

## **Building learning networks for small-scale farmers: Pachamama Raymi as an innovative knowledge management system**

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*Pachamama Raymi* (Raymi for short) is a capacity building system built in a creative and non orthodox search for introducing new and better solutions for agricultural innovation and natural resources management. The design of Raymi was a persistent quest, always looking to improve the creation and introduction of new technologies to care for *Pachamama*, ‘Mother Earth’ in Quechua, the language of the Incas. Pachamama Raymi means ‘Fiesta of Mother Earth’.

The development of Pachamama Raymi started in 1986, when Huub van der Zel, a Dutch rural development expert from PRODERM<sup>1</sup>, was looking for ways to improve field irrigation techniques in a great number of irrigation systems constructed by this project, located in the mountain areas of Cusco, Peru. Van der Zel decided to entrust his compatriot Willem van Immerzeel with the field irrigation-training program. An unorthodox proposal ensued: to use contests with cash prizes, within a setting of traditional rituals with music, dance and theatre, to honor the Pachamama (Mother Earth in Quechua). The irrigation trainers were other farmers, traditional experts known as ‘Unu Kamayoq’<sup>2</sup>, heirs to pre-Inka gravity irrigation techniques, which are labor saving and allow a highly efficient use of water. These techniques are still considered superior to those used elsewhere in Peru, or even the rest of the world (Kosok 1965).

Van Immerzeel’s inspiration came from the Dutch rural tradition of ploughing contests; along with the acknowledgement of the pivotal role of culture<sup>3</sup> in the agriculture of the Andean region (also the case in many African and Asian rural traditions). He also found that there was very valuable local knowledge and knowhow, which had proven its worth over centuries, very well adapted to the scarcity of resources. This knowledge and knowhow, however, was not evenly distributed over the population, and it required a great deal of effort to find those exceptional people who possess it.

Contests, rituals devoted to Pachamama (Mother Earth) and farmer-to-farmer training became the cornerstones of the Pachamama Raymi system. This first experience evolved into a knowledge management system, mainly dedicated to agricultural innovation and management of natural resources.

This rather intuitive creation of Raymi was later understood and completed by theoretical reflections about why it was so capable of producing such successes. On

that basis, methodological elements were incorporated (Van Immerzeel and Nuñez del Prado, 1994).

The Raymi methodology has spread to several regions and projects of Peru, Bolivia, Guatemala, Chile and Ecuador in the two decades since its creation. The methodology was designed and subsequently applied in several projects of the European Union, which found that Raymi was “the most effective capacity building system in use in their projects in Latin America”.<sup>4</sup>

In 2004 and 2005 Raymi was adapted to be used on another continent, to improve water management in polders of the coastal area of Bangladesh. Polders are large, extremely flat and low lying areas surrounded by embankments. The polders drain on, or take water in from surrounding rivers and canals. Only very recently, Raymi was proposed to be introduced in Burkina Faso, to improve the efficiency of rainwater use in a participatory way and to stimulate Sahelian villages and communities to become learning institutions.

**Table 1: Most important projects using Pachamama Raymi**

Years using Raymi	Name of the Project	Country	Financiers	Budget (US\$ Million) <sup>5</sup>	N° of farmer organizations	N° of families	Number of Field Staff for RAYMI
1988-1990	PRODERM	Peru	Peruvian Government European Union	45	41	431	30
1992-1996	PAC II	Bolivia	Bolivian Government European Union	35	170	4,200	13
1997-	Pachamaman Urupa Qhantawi”	Bolivia	Strategies for International Development	2	50	1.500	4
1998-2006	MARENASS	Peru	IFAD Peruvian Government	18	350	52.800	20
2002-	MASAL	Peru	Swiss and Peruvian Governments	5.5	23 districts	4,500 increased to 7,000 in 2007	27
2000-2003	Rural Development Program Alto Verapaz, ALA 94/89	Guatemala	Government of Guatemala European Union	18	37	600	1.5
2003-2007	Programa Araucanía Tierra Viva	Chile	Government of Chile European Union	28	250	8,000	14
2006-2007	Pachamama Raymi	Peru	DEXCEL Municipality of Challabamba	0,01	12	491	1.5
2007-	Pachamama Raymi	Peru	Stichting Leren van Elkaar DEXCEL 4 Municipalities	0.2	45	2,500	5

These projects mostly used Raymi as an instrument to improve agriculture, field irrigation techniques, irrigation organizations, land reclamation, and natural resources management. However, Raymi was also used successfully in preventive health care, micro industry and other fields relevant to (rural) development. The population in all these projects was extremely poor, suffering the consequences of environmental degradation. With Raymi it proved to be possible to achieve substantial improvements within about three to four years. We include a short list with some of the main projects that used Raymi and which are significant either because of the scale of their operation, or because of their methodological contributions (Table 1).

## Evaluating Raymi

The citations from just a few of the many project evaluation reports<sup>6</sup> below illustrate the efficiency and effectiveness of Raymi (see also: [www.stichtinglerenvanelkaar.nl](http://www.stichtinglerenvanelkaar.nl), Baldivia 1997 and Quiroz 2000).

Project	Results according to independent evaluations
MARENASS worked with 360 communities in Peru Financed by IFAD and the Peruvian Government	<p>“The improved quality of daily life is one of the most spectacular results. In the first place, people are no longer hungry; food security was obtained. (...) The new farm practices allow people to cultivate all year round (with irrigation, humus, compost, terraces and diversified crops), better storage of grains, milk all year round, and not just during the summer months. Besides, the families highly appreciate a new taste of life, expressed in their food, richer and healthier (...)</p> <p>At the same time, incomes increased strongly, especially the daily and weekly ones: the milk production multiplied at least by four or five, so more cheese is produced; Muñapucro only has a small cultivable area, but it is now selling fodder to other communities; the rent of the rooms for the school teachers increased, as the houses are better now...All this allows investing in comfort, in education, and further production increase. The community has changed its main occupation, from agriculture to livestock. Agriculture improved and people now have organic horticulture on terraces, cultivate fodder and have multiplied their livestock production.” De Zutter, 2004: 28-29, In: Van Immerzeel, 2006</p>
PLAN MERISS INKA Financed by the KfW and the Peruvian Government. With technical assistance from the GtZ	<p>“The methodology of the ‘Contests’ applied to spread knowledge horizontally, is a renowned success. The irrigators engage in competitions, applying to their fields what they learned <i>in situ</i> from the <i>Kamayoq</i> (traditional expert irrigator from Arequipa).” Moosbrugger, <i>et al.</i> 2002</p>

However, the most significant achievements of the projects using Raymi are scarcely documented in external evaluations. This is because project objectives tend to focus on economic and technical issues, which then is reflected in evaluations. The realm of social capital, self-esteem and, most importantly, the expression and revelation of ‘cultural energy’ are neglected, while these have shown significant enabling capacity. ‘Cultural energy’ is “a source of renewable motivation to join in a collective movement or cooperative action, overcoming obstacles, adversity, or even failure” (Kleymayer, 1995). Social networks are as valuable as physical and human capital, according to Putnam (2000). Raymi contributes greatly to development and

strengthening of these networks, influencing decisively on factors such as collective action, governance and institutional development, all very relevant for development.

Initially, the prizes appear to be the main motivator of the contests promoted with Raymi. However, as self-esteem grows and cultural energy increases, the prizes become rather secondary. This may explain why people invest in labour and materials up to ten times the amount they receive in prizes (De Zutter 2004). Findings by the same author indicate that Raymi restores the self-esteem of families and communities and people are no longer beneficiaries of handouts, but become interesting partners, in whom it is worthwhile investing.

Growing self-esteem is linked to achieving better results, which is another reason why prizes become less important as motivator as the project progresses. This became apparent in a project in Bolivia in the mid 90's. During the final months of the project, funding availability significantly decreased; as a result, the prizes were lowered to less than half, but the number of participants increased by forty percent (Van Turnhout, 1994). Quite a few communities, who did not want to participate during the first contests, later changed their mind upon seeing the result of the innovations introduced by the communities that had participated in the first contests, and the participants invested even more in improving their condition, showing growing enthusiasm. It can thus be seen that results derived from the innovations introduced through Raymi become an increasingly important motivator, contributing to project sustainability.

Another interesting case is the Peruvian district of Socos, in particular the community of Luyanta. The NGO CEDAP used Raymi since 1992 in this district. As a result, the communal organizations were invigorated in their traditional roles, as well as new ones, where communities spontaneously became 'schools' to others. In this area, destabilized by extreme violence during the eighties and nineties, communities resumed their functions in leading local affairs as a result of the process intervention. Projects have multiplied and have created the conditions needed for a better life. A rural 'service industry' sprung up in different trades, with farmers as teachers. Institutions from near and far hired several such teachers to help improving farms in other areas. Their expertise includes preparation and use of organic fertilizer, improved stoves, small irrigation systems, selection and management of native seeds, etc. (Portugal, 2003).

### **Pachamama Raymi success factors**

#### *A shift of focus: recognizing local capacities*

With RAYMI the population is not perceived as the problem but as the solution. This is an important shift of focus: rather than focusing too much on the problems of those we seek to help, it is time to look for, appreciate and recognize their potential, in terms of capacities knowledge and knowhow (Charles 1999). By doing so, they will grow and exceed their present limitations.

In rural development, budgets are often distributed according to need, to 'problems'. What would happen if resources are distributed according to quality of management by families and villages? Such a strategy may stimulate people to improve their management quality, as Raymi shows, providing prizes for those who care best for 'Mother Earth'. No project can provide every family (farmer) with the solutions to their peculiar situation of today or tomorrow. A development project may play a role in helping people realize that there are always better answers to their situation and that they should search for them, within or outside their own communities, or by creating new solutions. In the Raymi philosophy, each farmer family is in the best position to find the answers to their particular situation, and the process is designed to support them in doing so (see also Rhoades 1988; Farrington 1988; Bunch 1985). Pachamama Raymi also reconstructs the networks of learning and innovation. Individual and collective learning is greatly enhanced by revitalizing these networks, as it creates a stimulating ambiance, as a means and as an end in itself.

*Acknowledge and appreciate diversity and complexity*

Agriculture of small farmers is complex, diverse and risk-prone and is often characterized by a combination of yearly and perennial crops of different varieties, a stock of domestic animals, and other activities which may include any number of trades and crafts. This productive complexity is set in great environmental diversity. On top of that conditions rapidly change, including communication means, markets, soil fertility, exposure to pests and diseases, etc.

Conventional projects necessarily need to reduce the number of 'solutions' to this great complexity and can hardly cope with each and every situation. Neither a single simple package of solutions, nor a basket of diverse choices is sufficient to respond to this ever changing complexity and diversity. The conventional strategy of generation, adaptation, and distribution of technology is one-directional, top-down. Such a strategy does not take advantage of, and can even block, the innovating, creative capacity of farmers. Such a strategy creates a false perception and false division between those who know, the experts, the agents of change, and the ignorant, the farmers.

A novel paradigm is proposed to re-focus this whole issue of technological advancements in agriculture. It is called Participatory Development of Technology (PDT). Farmers have a different role to play in PDT, in identifying the kind of innovations they are looking for, in testing the different alternatives they created or found elsewhere, and in sharing their experience with others, when they found a promising one. This is how specific solutions can be found to each particular situations and demand.

These shifts of focus from 'Transfer of Technology' (ToT) and related methodologies, to Participatory Development of Technology (PDT) were part of a learning process for all involved in Rural Development. This process is reflected in Table 2.

*Locating exceptional knowledge*

It is generally assumed that the knowledge and knowhow available among a poor population is insufficient to be of much use in their training and development. Rather, certain gaps in their knowledge and knowhow seem to oblige projects to employ outside (technical) assistance.

This line of thought is understandable, as very few people within the population possess exceptional knowledge and knowhow. For instance, only two out of 15.000 families participating in the Bolivian Altiplano project were found to possess the knowhow to recover and manage natural rangelands. This reality can be further illustrated with the ‘normal distribution’, which is applicable to large populations. The bell-shaped curve of normal distribution reflects that most people can be found around the average, while only the great exceptions possess exceptional characteristics (Van Immerzeel 2006). Conversely, exceptional knowledge can be expected to be hidden among a population of many thousands. This phenomenon is called the ‘law of the large numbers’.

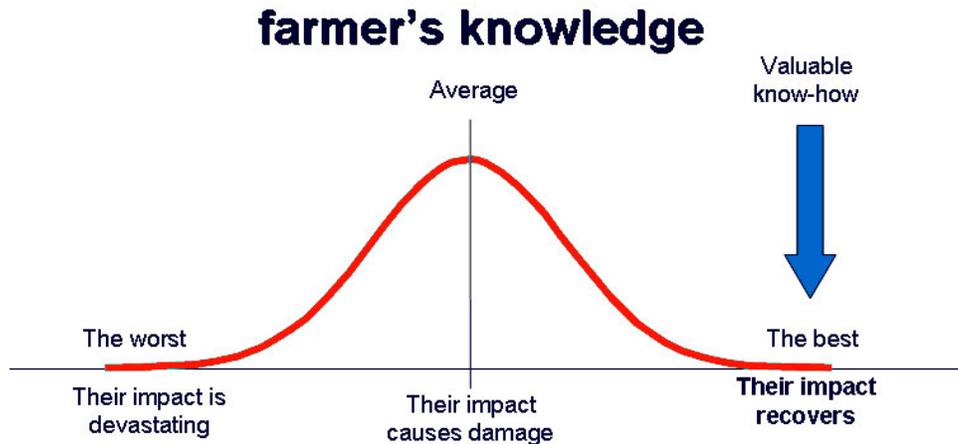
**Table 2: Changes in agricultural research and extension between 1950 and 2000**  
 (Source: Hagman 1998)

Period	Explanation of failure to adopt the new technology	Solution	Key activity	Key aspect of investigation	Predominant method of investigation
1950s 1960s	Farmers' ignorance	Extension	Teaching / preaching	Understand the process of spreading and adoption of technology	Surveys
1970s 1980s	Limitations of soil conditions, etc.	Eliminate limitations	Provide inputs (fertilizer, seeds, etc.)	Understand agricultural systems	Analysis of limitations. System analysis
1990s	The technology is inadequate.	Change of process or focus	Facilitate farmer participation	Reinforce the investigative capacity of farmers. Change of attitude of professionals.	Participative investigation with and by farmers

The knowledge and knowhow of the rural population can also be represented by the bell-curve of normal distribution. The bell-curve is not static, however. In other words, people can ‘learn from the best’. That way, the whole bell shaped curve moves towards the right. For example, farmer’s knowledge of a large population in a severely degraded area can be represented in a graph as shown below (Figure 1).

Shifting the curve to the right requires the assistance and cooperation of those exceptional people that are on the extreme right of the curve, socializing their knowledge and knowhow through knowledge management processes. ‘Learning from the best’ recognizes the fact that (tacit) knowledge is present in those people who ‘know how’. The great challenge is to find them and achieve that others can learn from them and with them. Knowledge needs to flow from the exceptions to the rest of

the population and everyone needs to experiment with new-found knowledge, to adapt it and thereby, improve it. This is a key process which Raymi aims to facilitate through a practical and easy-to-use methodology.



**Figure 1: Normal distribution of knowledge, as applicable to large populations**  
(Source: Van Immerzeel 2006)

## Knowledge management in Raymi

This whole process proposed by Raymi of finding, exchanging, adapting and creating knowledge, can be considered knowledge management *avant la lettre*. Nonanka and Takeuchi (1995) made great strides in clarifying the basic concepts of knowledge management, which can be defined as:

*an emerging discipline, with the objective of generating, sharing and using existing tacit and explicit knowledge, to respond to the needs of development of individuals and communities* (Peluffo 2003).

The same author defines knowledge as 'the capacity to relate in a highly structured manner, facts, information and knowledge of an object, which allows one to act effectively, based on value and context.' Tacit knowledge comes with the person. It is the result of experience and shows in performance and in the capacity to respond efficiently to new problems and challenges. This type of knowledge is accumulated experience; it is personal and non-explicit. This implies that transferring it to other people is difficult and complex.

Tacit knowledge is essential in agriculture, as it is in all activities. However, farmers are frequently trained almost exclusively on the basis of explicit knowledge. A U-turn is needed here, a complete paradigm-shift, from teaching to learning: from a focus on teaching, towards a focus on learning among people, from their own experience and from that of others, to generate new knowledge.

This brings us to assert that every organization – including the farmer family and the community as a productive entity – needs to appreciate its available tacit knowledge, synthesize it, and incorporate it in key activities of the organization, to boost a process of continuous, social innovation (Peluffo 2003).

In this sense, the specific sense and meaning of RAYMI is to multiply, in people and their organizations, both their capacity and the opportunities to learn, which will improve and generate new local knowledge, pertinent to and relevant in its context. In other words, Raymi doesn't seek to teach anything, and much less pretends to 'transfer' one technology or another, but rather facilitates a learning process. This depends on the following variables:

### **Multiply people's and organizations' capacities and opportunities to learn**

Farmers learn their trade by direct observation, mentoring, and also by carrying out their own experiments. Tacit knowledge flows in all these activities, between generations, from neighbour to neighbour. However, this all occurs in a very small radius, as the existing platform of socialization of knowledge is weak, as it is (almost) spontaneous. RAYMI reinforces this basic platform of learning and innovation. This enhanced platform can involve hundreds, even thousands of farmers. Each participant experiments, in an effort to win the prize. This improves their capacity to learn in a more systematic fashion. Evaluating who are the winners is an exercise which involves everyone, as everyone compares his or her achievements to those of others. This self-evaluation increases the value of the experiments and further reinforces the learning-platform. Selecting the winners also implies the identification of the best practices available, adapted to local conditions. Sharing best practices and the names of their innovators creates legitimate and well founded pride in one's capacities. These processes therefore improve both capacity and opportunities to learn.

### **Improve and generate new local knowledge**

Every technique and its applications, can always be improved upon. Farmers' extant knowledge base forms the basis of significant learning, which occurs when new information is added to the cognitive structure. This implies that new ideas, concepts and propositions, can be learned, *if and when* these connect to those that are already available in the cognitive structure of the individual. These previously available ideas, concepts, and propositions serve as an anchor to the new ones (Piaget 1971). Learning and generating new alternatives makes it possible to break through the roof of what appeared to be the limit.

### **Knowledge must be relevant in its context**

Knowledge is always highly contextualized in time and space. Raymi's approach is therefore 'adaptive': the farmer's management system must be constantly updated and adapted to changes of the environment (physical, biological, economical, social, etc.). The quality of adaptation and renovation is intimately linked to learning, defining 'adaptive management as the process by which people adjust their management strategies to cope better with change' (Wollenberg 2004).

### **Refocusing sustainability**

Sustainable development cannot be achieved by by transferring pre-conceived 'solutions'. As Freire (1973) said:

*Knowing is not the act by which a subject, transformed into an object, humbly and passively receives the contents that the other gives, or imposes. Knowing requires action that transforms a reality. It implies invention and re-invention.*

The Raymi process allows learning to continue also after project intervention, and therefore contributes to a more sustainable model. This happens through two mechanisms: first, participants in the project have regained self-esteem and have learned to investigate independently and second, the impact of the project spreads also to those who did not participate. This is achieved by involving 30-40% of the population in the innovative processes. This is the critical mass required to assure that the process of change continues beyond the end of the project, to include the population as a whole (Van Immerzeel and Cabero 2003).

### **Refocusing on the system approach**

Every part of a system depends on the whole. In turn, the functioning of the system depends on its constituting parts, but above all, on how relations between the parts are organized. In rural development projects, reality is often perceived as a complex 'system', and as a result many project approaches are defined as 'systemic' or 'integrated'. There are however important differences between how the system focus is being operationalized.

Raymi enriches the system focus by, first, the use of simulation models, to improve its understanding of the eco- and agricultural system. These models can and should be used in combination with models that predict the impact on the regional economy. The use of these models can help to find the changes which are ecologically and economically sustainable and most desirable. Second, the approach recognizes that development is also about developing the social system interacting with the ecological and economic systems. Growth should occur on the relevant levels of human development: socio-cultural and technological.

Social articulation follows a sequence of growth, starting with actions taken to strengthen peoples own identity, and then providing mechanisms to strengthen coordination between the different levels of the social organization. Strengthening identity in the case of indigenous farmer communities means strengthening their cultural identity. This in turn contributes to the development of the social system.

By refocusing on the system approach it becomes possible to effectively change communal rangeland management, in such a way that these vast areas are reclaimed quickly and at hardly any cost. We believe this approach to be vital for eradication poverty in this part of the world.

### **Tasks and challenges of Raymi**

The Raymi process is constantly considered to be ‘under construction’; it is not finished and it never will be, evolving and improving through new experiences. This is supported by three approaches, which continue to provide challenges:

### **Evaluate experience**

Common criteria and instruments are applied to make comparison of facts and figures possible, and to make lessons learned widely applicable. Such a strategy allows good practices to be reaped from the innovations of each project. Evaluations must include the socio-cultural aspects, among them, self-esteem, social capital, identity and cultural energy. This should not be a one-off effort, but an ongoing process whereby procedures and methodologies rather than results are evaluated.

### **Conduct case studies**

Case studies can contribute to greater understanding of the processes described above, and can generate knowledge and understanding of the success factors of self-sustained development processes.

### **Adapt and apply Raymi in other cultural settings**

While the approach has shown its effectiveness in a wide range of cultural and institutional realities, in rural development, as well as in preventive healthcare and micro-industry, its application has been predominantly restricted to the Latin American Region. Whether it can have similar results in Africa, Asia and Oceania, and whether its basic principles are applicable elsewhere, remains to be seen.

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### **Abstract**

This article presents the origins of the RAYMI capacity building system and shares some of its experiences in Peru, Bolivia, Guatemala, Ecuador, and Chile. It illustrates results and outcomes of applying the approach in rural developments projects, as seen by several independent evaluations. Further, the article presents the approach's main success factors, including some of the theoretical assumptions, methods and tools which include: constructivist learning theory; knowledge management; agricultural innovation; agricultural systems and simulation models in animal and crop production systems research; ecological community succession; colonial syndrome and transcultural participation. It illustrates how these were brought together in the Pachamama Raymi knowledge management system.

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<sup>1</sup> PRODERM, a European Union – Dutch Aid rural development project in Peru.

<sup>2</sup> “*Unu Kamayoq*” = “guides of the water”, specialists in field irrigation in Quechua.

<sup>3</sup> The indigenous cosmology of the universe includes a sense of reciprocity: farmer families must return, acknowledge the “favors” received from Pachamama, whose elements (mountains, rocks, trees, creeks, lakes, animals, plants, etc.) are a living entity, quite similar to our concept of “environment”, with the crucial difference that Pachamama, Mother Earth, is sacred.

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<sup>4</sup> Conclusions of the “Workshop Identification of Supply and Demand in Training Methodologies in Projects of the European Union” in Latin America (Arica-Chile, March 27-28, 1995).

<sup>5</sup> In most projects, only a small percentage was destined for Pachamama Raymi, with the exception of MARENASS, Pachamaman Urupa Qantawi and the two Pachamama Raymi projects, which dedicated almost all their resources to Raymi.

<sup>6</sup> A number of publications on RAYMI is available online: [www.dexcel.org](http://www.dexcel.org)