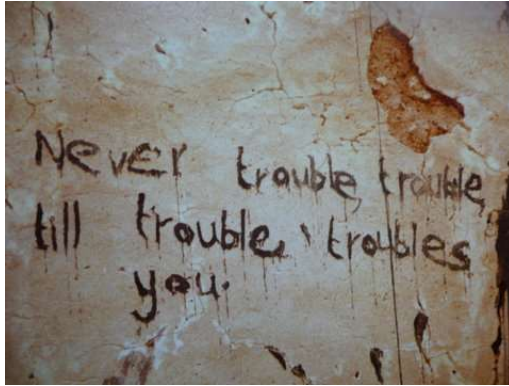
Nature includes all living beings such as plants and animals as well as 'non-living' entities such as rocks, soils, waters and clouds. We believe that all elements of nature are an expression of the spiritual world and are thus part of the vital force that permeates nature. For us, *land* is of special significance. Land provides food, provides the shelter for our deceased in the form of graves and constitutes a space or habitat for the spiritual beings. We believe that land belongs to the spiritual world, but has been given in custody to humans, plants and animals. Also, *water* is very vital for us. Water is life! Aside from the everyday uses of water, it is water that precedes every sacrifice and spiritual performance. We also have certain water-bodies that are spiritual in character.

4.2 Our values and ethics

Our community values bind us together and keep us going. For us, the most important thing to achieve in this life is '*to be received well by the ancestral world when you die*'. Hence, what we do is underpinned by this goal in life. We hope that our soul will become part of the spiritual domain and therefore we attach great value to funerals, having children, building relationships among ourselves and with our own ancestors. During our life on earth men and women strive to develop our physical and spiritual strengths that will reconnect us with our ancestors. Hence we value qualities such as:

- Generosity: the capacity to share wealth and power, especially within extended families, clans and villages. We also share in our poverty.
- The wisdom to speak the truth and defend justice.
- Respect for ownership, marital status and the elderly.
- Friendship and kindness, especially when it is directed to persons in our own family, kin and ethnic group.

In our notion of justice and our concepts of law, we value authority as an expression of ancestral powers. We have common ownership of land, water and knowledge and appreciate solidarity, and care of our brothers and sisters within the family. We have our notions of equality and democracy and human rights, but they differ from the western or republican notions in the sense that they are more based on loyalty and accountability within the ethnic structure than on others. With our notion of time, we like to live in the present and do not give premium to the future. Hence we find it not necessarily important to save money or to invest in activities that may yield gain in the future. Beyond our ancestral religion, we are happy to have the possibility to also relate to the gods and spirits of Christianity, Islam and other belief systems. Religious freedom and tolerance of differences are highly valued.



People's wisdom expressed on the walls.



Traditional architecture and wallpainting

We do not accept violence against women, children and elders or to persons in our own clans. But if our ethnic identity or sovereignty is threatened, we may defend ourselves vigorously. We have our own mechanisms for dealing with criminality: reconciliation and restoring relationships is more important than punishing. If our lands and livelihoods are being threatened, our people can be mobilised easily and ethnic unities can group together to protect their right to land. We have a number of taboos that regulate and guide our behaviours. These are intended not to disturb the vital forces and harmony in nature. We have totemic relationships with plants and/or animals with which we have established a spiritual and ancestral relationship.

Our notions of poverty, wealth, and *living well* are regarded as aspects of spirituality and are captured in expressions like *Ubuntu*, *Mma-mere* and *Saakumnu*. A person's wealth is measured by his social capital– how many people he feeds, how many follow him. A direct expression of this position is how well attended one's funeral has been.

4.3 The way we learn, teach and adapt our knowledge

We consider our knowledge as *ancestral knowledge*. The ancestors have acquired and accumulated knowledge and they are our source of knowledge, our 'library'. Hence any innovation, any deviation in the use of our ancestral knowledge we can only accept after having consulted our ancestors.



Sacrificing a chicken during ancestral consultation in Bongo

The family homestead is the nerve centre of all learning. It is here that self-generated learning occurs, and here that externally induced learning is refined. The family tree is built here, family trade introduced, some secrets divulged, and the challenges for each member of the family are exposed to the apprentice.

The family unit is surrounded by an active immediate environment, such as markets and drinking bars, farms, and functions such as hunting, water/fuel wood fetching, marriages and sacrifices.

The third level of knowing, the 'distant environment', are locations such as government institutions, external religious institutions, and functions such as migrant labour and visits. Migration is often generally described as a wage and a labour activity but it is also important for the exposure for learning.

The methods for testing and validating and the criteria being used for validation overlap. The holistic nature of our body of knowledge and the complexities therein result in complex variables and criteria for validation. Certification and quality assurance are also going on within indigenous knowledge communities. Results are proven individually, by the family, and by the community at large. Process, content and spiritual acceptability are all measured, as is dissemination. Verification and validation are a continuous process, and acceptance or rejection are also a continuum. The ancestral knowledge owners are the final decision makers. No matter how good, successful or productive a new idea is, if it is contrary to the wish of the ancestors, it will be rejected.

4.4 How we organise our learning process

We have developed our own notion of cause and effect: things in the natural and human worlds do not happen by biological, physical or social process only, or by chance. There is spiritual force behind material processes. A climatic condition, health problems, social conflicts and even birth and death are guided or controlled by spiritual forces. The All father, deities, ancestors and other spiritual beings interact with the natural and social worlds and humans have the opportunity to appease these forces through good conduct as well as through sacrifices and rituals. An event may have several causes: physical, biological, social, moral or spiritual. Therefore, the wise way to pre-empt a situation is to address the different forces. Therefore any activity of healing, farming or family-related *rites de passage*, involve the combination of biophysical activities, social activities and spiritual or ceremonial activities. A rainmaking ceremony involves dancing, drumming, drinking and eating as much as it involves sacrifices and praying. Healing may involve the use of herbs, sacrifices of chickens, invocation of magical forces and consultation of ancestors. Farming involves land preparation, sowing and weeding, as much as sacrifices for the spirit of the land and family- or community-based labour, with drumming, drinking and meals. Our chiefs have councils of elders, and different soothsayers may be consulted in important matters. The knowledge of the 'whiteman' and of our educated children can also be used for validation and cross-validation.

4.5 Our knowledge community

Education and socialisation take place through mimicking existing activities and skills of the adults. They are also supported by correcting activities, recognition, ceremonies and story-telling. Education is a collective responsibility. Education takes place in the local language. Our language is rich and has many words to describe the processes we see in our worldview (proverbs, wise sayings and parables are critical modes of advanced communication of our knowledges). Members of the knowledge community also include the family, the community, the old and the young, local experts, spirit mediums, skill experts and certain relevant 'external actors'. Hence it is not a closed system. The gatekeepers of knowledge are the 'knowing institutions' – spiritual, social and material institutions. The perpetuation of knowledge among the community is a gift from the Allfather, transmitted through individual experts, community experts or family heirlooms. The school system, external religions, science and development interventions, 'modern' forms of communication, critical arenas such as funerals, markets and festivals, and various networks all contribute towards the development and growth of our knowledge communities. Some of our knowledge is secret, because of its sacred nature and its powerful character; it could be misused if applied by a person who is not properly initiated.

So far, the African universities have not yet fully embraced the potential of endogenous education and research. But, in individual universities interesting programmes are being developed and at the policy level, attention for endogenous development and indigenous knowledge has grown.

5. Co-evolution and co-creation of sciences

Cases from India, Bolivia and the Netherlands

The Partners in the CAPTURED programme in India and Bolivia have made similar case studies of the cosmovisions, values, methods of learning, the knowledge concepts and the ways in which the knowledge communities are functioning. These efforts show a great diversity of ways of knowing and practising sciences. This paper does not provide space to present the results of the studies in the other continents. ¹. But in summary we can provide the following:

A traditional knowledge community in India is the Ayurveda health science. This knowledge community has a cosmovision in which people believe in the unity of matter and the mind, and a continuum between the gross, manifest world and the fine unmanifest reality. They believe in reincarnation of people and animals, and the enduring impact of karma that goes from one incarnation to the other and may lead to enlightenment. They see a multiplicity of powers (sound and vibrations, time, place, symbols, rituals, minerals, plants and herbs). People attach value to mental freedom, spiritual enlightenment and purity of the mind. They learn through intuition, observation and interpretation by scientists who have a pure mind and pure lifestyle. There are a great number of hospitals for ayurvedic treatments, associations of healers, and training centers and schools, all parallel with other traditional schools such as yogha, sjamanism, Unni and with the mainstream health system.



Left: A Shaman performs a ritual in a rice field in Sri Lanka during which he requests the pest in the field not to take more than their fair share.

Right: A traditional healer in India showing his library with ancient texts in Sanskrit with theories and practices on health and disease.

In the Andes in South America the indigenous people live in a reciprocal relationship with pacha mama, the sacred time-space of mother earth. Reciprocity suggests respect for and balance in nature, the spiritual beings and humans , expressed in ritual, sacrifices and festivals. People learn by observing the forces in nature, the climate, health and growing conditions of the plants and animals. A hierarchy of spiritual leaders and shamans are engaged in reading the lessons from nature and in formulating guidelines for action. Diseases can be cured by sacrifices and by rituals where not only the patient (human, animal, plant) is treated, but where the entire environment in which life takes place is involved.

¹ For info on each of these case studies and for the synthesis: Haverkort et al, Towards co-creation of sciences 2016.



Pacha

Mama rituals in the Andes

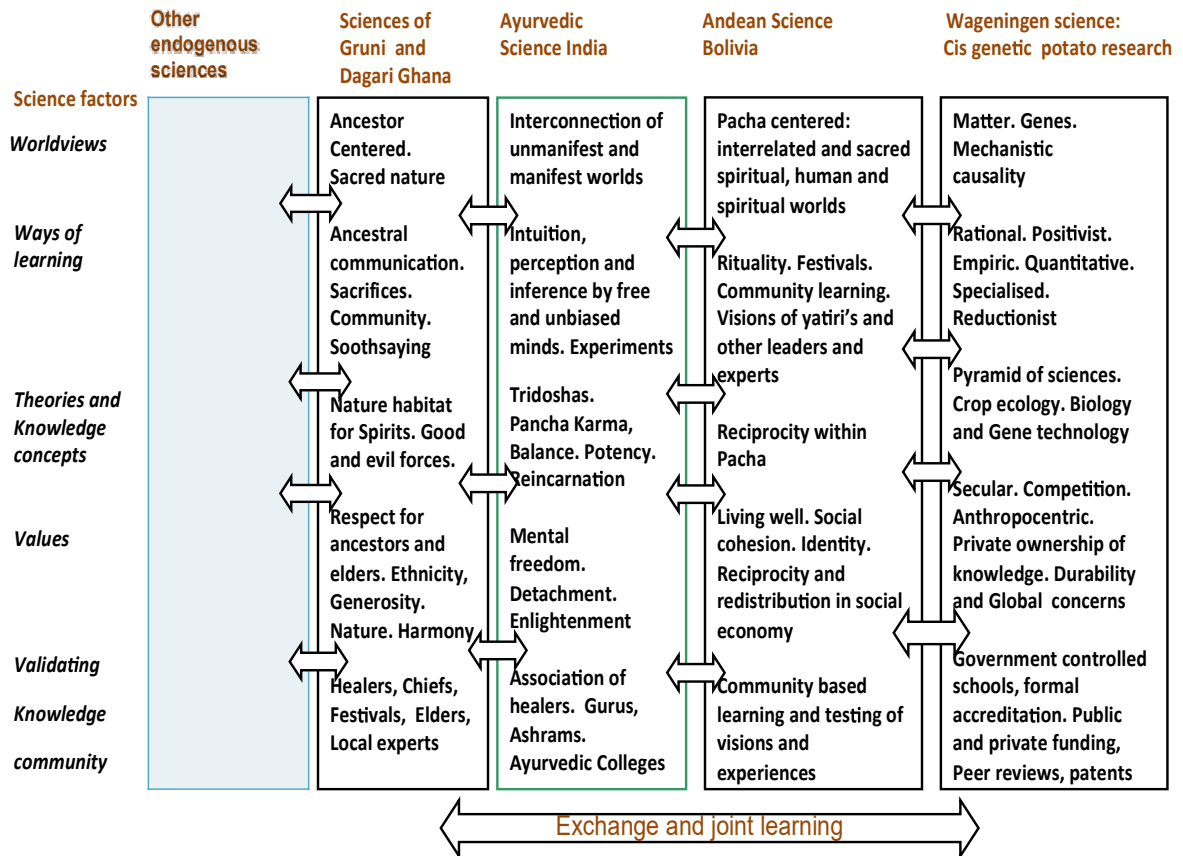
A case study of the **bio-sciences in Wageningen** the Netherlands, revealed that their worldview is focussing on the material world: (sub)atomic particles, molecules, cells, genes, photosynthesis, ecosystems, cosmos, owners of gravity, electricity and atomic energy, black holes. Flows of nutrients and energy allow for its dynamics. The big bang and evolution theory explains and justifies the competition between living beings in nature and in the human politics and economy. Mankind has the right to control, dominate and use the natural resources of the earth. In science the laws of physics, biology and mathematics dominate and lead to technological developments that have big impact on economic growth and have strong ecological impact such as climate change and biodiversity loss.

From imposition of western knowledge to co-creation of sciences

During the last three centuries, during which Europe has been politically dominant on the world stage, a remarkable social phenomenon has arisen in many parts of the world, particularly in countries in Africa, Asia, Australia and North and South America. The European nations colonised by imposing European traditions on the indigenous cultures. Western powers lead the indigenous intelligentsia in colonised countries into believing that the way to modernity was to be imported from the advanced West. Thus a cultural divide was created between an evolving indigenous tradition that was seeking to come to terms with its own present, and an alien intervention from the West. It neglected the fact that all living societies and communities are continuously modernising by their adaptation to the present (UNESCO, 2005). The content of the modernisation of different societies is bound to be different. It cannot be uniform. Modernisation ought to be essentially a multi-cultural phenomenon. In recent literature on colonial encounters there is acknowledgement of the value of traditions and local cultures and their role in shaping contemporary society (UNESCO, 2000).

The CAPTURED program has supported local knowledge communities to formulate their own ways of knowing. It encouraged them to use endogenous ways to improve traditional knowledge and has supported traditional knowledge systems from different cultures to exchange experiences and learn together. The table below summarises the main characteristics of the sciences involved in the research of CAPTURED. It also indicates possible levels for joined learning and co-evolution.

Different sciences and their possible levels of co-creation



The international partners in the programme agreed that none of these sciences is perfect or superior. Each of the different sciences can learn from within, by challenging their own concepts and methods. All of them can learn together by different form of exchange: The southern partners can learn together on ways to cope with (neo-) colonial influences and economic superpowers from Europe, North America and China. The south can learn from the North when it comes to scientific methods with concepts as objectivity, measuring, mathematical processing of data. Application of technologies with a Western (or Eastern) origin can be helpful in communication, health care and food production. And North can learn from the holistic approaches in the south to reduce the anthropocentric tendencies, rediscover the rights of animals and restore biodiversity.

To explore the potentials and limitations of inter-science dialogues and co-creation of sciences, below we will present possible options for building bridges in each of the science factors: worldviews, ways of learning, theories and knowledge concepts, values, and technologies and the validating knowledge community.

Our experiences in inter-cultural and inter-science exchange have led us to conclude that communication between different culture-specific sciences is possible and can be beneficial when the following conditions are fulfilled.

- No science is considered a priori superior or inferior. Neither endogenous nor mainstream sciences are romanticised or rejected a priori.
- Each science is prepared to search for its weak points and to look for ways to improve them through intra-science activities *and* inter-science dialogue. They are prepared to learn from others about worldviews, values, ways of learning, accumulated knowledge and theories, and the way the knowledge community is organised.
- The participants are prepared to question, challenge and criticise each science in order to determine those aspects of the science and value systems that can be modified and improved.
- Respectful dialogue does not imply the unconditional acceptance of all differences. It implies the willingness to listen, the openness to learn and to be responsive, the capacity to criticise and willingness to accept criticisms when necessary (Fay, 1999).

We realise that these conditions present an enormous challenge for the partners in the process. They go against common understanding of the superiority of mainstream science and the assumption that endogenous sciences are flawed by fundamental weaknesses. Inter-science dialogues require resources and methods that are difficult to mobilise and they do not easily fit existing protocols for accreditation, funding and research methods. Embarking on this challenge also requires a mental attitude of accepting vulnerability, curiosity and modesty, and determination on the part of the actors involved.

6. *Products of and perspectives for endogenous development, education and research*

Some products

Under the label of COMPAS dozens of NGO's and universities worldwide have embarked on field programmes for supporting endogenous development. Their experiences have been summarized in the book *Ancient roots, new shoots*. (Haverkort et al 2003). It provides case studies and a framework with methods for field work. David Millar together with Dr Atia Apusigah made an overview of experiences of endogenous development in Africa. The book *Endogenous Knowledge and African Development* (2010) describes the policy environment for endogenous development, it explores the relevance of the approach for handling conflicts in natural resources management, summarises a number of studies on African traditions, worldview and values in relation to poverty reduction, gender and social protection.

The authors have contributed to a book with the title: *Learning endogenous development. Building on bio-cultural diversity*. (ETC foundation 2007). This book explains the principles of endogenous development for development workers of NGO's. It provides several practical ways of learning about the diversity of worldviews, gives methods for enhancing local learning and for strengthening local institutions. It gives examples of endogenous development of local communities in countries from all over the world.

In Ghana, Bolivia and India the universities participating in the CAPTURED programme have started undergraduate and postgraduate training in endogenous knowledge development. The programme has stimulated the production of academic training materials for endogenous education. This is a response to the felt need to build up capacities in the universities to support endogenous education and research. Together the universities in these three countries have developed a curriculum for endogenous education. It has produced a handbook *LEARNING TOGETHER* (Captured 2010). This two volume book brings together the concepts and challenges in endogenous development, education and research. It explores advantages and limitations of the

conventional quantitative research methods, and elaborates on dozens of participatory research methods and ways to revitalise endogenous knowledge.

In 2012 book was published with the title *Towards co-creation of sciences*; (Haverkort et al, Nimby books, new Delhi). Based on results in Ghana, India, Bolivia and the Netherlands, the book provides a theoretical framework for understanding and supporting the plurality of worldviews, values and methods in different knowledge communities. It gives guidelines for reforming higher education and research.

Five years after its inception, the CAPTURED programme has more than 50 PhD students doing research devoted to understanding and enhancing endogenous knowledge in Ghana, India en Bolivia.. In each of these universities deliberate actions are being taken to strengthen the capacities of university staff to carry out endogenous education and research.

The courses being taught in MITDS include subjects as: Transdisciplinarity and culture, Endogenous development, Philosophy of science, African Philosophy, Social anthropology, research methods for endogenous development and research. 10 PhD students have graduated and 5 are expected to graduate next year. The students in Ghana are conducting research on topics such as the role of traditional institutions in natural resource management, traditional knowledge related to agriculture, health, management of natural resources and governance systems. Participatory action research is done with close involvement of indigenous experts, resulting in increased identification with and ownership of local knowledge processes, and this will enhance the endogenous knowledge and science base. The specific research topics include: The spirituality and socio-economics of the “Bolga Basket” and poverty reduction; Competing Claims between Transhumance and Farmers on Natural Resources in Northern Ghana; Traditional Media and the Development Agenda From Extinction to Distinction: Promoting Indigenous Ghanaian Foods for good Nutrition and Health African Traditional Religion: Its influence on the Socio-economic Development among the Dagara of Northern Ghana and Southern Burkina Faso; Worldviews and Experiences on the Natural Disaster Management in Northern Ghana; Worldviews and Experiences on the Natural Disaster Management in Northern Ghana; Myths and realities of African traditional medicine: the sacredness of the practice amongst the Bossi and the Dagaaba traditional healers in Northern Ghana; Policy implications for women in traditional and modern governance in the Upper East Region of Ghana; Traditional Medicine as a Synergy to Orthodox Medicine in Dagbon, Northern Ghana; Indigenous pedagogy and early childhood education in Upper East Region; Promoting cultural and ethnic identity and social cohesion: the role of *mifɛɛ* festival of Lambusie in the Upper West Region of Ghana.

Perspectives

The examples presented illustrate the fact that endogenous education and research is a worldwide phenomenon. They are no longer isolated initiatives but form part of a strong and as yet, partly interconnected international movement.

Apart from the examples mentioned in this paper, there are initiatives that emerge from indigenous peoples' emancipatory activities in countries like Canada, USA, New Zealand There are the struggles against the conventional scientific and educational concepts, approaches and structures, systems of accreditation. Each of them cope with limited resources, the challenges to design curriculum and research methods in indigenous languages and within culture specific contexts, the weak articulation of the own scientific foundations, the need to strengthen the own scientific communities. A major stumbling block often mentioned is the opposition by mainstream academics and policy makers against efforts by indigenous scholars to establish the scientific credentials and limited financial and human resources. But the overall picture is that there is a growing enthusiasm from indigenous knowledge communities and slowly but gradually increasing support from international policy bodies and mainstream institutions.

The choice for endogenous development and for co-creation of different forms of knowing implies a number of shifts in the way sciences are being developed in the world. It implies a shift away from

the notion of one superior and universal science that replaces other sciences, towards a notion of a plurality of sciences, each with its own strong and weak aspects. It implies a shift for the institutions for education and research away from the exclusive transfer of dominant knowledge and exclusive use of the scientific parameters and methods, towards: Learning with and within local knowledge communities; Understanding and improving local worldviews, values, methods; Finding complementarity and synergy with dominant educational and scientific institutions; Co-creation of education and research with knowledge centers within the continent, south-south, and with the mainstream. Such shifts will not happen overnight given the scale of the task to be accomplished, the appeal of and resistance from the dominant system, the lack of capacities for supporting endogenous education and research, the funding issues, and lack of operational methods. Yet, it presents a challenge for decolonizing non-western sciences and with that for empowering southern peoples. The conference paper of Millar and Azupogo; Local knowledge and its (non-)integration in 'formal' education institutions gives practical examples of the institutional hurdles to overcome for a university on its path to endogenous education and research.

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