TECANA AMERICAN UNIVERSITY

Postdoctoral Program in Health With emphasis in Environmental Education

A CHALLENGE TO CHANGE MODEL

CLIMATE transcending HEALTH

INTELLIGENT ENVIRONMENTAL IN THE TWENTY-FIRST CENTURY

(WITH commitment, leadership and footprint reduction ECOLOGICAL)

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"I hereby swear that I am the only author of this draft and that its content is the result of my work, experience and academic research "

La Paz, July 2017

Up to heaven, explores the infinite and you will reach the stars

in the most wonderful time of your

existence, to satisfy your craving

grandeur and know

you're still alive.

Elba Viviana Flores Yugar Ph.D.

DEDICATION

In the infinite some possible spaces of encounter with science, ever so come down in the scientific environment of those who pride ourselves wanting forward in time are drawn.

To all we propose goals that many times seem to become unreachable by barriers that certain human try to impose.

A bold, which constitute ourselves as scientists are required to be infallible and not transgress on the minimum standards imposed by / which constantly break them?

Those who condemn us even cares detective who escarmientan us for trying to support those who really really need us?

Those who journeyed paths of worlds so different, yet so alike?

Those who still retain hope to continue and succeed in building knowledge still to be revealed.

The author

GRATITUDE

It is not easy to start these lines immeasurable joy that feels, because there are still things that accompany the process of attaining the unattainable.

Those who continue to encourage my actions from different national and international contexts (North American, European, Asian, and Latin), which magnifies my spirit and makes me able to move on the path of relentless advance of science.

My mother Flores Max Michel, from which I come forth as a thinking being.

My brother Eddy Alejandro, special thanks.

My brothers / sisters Sara, White, Marlene, Fernando, Ricardo Yugar Flores, with whom I share great moments of life.

The author

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GLOSSARY OF ABBREVIATIONS, ACRONYMS

GEI	Greenhouse gases
UN	United Nations
GIEC	Intergovernmental Panel on Climate Change
IPCC	Intergovernmental Panel on Climate Change
CO_2	Carbon dioxide
WFF (acronym)	World Economic Forum
BSA (acronym)	The Software Alliance
CEPAL	United Nations Economic Commission for Latin America and the Caribbean
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross domestic product
ODM	Millennium Development Goals
ALADI	Latin American Integration Association
CELAC	Community of Latin American and Caribbean States
ODS	Sustainable Development Goals
ABI	Bolivian Association of Information
IRD	Researche Development Institute
INE	Statistics National Institute
ICT	Information and communication technologies
PNCTIB	national plan of Science, technology and Bolivian research

SUMMARY

The research raises the situation of the population affected by climate change, which needs to take up the challenge to it, with commitment and leadership through the implementation of educational preventive measures in the twenty-first century; whose mechanisms of decreasing the ecological footprint and impact on the process of adaptation and mitigation of climate change, challenge and get the raised transcends to the Intelligent environmental health, outlined in a model.

The specific purposes are raised awareness of the nutritional status of the youth population, and its impact due to climate change. The challenge to climate change, with commitment and leadership; by implementing preventive measures possible to transfer educational information, motivation, personal skills and self-esteem; unmissable towards continuous improvement of health. Also, establish mechanisms of decreasing the ecological footprint and impact on the process of adaptation and mitigation of climate change. It also addresses the economy and its relation to environmental impact. In addition, the technology applied to its progress in this century, make it possible to achieve significant changes after the smart environmental health.

Keywords: climate change, ecological footprint, adaptation, intelligent environmental health model.

ABSTRACT

The research presents the situation of the population Affected by Climate Change, who needs to take up the challenge, with commitment and leadership, through the application of preventive educational Measures in the 21st century; Whose Mechanisms of reduction of the ecological footprint and the repercussions in the process of adaptation and mitigation of the climatic change, get the challenge posed to the intelligent and transcend environmental health, outlined in a model. The specific AIMS That are Proposed are the knowledge of the nutritional situation of the youth population, and Their Repercussions due to climate change. The challenge of climate change, with commitment and leadership; Through the application of preventive educational Measures to transfer information, motivation, personal skills and self-esteem;

Inescapable towards the continuous improvement of health. Also, Establish the Mechanisms of reduction of

the ecological footprint and the repercussions in the process of adaptation and mitigation by the climatic change. Also it addresses the economy and Its relationship to environmental impact. In Addition, of the Technology that applied in ITS advances in esta XXI century, are possible to Achieve significant changes, after intelligent environmental health.

Key words: climate change, ecological footprint, adaptation, intelligent environmental health, model.

I summarize

A research raises climate affected situação da população alterações pelas, which requires assumir or challenge to, com empenho and liderança da implementação using preventive measures Educacionais not século XXI; cujos mechanisms diminuir to ecological impact on or attached eo processo of Adaptação and mitigação gives climate mudança, Começa or challenge and transcend raised to a smart environmental saude, esboçada em um model. São os aumentou to specific objectives or nutritional awareness about Jovem da população, e seu climate impact devido mudança. O challenge for a climate mudança, com or compromisso and liderança; Possíveis da implementação of using preventive measures to transfer

informação educational, motivação, Pessoais skills and self-esteem; imperdível for a Melhoria Continuous gives saude. Além disso, estabelecer mechanisms diminuir to ecological impact on or attached eo processo of Adaptação and mitigação gives climate mudança. Ele também approached economy and com sua relação or environmental impact. Além disso, a technology used for or seu Neste século Progresso, é possível significant Mudanças alcançar após a smart environmental saúde. Keywords: Alterações climatic, ecological Pegada, Adaptação, model, intelligent Saúde Ambiental.

INTRODUCTION

Innovation technology applied in different situations progress in food production, in solving health status, positioning and leadership of economies, as a means of promoting health, preventing problematic situations as a result of adverse conditions that they are presenting on the environment by changing climate produced by

mainly because
Anthropogenic, make its position in the XXI century, a time when humanity can function planning, execution, control, monitoring and evaluation of the situation, moving towards continuous improvement.

Pollutants are one of the determining factors for climate change occurs and exert pressure to cause habitat loss, air pollution, water pollution, loss of biodiversity, drought in some cases and heavy rains in others; so it should be considered that one of the matrices that are part of the environmental conditions in which people live and work and should be addressed with sustainability, air, water, soil and food.

Climate change, which resulted in droughts considered as natural disasters,
floods, highly damaging to the
food production gives states as a result of malnutrition in certain populations,
what is necessary to reverse; putting on
consideration that every individual living in an environment with established relationships, being different expressions health and disease interrelation between individuals and groups with the natural and social environment in which it exists and develops.

The state of human health has to be preserved, is related to the welfare allowing one of the conditions for the performance and fulfillment of social role, whose development is physical, mental and social fulfillment; conditioned by the historical development time in which humanity lives, lifestyles, biopsychosocial changes, urban growth.

Regarding food security, consumption of one of the pseudocereals that may be used in the diet of the population is quinoa, resistant to sudden temperature changes and development in suitable environments for the product where it is not possible adaptation other food products, reducing the footprint, which for their high protein properties constitutes one of the highly favorable mainly for developing population nutrients (children and youth).

Raised the situation, this thesis investigates the nutritional status of the youth population, the challenge of climate change with the possibility of being mitigated by one of the food nutrients, positioning and product consumption in the domestic and international market with commitment and leadership ; whose main influence is towards achieving intelligent environmental health in the twenty-first century. This is reflected in the research content developed in the different chapters.

Chapter I, has the research base:

The perceived problem, after an analysis and assessment of the situation, formulating different cuestionantes arises which is intended to respond.

In addition, the research proposal is justified, once warned the problem, which through existing potentials give the possibility to respond to the situation.

The objectives pursued are those who finally may be answered through the submission of the final research proposal.

Chapter II relates to the method aspect, referring to the type of investigation to be performed is, the subject and temporo-spatial boundary; also possible limitations exist.

Chapter III, which describes the various materials from within research on the subject matter, whose theoretical basis is the basis for achieving the various objectives set out in this thesis.

Chapter IV is where built as proposed postdoctoral research this model as a basis for future proposals according to the needs and realities that will be presented raise.

Post-doctoral thesis ends with the conclusions that arrive after the different research and presentation phases of the model as proposed.

CHAPTER I. THE PROBLEM OF RESEARCH

1.1. Problem Statement

The current environmental problems today is related to climate change, the reality is determined the precariousness of the environment by the lack or decline in healthy environments, causing the vulnerability of people and countries; It is cultural, geographic, economic, social and political diversity that has influential character in environmental health. The C ONSEQUENCES health will be translated into the loss of working capacity and labor productivity,

limiting in their actions populations vulnerable.

Environmental health with sustainable development towards improving the conditions and application control determinants, is aimed at reducing the problem and extent of favorable conditions; whose inequalities are increasingly vast.

Human well-being as interactive part in the environment is possible, but when there is a break or imbalance of homeostasis, the environmental crisis occurs which human well-being in these cases is in question, as well as keep it.

Projections by 2050, making it likely that about third of humanity will constitute environmental refugees, because humanity is at risk of disappearing due to environmental health problems and not the planet; therefore, it is impossible to think of a finite planet linear system and achieve a favorable development of environmental health.

Upon an analysis and evaluation of the environmental situation and production of goods and services to humanity, it is inevitable considering the state of the environment also related to electricity, water, soil where the seeds that bear fruit need a room propitious, good air quality, which today is increasingly diminished by the intervention and anthropogenic modification of the land.

Another problem situation caused by climate change, as the current and future impact of climate variability to be addressed is the vulnerability of food systems to avoid deterioration of the nutritional status of the population, ecosystems, societies and national economies; whose impact could be negative for environmental health, which must adopt measures related to innovative data systems, tools to assess the impact of climate and vulnerabilities, and

adaptation planning practices, which according to FAO is already developing.

Production of goods and services originating in a certain region, the development cycle is related to the production, packaging, transportation, distribution, consumption, disposal, recycling; if no time is shortened, it is possible that the ecological footprint can have a negative impact on environmental health, and unnecessary spending of the economy that are detrimental to the economic situation in some countries; with impact on the process of adaptation and mitigation of climate change.

To achieve progress in improving the current problem of environmental health, it is also inevitable chord technological contribution to nature and the environment, the combination aimed towards sustainable development would ensure that the current needs through the implementation of policies and budgets for

entities

government; and the general population with environmental education to cope with adversity, following the slogan of protection and sustainable use of natural resources and the environment, towards smart environmental health in the twenty-first century.

1.1.1. Problem formulation

The problem, infers that a series of measures to be mitigate or control the current situation in which they live, according to the twenty-first century will be needed. So the formulation of the problem is posed as follows:

What is the model that can meet the challenge of climate change whose commitment, leadership and reduced ecological footprint, favors intelligent environmental health in the twenty-first century?

Secondary questions like the following research questions are formulated:

How it is affected the nutritional status of the youth population, and how climate change influences?

What makes it possible to take up the challenge of climate change, with commitment and leadership?

What are the mechanisms used to decrease the ecological footprint in the process of adaptation to climate change?

What model will get to challenge climate change,
transcends into a Intelligent environmental health in the twenty-first century?

1.2. Justification

Representations of future climate built on the existing climatological based on this that explains the use in research, it is one of the potential consequences of climate change, with successful intervention to reduce the effects of anthropogenic action.

This is useful and serves as a contribution to different projections represented in various forms of intervention.

The concern is present in all countries of the world. Climate change, caused by highly industrialized countries, produces high emissions disproportionately, which also seems to be behind a severe drought causes crop wilting, whose impact has been most severe in countries in southern Africa. As a result, it has caused a food crisis resulting from acute malnutrition of 1.3 million children in the African region, according to the United Nations, reported by New York Times (2017).

The occurrence of pests and diseases affecting crops and livestock, resulting from changing weather conditions constitutes an unfavorable situation for the nutrition of the population particularly the most vulnerable and productive in which is youth; because 60 percent of the land area of farmland, pastures and forests are increasingly exposed to threats from climate variability and climate change. With the possibility according to the FAO, that the Millennium Development Goals (MDGs), especially those related to hunger, reducing poverty and ensuring environmental sustainability, are seriously threatened by climate change.

As climate change as tangible as victims, it is necessary to pay more attention to the high impact on children, to make clear the possibility of quality of life and welfare of countries towards intelligent environmental health in the twenty-first century, as part the challenge of climate change, trying to be effective and efficient in deploying actions to avoid problems of malnutrition, environmental pollution, assurance of production and consumption of nutritional foods of the region and application of technology; focusing on the prevention of processes and attitudes of the population, for the purpose of

transit resilient development paths of climate change and poverty reduction of the affected population.

By adverse situations in the environment caused by climate change, as suggested by the United Nations 2009, one of the vital elements such as water, you probably will decline for many reasons, among which may be noted the increase in temperature environmental causing loss of water reserves found in nature; another cause is increasing population density becoming insufficient quantities of water present; the constant migration due to lack of employment, family or health reasons; the globalization; the use of natural resource for power generation, agriculture, health, hygiene, daily intake; use in livestock and vegetation.

By decreasing water reserves occur, it is likely that environmental health and ecosystem affected. The health of the population will also be affected by poor hygiene, by increasing water contaminated with the proliferation of different microbial agents and as a result is likely to food shortages that would undermine the nutritional status of the population occurs.

Food sovereignty, raised in the UNDP document 2017, as a right of peoples to nutritious and culturally appropriate, accessible, produced sustainably and ecologically also their right to decide their own food and agriculture systems in the policy framework and strategies are those that ensure food (Sellingue, Mali, 2007), which makes the current situation where the population is about their food and nutritional level reached reconsider.

What prefix, is related to the possibility of facilitating the study of one of the many aspects of science, technology and innovation, involving the Bolivian reality and the needs of development of scientific knowledge,

favoring natural resources and

potential biodiversity of Bolivia, promoted by the various research areas and involving different cultures in order to once planned problematic project into a future that enhances the productive, improving the health of the population growth, environmental ; in a society forward in the century

XXI.

One of the pseudocereals high possibility of positioning in the local and international market, quinoa, which should be given preference in consumption by national population to counter states

undernourishment of children and adolescents due to lack of nutrients as a result of drought, avoiding chronic food insecurity. The important thing is tending to ingestion of food that meets the dietary needs.

As for the relevance to national food security, quinoa, is appreciated for its nutritional characteristics, consumed Traditionally in the west. Its protein content and lack of gluten makes it an export product, where Bolivia is among the leading producers in the world.

Studied on the effects of climate change, according to the IRD, 2010, there is concern crop sustainability by expanding the agricultural frontier and poor soil management. Studies were also initiated to determine the effects of climate change, being dedicated to the performance and productivity of different varieties in the Bolivian altiplano.

Having described the situation justifies this research, the model to be proposed will be built considering the climate change challenge in cases of continuous droughts whose times are in which food insecurity and undernourishment states occurs. It also includes product positioning in the domestic market which decreases the footprint and export the surplus generated an increase in the economy. Commitment and leadership, production and marketing, and the application of digital technologies and communication and information, is designed to accelerate process improvement in production, nutrition and education; after the smart environmental health in the twenty-first century.

1.3. Objectives of the thesis

1.3.1. General objectives

Design a model climate change challenge, the commitment, leadership and reducing the ecological footprint, transcends the smart environmental health in the XXI century.

1.3.2. Specific objectives

- Knowing the nutritional status of the youth population, and its impact due to climate change.

- Take on the challenge of climate change, with commitment and leadership; by applying technologies that enable food security, preventive measures possible to transfer educational
  information, motivation, personal skills and self-esteem; unmissable towards continuous improvement of health.

- Establish mechanisms for decreasing the ecological footprint and impact on the process of adaptation and mitigation of climate change.

- Structuring a recital the aforementioned components model, which gets the challenge of climate change and transcends the Intelligent environmental health in the XXI century.

CHAPTER II. METHODOLOGICAL FRAMEWORK

2.1. Kind of investigation

Types of research to be applied according to the level thereof, shall:

- Exploratory to know the subject whose antecedents are applicable to the local context, related to the IMPAC to climate change in the nutritional status of Bolivian youth population on the basis of reducing the ecological footprint, commitment, leadership, and application of technologies; and to provide an approximate picture of the same.

- Descriptively, allowing describe variables related to the phenomenon d the impact of climate change , Nutritional status
on the basis of some nutrients; skills acquired on the ecological footprint, leadership and commitment .

- Depending on the design: documentary analysis, based on literature review whose information collected enables analysis and breakdown of the material and mental information regarding the research topic concerning the challenge of climate change that transcends the smart environmental health in the century XXI, and later to the structuring of the elements, relationships, supported as conditioning properties involved in the development of research.

- The theoretical modeling as a method that by abstracting reflected in thinking on the basis of theoretical knowledge, you can identify the fundamentals that will sustain the theoretical construct, whose design symbols, special codes and other graphic elements will be used; where construction guide the transformation of reality represented reproducing certain properties and relations climate change challenge in another model regarding the very essence

Original modeling; potential and actual processes, relations and functions, by analogy, to the deepest knowledge or better mastery of the ecological footprint, leadership, commitment and application of technology that transcends the smart environmental health in the XXI century.

Among the strategies to be applied will be those that respond to the questions raised in the investigation.

2.2. thematic, spatial and temporal delimitation

Delimitation Theme.

What is to investigate the impact of climate change on the nutritional status of the youth population confined to Bolivia; assuming as challenge the application of mechanisms for reducing the ecological footprint, with commitment, leadership, and technology that transcends the smart environmental health in the twenty-first century; to finally design a theoretical model, useful for mankind.

Space delimitation

Spatially the study includes the situation of Latin America, later to enter in-depth investigation of the Plurinational State of Bolivia and finally confined to the department of La Paz.

Temporary delimitation

The background for the management of statistics, research or other contributions in order to research; are those between 2015 and part of 2017.

limitations

The possibility of little information on the subject, by stagnation in research contributions.

Lack of existence of documents that reflect actual statistics on the subject.

Time factor and compliance activities; based on control and compliance established in the schedule of activities.

CHAPTER III. Frame of reference

3. Background research

3.1. Background

Referents from investigations that have close relationship with this investigation, are evidenced in the following publications presented below.

At work Eight theses on climate change and sustainable development in Latin America, authored Galindo L, Samaniego J, Alatorre J, Ferrer J, Reyes O and Sanchez L, published by the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), 2015; some related to climate change and useful for understanding and addressing on subjects related to running the thesis dissertation, which are the subject of analysis is:

1. **Climate change is already expressed in obvious changes in the current climate that intensified in the future.**

methodology

Depending on the level of exploratory research, descriptive, explanatory

results

Climate change is reflected in increases in atmospheric and ocean temperatures, changes in rainfall, snow and ice decline, increased sea levels and changes in weather events.

That recent decades have been progressively warmer, comparatively from 1850 1983 and 2012. Increased 0.85 ° C between 1880

- 2012. nights and cold days were waning.

There is a certain persistence on the level of confidence in the global trend of drought and hurricane activity, with differences between regions.

Climate change dynamic ice sheet and terrestrial water storage are treated as if they behaved according to a uniform probability distribution. That with current knowledge of data is not possible to make a quantitative assessment of the situation.

Projections for 2016 - 2065, is not taken into account the possible influence of factors leading to the range resulting from the evaluation for changing the global mean surface temperature short term (2016 - 2035), smaller than the range of models 5% - 95%, whose longer-term projections have not been quantified by insufficient scientific knowledge.

In Latin America, since 1960 there is a temperature increase of 0.1 ° C per decade, with increasing hot days. Climate projections being an increase in temperature for this century between 1.6 to 4 ° C for Central America and South America; with the possibility of further increases occur in the temperature regions. As the storm projections for South America would be heterogeneous by location, being reduced 22% for the Northeast of Brazil and an increase of 25% in the southeast of South America.

2. Another thesis is related to: **Climate change is a overall but doubly asymmetric phenomenon for Latin America**

methodology
Exploratory, descriptive, explanatory research
results

Global emissions in Latin America are even lower, but it is going to increase.

The effect of the multiple negative consequences on economic activities fall within the welfare of the population, ecosystems (IPCC, 2013ª; Magrin and others, 2014), significant impacts on agricultural activities, water, biodiversity, rising sea level, forests, tourism, health and cities (Magrin and others, 2014; ECLAC, 2014b). Which they are heterogeneous, positive for some regions and periods with negative long-term dominance. It is estimated for Latin America and the Caribbean an increase of 2.5 ° C temperature (probably around 2050) ranging from 1.5% to 5% of the current GDP. Such estimates are highly uncertain, conservative, limited to certain sectors and regions and methodological limitations, but are indicators for public policy.

Latin America (Galindo et al 2014b) show elasticity of economic growth on poverty changes between -1.53 and -1.76 for the indigence line and between -0.94 and -1.46 for the poverty line depending on the indicator of poverty. Data indicating that higher economic growth reduces poverty, and greater inequality in income distribution adversely affects the evolution of poverty. To 597,000 and 1.08 million people could remain in extreme poverty and poverty (Galindo 2014c).

This shows the inequity of climate change that are more vulnerable groups such as children and older adults and the poor, although these groups are not the biggest emitters of greenhouse gases (GHGs) (Kahn, 2005); (Pelling, et al, 2002; Kahn, 2005; Kalkstein and Seridan, 2007; Rodriguez, et al, 2010) .That poor have fewer mechanisms to cushion any macroeconomic shock for their socioeconomic and household characteristics.

Total emissions in Latin America and the Caribbean account for 9% of global emissions of CO_2 equivalent (4.2 $GtCO_2$ eq) in 2011, the average annual growth rate is 0.6% from 1990 to 2011, which contrasts with a growth rate of the global emissions of 1.5% for the same period.

Energy emissions in Latin America, representing 42% and 73% global emissions by land use changes represent 21% and 5% globally (ECLA, 2014b). So that emissions of energy are rising and land use change are tending to decline.

Emissions of Latin America and the Caribbean are middle income, lower historical contribution, but with gradual increase in emissions from fossil fuels.

Analysis per capita in Latin America and the Caribbean in 2011, indicate that they are 7 tons of CO_2 eq, referring to a global average of 6.6. Emissions in Latin America and the Caribbean per capita energy are 3 tons of CO_2 eq in comparison with the world average of 4.8, showing significant differences by country.

The thesis also analyzed is:

3. Adaptation to climate change to sustainable inevitable.

methodology

Explorative, descriptive, explanatory

Results of the investigation

There is evidence of climatic events and mitigation undertaken by countries of the United Nations, it is still insufficient.

Latin America must incorporate between sustainable development strategies, timely and efficient processes of adaptation to climate change, which do not require global agreement.

Adjustments have to do with social, cultural, administrative and process changes, changes in behavior, building new infrastructure or use of technologies, structural changes and modifications of inputs products or services and changes in public policy to cushion or take advantage of conditions climate change (IPCC, 2007, 2014; Wordl Bank, 2010ª; OECD, 2012).

Among existing adaptation processes are agricultural units grow maize, wheat and potatoes pass fruits and vegetables; the transition from farms to livestock or mixed and adjust their irrigation decisions (Seo and Mendelsohn, 2008b, 2008a, and Mendelsohn and Dinar 2009). However, there is still ignorance and uncertainty in the actions to be taken so that there is the possibility that the damage is irreversible, significant inefficiencies and barriers to implementation.

reference to the costs of adaptation for Latin America and the Caribbean that are less than 0.5% of GDP, with a tendency to increase (; Vergara et al, 2013 World Bank, 2010b) is

Analysis concluded that it is necessary to implement economic changes to implement adaptation processes against the negative effects of climate change.

Four. The thesis: **Climate change requires appropriate risk management that is only possible in the context of sustainable development.**

methodology

Exploratory, descriptive, explanatory

Results of the investigation

Climate change uncertainty must be addressed with appropriate risk management. Consider that is a phenomenon long term, with different probability scenarios including extreme events, the instrumentation of mitigation processes should be applied after a weighting performed at the best.

Attention must be paid to the benefit costs of measures to implement and manage the risk of the possibility of extreme events that are potentially severe and irreversible, putting into consideration the loss of life and biodiversity.

Also, consider the risk management process, reducing the negative impacts of climate change

Processes of adaptation and mitigation are not independent. So you should think about the possibilities and limitations of adaptation are limited to levels of mitigation to be implemented. In Latin America, it is necessary to think about this kind of synergies with a view to sustainable development.

5. The thesis **The challenge of climate change is the challenge of sustainable development**

Kind of investigation
Exploratory, descriptive, explanatory research
results

Adaptation processes and mitigation new climatic conditions should be made on the basis of substantial transformation; one is to stabilize GHG emissions to avoid temperature increase to less than 2 ° C, considering a reduction of 7 to 2 tons in the next 35 years.

So the development model should be with a new matrix configuration of public and private goods and services and more equal society; tending towards a better social safety net such thinking public transport predominates in urban mobility.

- Another publication reference of this thesis is the book:

Climate change and adaptation in the Bolivian Altiplano, E Jimenez and others. 2013; Climate change and adaptation in the Altiplano of Bolivia Corinne Valdivia, Anji Seth, Elizabeth Jimenez and Jorge Cusicanqui: the content of the chapter on was considered

Investigation methodology

Exploratory, descriptive, explanatory

Results of the investigation

This research presents recent findings on trends and projections of climate change for the Altiplano region. Assesses global models applied to the Altiplano region.

some contributions from researchers and the analysis by García arises (Valdivia et al., 2010) climate trends for the Altiplano, spatial and temporal character, showing tendencies to increase the minimum and maximum temperature in the last 50 years with differences between the South (cooling) and north (heating) .Also analyzes how people in rural communities is perceived variations and the impact on both their livelihoods and their capitals, especially in natural capital.

That global, or a global model models typically used by national organizations to initiate local models. There is a need for adaptability. A future by Seth et al,

2010 trends persist.

10 models to characterize precipitation, temperature and extreme events that affect agriculture, report results as identifying start date of the rainy season and the dry season, capturing the weakest cycle monthly temperatures ; being that observations models show a small bias to heat and moisture transport excess moisture from the Amazon (Seth et al., 2009a).

Mid 21st century, some agreement between models stockings increase in temperature which are 1.5C is likely that 2099 is greater than 4 ° C (standard deviation of 5 to 6). Rainfall between models are comparatively less intense and not significant for all seasons.

According to the analysis of the research is likely the beginning of the rainy season (September-November) is drier and the highest point (January-March) is wetter, which implies a shift towards a stronger rainy season and later (Seth et al., 2009a). As the temperature tends to rise overnight. Now increased frost occurs by increasing the temperature and decreasing humidity, this future may be reversed. But today rainfall was increasing, both effects are produced in the town of Patacamaya.

Dry soil in rural areas, is caused by rising temperatures and elevated evapotranspiration, despite existing rainfall, the results are still considered provisional until having higher resolution models.

Which means that the rains will be more intense, short-lived; This causes uncertainty in the population because periods of agricultural production will also be short. And arise cuestionantes of How can develop coping mechanisms?

On the analysis of future climate trends for the next 50 years in the Altiplano, they will be changing.

Although limitations on the use of forecasts found, even being made by trained personnel (Broad et al, 2002) and problems of hierarchy and coordination (Roncoli et al 2000); however, it shows that these results will be of greater benefit to the best developed countries.

While there is information that can help the rural population to accommodate their strategies and adjust to changes (Valdivia et al 2003;. Patt Suarez and Gwata, 2005); this alone is not helpful in changing actions, so that institutions must create new references, to facilitate the transition with practice.

For decision-making, should be considered risk assessment, perception, communication and management. As in the first case, risk assessment, probabilistic; risk that it may also happen to be systematically needed for decision-making.

As for perceptions, you can have influence on decision-making, whose few studies addressed on the impending ecological hazards (Willis et al, Rees, 2009); on existing data it notices a

underestimation of the population, but an overestimation of the probability of new data (Fischhoff et al., 1981).

Thus, in the Altiplano, its base is more to the expectation of the application of traditional assessment, if any problems between ancestral and from experts. If participatory communication can increase the degree of confidence. (Wilkins, 2001); Sherer and Cho (2003, 261) hypothesize that the Community network structure influences the risk; and understanding how information networks in the community affect perception, communication and risk management, which can contribute to define a basic framework of the changes occurring in the Altiplano.

In the Altiplano, there is little confidence in scientific forecasts, so that decisions are based on traditional indicators of climate conducted by local experts on the basis of interpretation and intuitive understanding of the principles of probabilistic forecasting; In addition to indicators like the stars and winds as patterns of regional or subregional climate are plants or animals to a specific neighborhood or local community (Gilles and Valdivia, 2009)

In family perceptions of each type of risk, in Ancoraimes (Northern Altiplano) three ecosystems were considered at high risk perceptions of climate change, with significant differences between agro-ecosystems like for the central part; in Umala (Central Highlands) basins were classified into two groups, dairy and agricultural mountain with high risk for floods, frosts and other extreme events mainly in the latter part. Not having the same level of risk from drought.

Among the dangers are also socioeconomic, pests, infertile soils, being higher for the municipality of Ancoraimes. Hazards are other selling prices of livestock, by be a source of accumulation of economic capital and tackling climate change.

The differences between the two regions is also the vulnerability related to job loss of an adult family member decreases the economic situation. These dangers, show that not only is agroecosistema features; but also socio-economic and lifecycle household conditions.

On adaptation and alternatives, it is necessary to conduct studies on the social and technological aspects of adaptation of cropping systems (Lobell et al., 2008, p. 610). Adaptability, skill demand in advance, rather than the reaction to an event. In the

This should add processes that facilitate planning and strengthening of social and political capital in rural communities. The latter being key to achieving resilience to micro and macro level (Valdivia et al., 2006; O'Brien et al, 2008, p 198..). The ability to adapt and reduce

vulnerabilities, is the
diversification. This requires taking into account the types of markets, the existence of non-market institutions such as ayni and the impact of different environmental policies. This is applied in the Highlands, with diversification towards adaptation; There is, however, significant differences between the North Highlands and Central regard to capital as in the case of human (education of the household head), natural (varieties of potatoes), social (access to credit), cultural (knowledge of biophysical indicators) economic (having won) and food security (food reserves).

Markets are seen as a source of opportunity, but involve risks because they have to face decisions about what is produced and what is consumed. (Valdivia et al., 2001, Valdivia and Quiroz, 2003; Easter, 2002; Materer, 2001; Ellis, 1993, 1998).

A non-agricultural strategy found is migration, especially where there is a lot of fragmentation of land, and where there is a high degree of climate risk (Valdivia et al., 2001; Valdivia et al., 2003; Bebbington, 1999; Reardon et al, 2001).; becoming an alternative especially during drought, for greater connection (Valdivia,

2004).

The development of adaptive capacities, can be achieved through processes and institutions, connecting knowledge and information systems; not always contribute to its generality, since the sources of vulnerability and fear vary according to the ecosystem, regions, people and expertise to address these issues.

Information on climate change and adaptation, must be collaborative in nature. Research in the Andes should be based on shared common goals and ethics, to enable the exchange, essential to the construction of knowledge. In the field of modeling of climate change, it is important that regional models from global studies aimed at accumulating local information are designed.

For adaptation, success depends on the collective action of communities with municipal, government and private nature interaction. Approaches to facilitate exchange and collaboration among all stakeholders

created and strengthened, which contribute to the generation of different capacities effectively and equitably.

- Another publication related to nutritional status, which is the subject of analysis of some of its chapters, is:

food security, nutrition and hunger eradication CELAC
2025. Items for discussion and regional cooperation. (ECLAC), (FAO), (ALADI) (CELAC). 2016.

Results of the investigation

Chapter I on the current situation of food and nutrition security in the region, food availability is addressed, the same that exceeds the minimum requirements in all countries in the region. Latin America and the Caribbean have enough food to meet their needs in terms of energy. Since the 1990s, calorie availability has increased global and regional scale, the region currently exceeding the world average according to FAO estimates for 2014-2016 triennium availability of 3,069 calories per person per day, exceeding 15% between 1990 and 1992.

The comparative study of South America, shows that food availability has increased by 19%, reaching an average of 3,141 calories per day per person. Central has 2964 calories per capita, an increase of 5% over the period 1990-

1992. In the Caribbean, availability increased by 19% in the period, reaching in the last quarter of 2758 calories per person per day.

While there has been an increase in food availability has influenced the dietary diversity, there are still challenges.

Cereals have become the main source of calories in the region three years 2009-2011: 36% of total available. In Central cereals account for 43% of calories, in South America, 35%, and the Caribbean 33%. But it has declined compared to the 1990s.

The proportion of calories from meat, has increased, as the dairy and, slightly, fruits and vegetables.

However in the region, one third of the available protein comes from cereals, primacy observed in the Caribbean and Central America. In contrast, in South America, the main source of protein is meat and cereals also important.

Regarding access to foods that are related to income, the region has seen a slight decline in income inequality, the Gini coefficient 0.491 remains the most unequal in the world, what a challenge is overcome .

Since 2014, there has been a decline in acquisition costs of products in the region, but there are some variants for inflation warned by lower oil prices and others that are detrimental to the economies of those countries .

Chapter II, is related to the nutritional status in countries of the CELAC: global targets and associated variables, of that analysis related to malnutrition, overweight and obesity also micronutrient deficiencies is made.

Existing records on the low birth weight of children note that reaches 9.1% comparatively between countries of the Latin America and the Caribbean, Bolivia is the state with the highest prevalence with this deficit; this delayed intrauterine development associated with nutritional deficit, which brings problems in the future.

Decreasing the problems according to the WHO, it is 30%, being reduced to 2015 2 percentage points in regional average LBW.

Another consideration is breastfeeding to prevent infant malnutrition, being highest in Peru where it reaches 60%, however, the WHO it is expected that by 2025 50% is reached, being Bolivia between to reach that goal.

About anthropometric values that have to do with the low height for children under 5 years, there are different prevalences among the countries of the region. Although chronic malnutrition or stunting was not part of the goals for monitoring the Millennium Development Goals (MDGs), but currently in the nutritional goals of WHO and the Sustainable Development Goals (SDGs), this it is the most important indicator. However, the approaches are quite different between WHO and ODS (Sustainable development goals) 2030, being in the first case the approach decreased 40%, and in the second case involves eradication (a lower prevalence 2.5 points).

The differences are between the countries of Latin America and the Caribbean, and also warned the overweight of children produced by a sedentary lifestyle and increased macronutrients in the diet, which is affecting the population, child, adolescent and adult; being higher among women 61% in men 54%; this situation is

higher in urban areas as opposed to rural areas, where most malnutrition exists.

Regarding micronutrients, do not yet exist reliable data on the subject, despite the great efforts. But it warns that there is a micronutrient deficiencies affecting the infant population under 5 years of age in the region. Bolivia and Haiti, would be the most problematic being affected with iron deficiency anemia, about 50% of children.

Chapter III of the same publication the food prices are studied:

The time when levels were quite high prices are between mid-2008, late 2010 and September 2011, decreasing by March 2014 by high levels of production of cereals and oilseeds and stocks.

Conditions in the countries of Latin America and the Caribbean are different with respect to the food supply, with respect to dependence on a larger scale of imports and exports in various product categories. Variations in international prices on local economies and the region are also very different, by differences in the magnitude and speed of price transmission, in addition to price action that benefits an exporting country can be detrimental an importing country and vice versa.

Also in the same country there are groups of consumers and food producers who suffer differentially impacts the behavior of international prices. This has a greater involvement on the poor in peri-urban areas and rural areas, because they are in greater proportion, up to three quarters of their income used to purchase food, causing a strong impact on their economy and becoming a population with low capacity for immediate consumption, thus undermining food security.

Projections by 2015, given the likelihood of improvements in prices of cereals such as rice, wheat and other grains including oilseeds. However, there is a tendency of staying in prices in comparison with what happened between 2007 and 2008.

Barriers demands, also produced by a rise in production in emerging countries. However, major changes are looming in developing countries, the demand for protein foods according to population growth and per capita income,

Unlike starches. To this, the low oil helps in the production adds.

The volatility in prices is not possible to easily control, this depends on the policies adopted by countries based on multiple factors such as the degree of vulnerability to external shocks, the status of importer and net exporter, policy objectives, availability of and other resources. Implementing long-term strategies may be those that reduce the vulnerability of consumers against rising commodity prices to sudden falls in agricultural prices. There is a need to incorporate into development policy to the poor, so it can be possible to enter the food access and coping with economic volatility.

International politics, must also be strengthened to avoid vulnerability among countries of the region, against price volatility. It is also necessary to foster open markets for marketing fresh produce from small farmers, reducing transaction costs; smooth and unexpected changes in world prices.

Chapter IV of the same publication, it is: trade in the region

It is considered that there has been a surplus since 2000, exceeding exports of food by 2014, and producing a decrease in the value of their shipments.

America particularly South America, constitutes one of the main global suppliers of food, extensions of land, water resources, biodiversity, its climate and entrepreneurship; becoming a strategic asset, because the world population will increase from 2015 to 2050 from 7,349,000 to 9,725,000 inhabitants, with the probability of opening markets with higher value added, there being an expansion of the middle class population in regions development.

However, there is heterogeneity between subregions and countries of Central America and Mexico; and in the Caribbean there is a deficit in food trade.

Chapter V analysis, natural resource management and climate change Biodiversity Analysis to climate change and its impact on food security, It is of significant importance in the provision of food, fiber, fuel, genetic resources and water, among other resources. Also, processes and regulation services essential for life and human activities, particularly agriculture,

water purification, pollination, soil formation, control of pests and diseases, the regulation of temperature and humidity, natural disaster protection and prevention of erosion, among others.

Temperature changes have led invasion of ecosystems by alien species, displacing native.

Achieving adaptation to a changing climate conditions, it helps maintain and improve the natural conditions of ecosystems and thus withstand the effects of climate change or recover from them; This decreases the vulnerability of humans against disturbances helping minimize and mitigate impacts on its activities and on infrastructure.

It is also necessary planning instruments with long-term vision, promote thinking about complex adaptive systems, promote knowledge and learning, promote polycentric governance and manage slowly changing variables and their interactions (CONANP, 2015).

To this, the alternative management of some edible species with positive effects on ecosystems that helps improve the quality of human food, especially with nutritional deficit adds; whose management can add unconventional processed foods of different origin. So that globally there are more than 1,000 species of edible insects in the stage of development.

End hunger by 2030, promote sustainable agriculture, to end poverty in all its forms, promote sustained economic growth, inclusive and sustainable, full and productive employment and decent work for all (Goal 8). This is because the countries are developing policy actions and have reflected a shared vision with the objectives of sustainable development with a focus on human rights, focusing on countries and population groups most backward and the value of cooperation between countries region mainly through South-South cooperation to achieve them.

So that countries must work around the measures proposed plan of CELAC, following the Agenda 2030 for Sustainable Development, which encourages States to continue the efforts made on the issues raised in the Sustainable Development Goals ; including ending malnutrition, achieving, by 2025, meet the internationally agreed targets on stunting and wasting among children under 5 years, and address the nutritional needs of adolescents, pregnant women and infants and

older people, and strengthen the prevention and treatment of substance abuse, including drug abuse and harmful alcohol consumption.

- A publication that refers to one of the nutritional foods that is important to improve the nutritional status, food security and reduce poverty of the population, and go after decreasing the ecological footprint is quinoa:

What is quinoa? of Maruenda M.

This publication refers to the benefits of quinoa considered a pseudocereal or sometimes as a pseudooleaginosa for its high oil content. It has a high protein, being an alternative to solve nutrition problems, hunger and food security; so the UN has declared 2013 as the International Year of Quinoa on a proposal from Bolivia, Peru and other Andean countries, Bolivia in that year was considered the largest producer of quinoa and has been promoting the product for the world.

On the nutritional properties, Quinoa is defined as a superfood, whose protein content exceeding 13% has essential and non-essential amino acids other than cereals; It has in its composition 55.7% carbon hydrates inferior to other cereals (Galwey 1990). It has many medicinal actions on the human body,

both preventive and curative. Among the medicinal properties, FAO, its component parts can be used as medicinal product.

In addition to the protein content, it has oils, vitamins and minerals in high concentration. It can be prepared in different ways for consumption. It can also be used in cosmetics, textile industry.

According to the FAO, quinoa is a product that by its composition, must become as essential in the diet.

Among the major producers, Bolivia and Peru are with 92% globally, to a lesser proportion other countries. Depending on weather conditions and other national interest, is it possible to increase the percentage of acreage.

Quinoa production in Bolivia has reached 63,000 ha. 2013, by the higher international demand. But according to Cossio 2008, intensifying the cultivation of quinoa, high mechanization, with climate change at high temperatures, lack of rainfall, can damage

in culture. Among the solutions, poses maintain the biodiversity of the area and Bolivian farmers continue to consume the product at a level of 1.10 kg / person / year, also benefiting from demand for its exports.

United States constitutes one of the main consumers of Bolivian quinoa reaching 61%, followed by France and Canada.

On the export price, quinoa exceeds US $ 3000 / ton, comparatively higher than other cereals; However, their production is not very high.

Quinoa in the world enjoys enormous prestige for its nutritional value for human consumption, and what should be achieved is to be available to consumers at more affordable prices in the Bolivian market.

3.2. Theoretical fundament

3.2.1. historical facts referencing climate change

When performing a historical analysis of the situation, it is necessary to note that history is not just a time frame or sequence of events, but also constitutes an explanatory framework process of medium and long-lasting as the required emphasis (Sahlins 1997), cited by Paz E (2017).

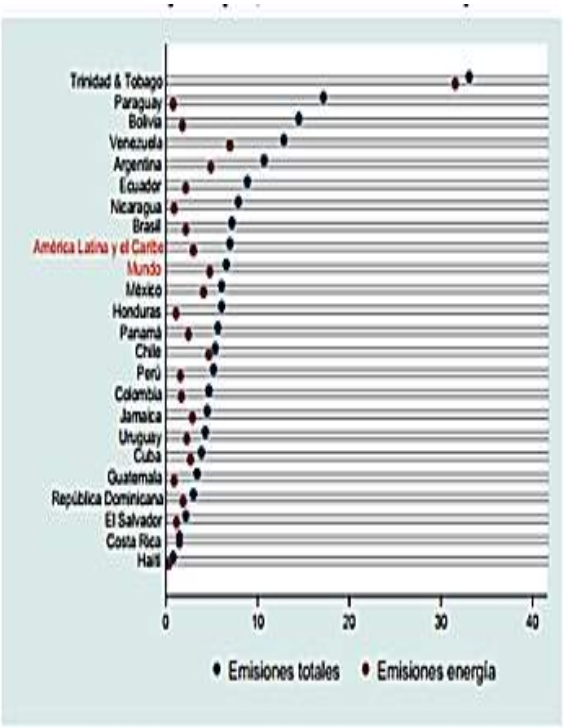
As for the historical facts referencing climate change, they are place and is aware from the neolithic ancestors who started building their tools also observe natural changes that were occurring in the environment such as wind, clouds, rain and everything about the weather that governed their lives.

One of the facts leading to consider climate change, is developed in the fifth report of the Intergovernmental Panel on Climate Change (IPCC), for its acronym in French, and the Intergovernmental Panel on Climate Change (2014), where there was a consensus on the fact that greenhouse gases are produced by fossil fuels, deforestation; misalignments that cause climate system produced by the kidnapping of CO_2 and consequently the temperature rise, so are urged to take

awareness that future emission levels should be lower until it reaches 0.

Environmental pollution confluence gases as contaminants, clouds;
They were analyzed by the group since 1988
Intergovernmental IPCC, which raised as one of the objectives evaluate research of current knowledge on climate change and effect from 1989, 1995, 2001 based on the concentration of greenhouse gases GHG, which increasingly is rising for shares anthropogenic causing increased environmental temperature, the expected could reach 1.4 to 5.8 to 2100.

The greenhouse gases in the atmosphere is composed mainly including carbon dioxide by 75%, to a lesser extent methane and fluorochemicals.



Fuente: Comisión Económica para América Latina y el Caribe (CEPAL) con datos de Climate Analysis Indicators Tool (CAIT) 2.0. ©2014. Washington, DC: World Resources Institute. Available online at: http://cait2.wri.org.

Figure 3.1. GHG emissions per capita 2011, Latin America and the Caribbean.

The total GHG emissions per capita in Latin America and the Caribbean reached 7 tons of CO_2 eq referring to a world average of
6.6. CO_2 eq from energy reaches about 3 tons in Latin America and the Caribbean, compared with the average of 4.8 tons worldwide.

The graph shows, shows Bolivia among other countries reporting information as one of the countries of Latin America and the Caribbean with high total emissions of greenhouse gases, being yet low energy emissions.

As this issue is currently planetary order, solutions must be raised together.

In correlation with the point, they have been established agreements, including the agreement was the UN, where attended 189 countries, whose central axis theme was to stabilize concentrations of greenhouse gases (GHGs).

This agreement came after the Kyoto Protocol, 1997; establishing a commitment to decrease greenhouse gases mainly by developed countries, whose goal was set to 2012. This is in consideration that for example the European Union generates about 11 tons of GHG per citizen per year, compared with countries developing where 1 ton of GHG generated per citizen per year. This agreement was approved by 150 countries, of which about 36 industrial countries decreased GHG by 5 to 8%; of which the United States and Australia do not participate.

Among the policies and measures under the Kyoto Protocol, is promoting sustainable in light of climate change considerations agricultural modalities; as one of the underpinnings for the achievement of food security, which will give way to maintain the nutritional balance of the human population.

is also formulating, implementing, publishing and regularly updating national and, where appropriate, regional measures which mitigate climate change also facilitate adequate adaptation to climate change. Their relationship would be in conjunction with the sectors of energy, transport and industry as well as agriculture, forestry and waste management; in order to improve the quality of life of the population.

Another important aspect is that, through adaptation technologies and methods for improving spatial planning, mitigation and adaptation to climate change; putting into consideration the geographic information systems.

Cooperation in the promotion of effective modalities for the development, implementation and dissemination of technologies, expertise,

environmentally sound practices and processes in relation to climate change and implementing feasible to promote, facilitate and finance measures, as applicable; They favor financially and move after the improvement of the environment as part of the implementation of clean technologies.

To consider the transfer of resources or access to them, for the benefit of developing countries, including the formulation of policies and programs for the effective transfer of environmentally sound technologies that are publicly owned or in the public domain and the creation in the private sector an enabling climate for promoting the transfer of environmentally sound technologies as well as access; enabling the optimization and acceleration of the problem due to climate change; by applying tools as part of the new technologies.

The Kyoto Protocol refers to cooperation in scientific and technical research and and promote the maintenance and development of systematic observation systems and development of data archives to reduce uncertainties related to the climate system, the adverse impacts climate change and the economic and social consequences of various response strategies; which they will promote the development and strengthening of the capacity and capabilities to participate in activities, international and intergovernmental programs and networks on research and systematic observation, aimed at a better knowledge society.

Post-Kyoto protocol occurred related to climate change. Among which is that of climate finance from developed countries (2009), for developing countries, which amounts to 100,000 million annually.

The Paris Agreement allowed reaching commitments, as the limit below 2 ° C of temperature increase, in relation to the pre-industrial era.

Durban Platform (2010 - 2011), comes up with the initiative to work pathways are related to reach a binding climate agreement and post-2020 global climate and rising ambition by 2020.

later (2015) emerges as a second Kyoto commitment period, extending to 2020, the amendment of Doha.

Marrakech Summit (2016), where calendars and timetables were established for the
I work on various issues relating to the
transparency, accountability, capacity building, meeting targets, climate financing and implementation of the system of global climate observation, among others.

This summit shows that the fight against climate change is a long process. Despite political changes brought, developed countries are those that maintain the initiative to continue working on the issue and promote agreements to improve the environment. The inclusion of the private sector to contribute according to the problem that has been raising and propose solutions in addition to the investment that goes improving climate change.

The problem of advancing climate change, and also involves aviation, according to the agreements raised in Montreal.

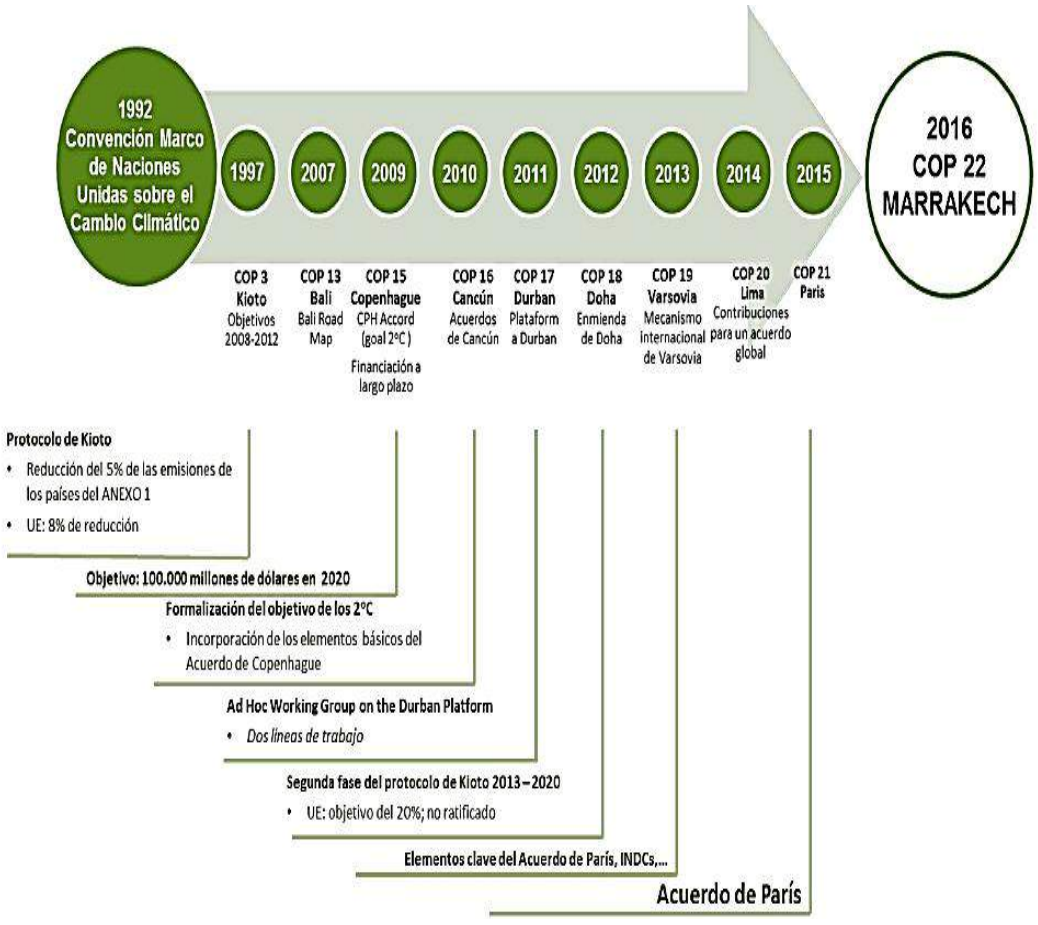


Figura3.2. Main climate summits. Source: Muñoz M and Erias A. Results of the climate summit in Marrakech.

3.2.2. climate change and nutritional status of the youth population

The problem for which has been going through, makes it likely that the effect of climate change is reached to reduce by 4.6% yields the most important crops in Latin America and the Caribbean, and the effect of that situation availability food will decrease by about 300 calories per person per day. If prolonged drought or significant increase in precipitation occurs, it is expected a reduction of 30% - 50% of maize production, 10% - 35% of the production of sugar cane.

The effects of climate change by environmental factor, related to changes in temperatures that are ever higher, have not occurred evenly across the world, but have varied according to different regions. In some countries in Latin America, it made the 2017 agricultural production is in many cases decreased affecting consumption and nutritional status of the population by the high economic costs of food, which corresponds to its acquisition.

That situation occurred in Bolivia since 2015 . While the production of quinoa, considered one of the foods with high protein was higher, 89,488 metric tons (Tn), compared with previous years, but the price was a dramatic fall, by supply from neighboring countries, such as Peru; causing a lack of motivation of the producers who had estocado the product and as a result part was waiting for market demand. To this climatological factor, the effect of drought and earth, there was a deep burial of the seeds which failed to develop sown, affecting the departments of Oruro (Salinas de Garci Mendoza, joined where produce at least 20 native varieties of royal quinoa), northern Potosí and southern La Paz.

Consider that today in reality already been occurring in the global context of rising prices and low production and food and an unprecedented economic crisis; It is to highlight climate change and food security are of international concern and debate.

Figure 3.3. Quinoa exports in millions of dollars. Bolivia. Source INE. MDRyT development

One possibility of contribution towards improving the situation, the implementation of climate projections, which prove useful and base material to construct scenarios that usually require additional information such case constant climate observations.

Another aspect to be treated, is related to the climate change scenario, characterized by the difference between climate scenario and the current climate as part of environmental health.

These impacts analyzed, which are happening in recent years, due to the determinants that are socio-economic, technological and environmental types; identified thereof, they do provide the negative effects that occur in a population.

It is anticipated that climate change will severely undermine progress in reducing the proportion of malnourished children in the world. As for the estimates, climate change has to be responsible alone an increase of about 11 million the number of malnourished children. Food security is also threatened by the effect that food availability will be reduced by 21%, which means 500 fewer calories per person by 2050.

One of the challenges faced related to nutritional status and climate change, has to do with the food system, which according to FAO affects four dimensions, among which are: food availability, access to, the stability of supply and the ability for consumers to use food, considering their safety and nutritional value. Therefore advised to take various measures including monitoring of food and nutrition security, the result is useful to increase knowledge, ability to self-determination and response to climate change of vulnerable groups; this by making and guaranteed rights of the population.

3.2.2.1. Adapting to climate change

To cope with the current situation in which humanity finds itself, from the changes that are raising in the environment in which it is included to climate change that is causing the decline of natural resources being the consequences of jeopardizing the nutritional status of humans, the ability to alter and destroy human health and environmental health; it is necessary to take action to slow its progress and build capacity to adapt.

Adaptation to climate change is necessary, response and challenge to this situation that exists, one of the effects of drought and the consequent reduction in water, requiring adjustments that can be made with respect to the different actions develop.

Fuente.- FAO: Cambio Climático y Seguridad Alimentaria: Un documento marco. Roma, 2007.

Figure 3.4. Agricultural production.

One of the actions to be implemented as part of adaptation to climate change is through the adoption of changes of various kinds including cultural, social, administrative changes related to the habits and customs behaviors construction are new infrastructures adapted to address climate change, use of technology, structural changes, modifications inputs products or services and change public policy to cushion and take advantage of new climatic conditions as published by ECLAC 2015 (Eight theses on climate change and sustainable development in Latin America).

Adaptation practices according to the FAO, may include integrating agriculture, agroforestry, management and management of land and water, sustainable management of land, watershed management and reduction / risk management disaster.

It is also necessary, according to the FAO, the development of methodologies to translate the assessment of impacts of climate change on an adaptation of lifestyles. This involves working with farmers to test, apply adaptation options and report the results to agricultural researchers and policy makers so that they can facilitate replication of successful cases.

Among the plans to avoid the adverse effects of climate change, as part of the challenge is the implementation of national adaptation plans that address the issue of climate change in different regions of the country, to assess the vulnerability, achieve development measures adjusted adaptation to territorial realities and thus reduce the risks of the most vulnerable communities. They also encourage the development of actions in managing risk and a culture of prevention.

In Bolivia, this adaptation process is being achieved in the case of drought caused decreased water for human, animal and vegetable consumption; by investing in technology resources from some loans as from the CAF (Corporacion Andina de Fomento), which has to give you better handling.

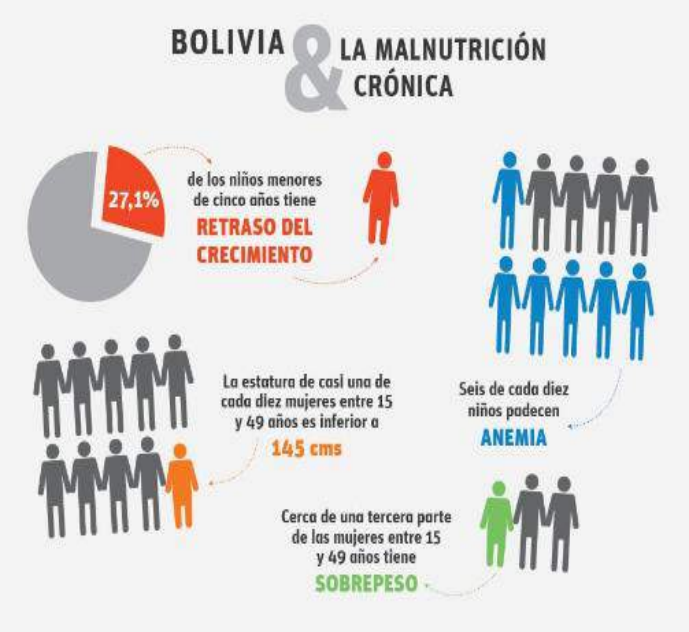


Figure 3.5. Background of malnutrition

In the perspective in which humanity seeks to achieve high standards of living, remembering that the power level nutritional levels of physical and intellectual performance, which make significant progress towards present and future generations; the issue is addressed considering one of the nutrients consumed as food, as in the case of quinoa.

One of the research advances on the cultivation of quinoa, is the discovery of the genetic code achieved earlier this year, which aims to control its development pattern as planting, to exist

possibility that new varieties can be grown able to withstand adverse weather conditions in warm ecosystems (Jellen E.
2017). This according to Bolivian producers, threatens domestic production because the crop can be done anywhere in the world, although the quality of the product will not be the same, on which you should keep working.

3.2.2.2. Biodiversity and its relation to obtaining nutrients

Biodiversity is considered in this investigation, to discuss obtaining a varied diet with a wide range of nutrients and micronutrients for human welfare. For thousands of years mankind has used, developed and maintained biodiversity for food and agriculture. However biodiversity, especially genetic diversity, have been lost at an alarming rate.

To prevent degradation of these resources mankind loses the potential to adapt to new socioeconomic and environmental conditions such as population growth and climate change, according to FAO, is necessary to stop this trend through:

a) Ensuring the conservation and sustainable use of genetic resources of plants and animals (terrestrial and aquatic);
b) Protection of ecosystems that offer services such as pollination, pest suppression, carbon fixation, regulation of nutrient cycles and water resources;

c) Considering the resilience of ecosystems to environmental stresses such as climate change.

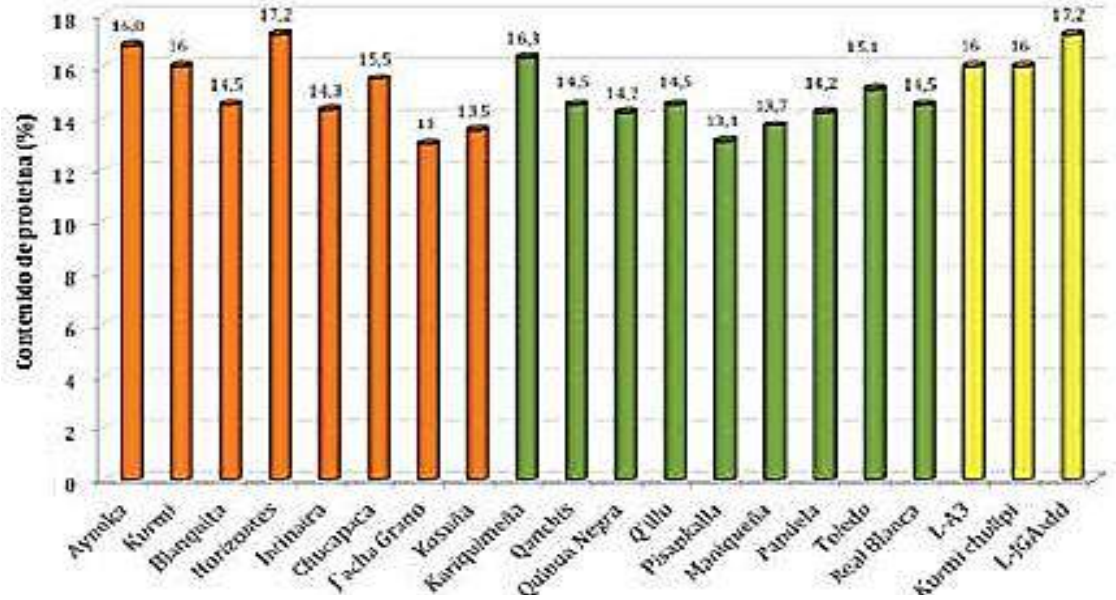
The relevant analysis regarding one of nutritional foods as quinoa and research carried out in their composition, make this food with high nutritional value; It is that after an analysis of 20 varieties and breeding lines have a variation in its composition and characteristics, whose protein content is 15.28% average, with a diameter of 3.35 µ, inverted sugars

17.5% water filling of 25%, 15% amylose. For purposes of use and benefit, there are different uses depending on the size being small grains used for the production of flour and lower gelatinization varieties for preparing baby food.

The nutritional value of quinoa, native and improved varieties used in Bolivia, whose representation is genetically homogeneous materials and not benefit are those that were subjected to analysis, particularly of whole grains. The value

Nutritional this food, it is argued on the basis of the composition of protein, essential amino acids, vitamins, minerals, fatty acids amylose and amylopectin.

Studies on protein content of quinoa, comparatively with wheat, rice and corn they resulted as above; being possible, however, to improve its protein content through genetic improvement.



3.6 Fig. Protein content in 20 varieties of quinoa. Source Production and market quinoa in Bolivia (2015)

In the case of iron content in quinoa, the mineral is necessary to deal with the states of anemia and child malnutrition through breastfeeding, research was also conducted.

Since iron intake in daily diet recommended is 4-30 mg / day, and following this investigation, the content of this mineral in quinoa is 4 mg / 100g dry matter; This means that only the consumption of quinoa would be the necessary contribution of this mineral in the diet, which would impact positively on the nutritional status of the population; and that it may be implemented as part of one of the efficient and feasible strategies for food with high iron component to counteract the states of malnutrition and anemias mainly states.

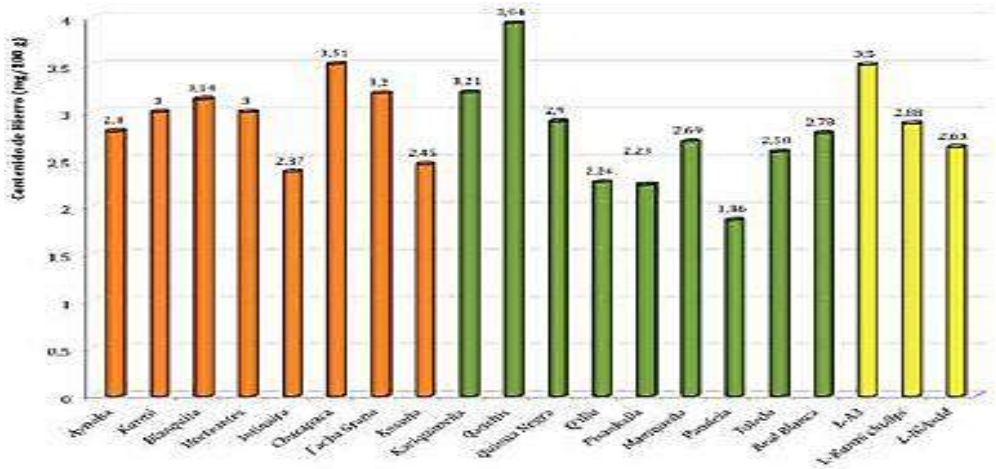


Figure 3.7. Iron content in 20 varieties of quinoa mg / 100 g. Source Production and market quinoa in Bolivia (2015)

Continuing with the above consideration, the rough estimate of half of anemia in the population worldwide by the WHO, is due to the lack of iron; and usually triggers iron deficiency anemia.

According to the University of Toronto, lack of iron causes total loss (cognitive and physical) by about 4,05% of GDP per year, whereas physical losses are only about 0.57% of GDP (calculation made on the base 10 developing countries).

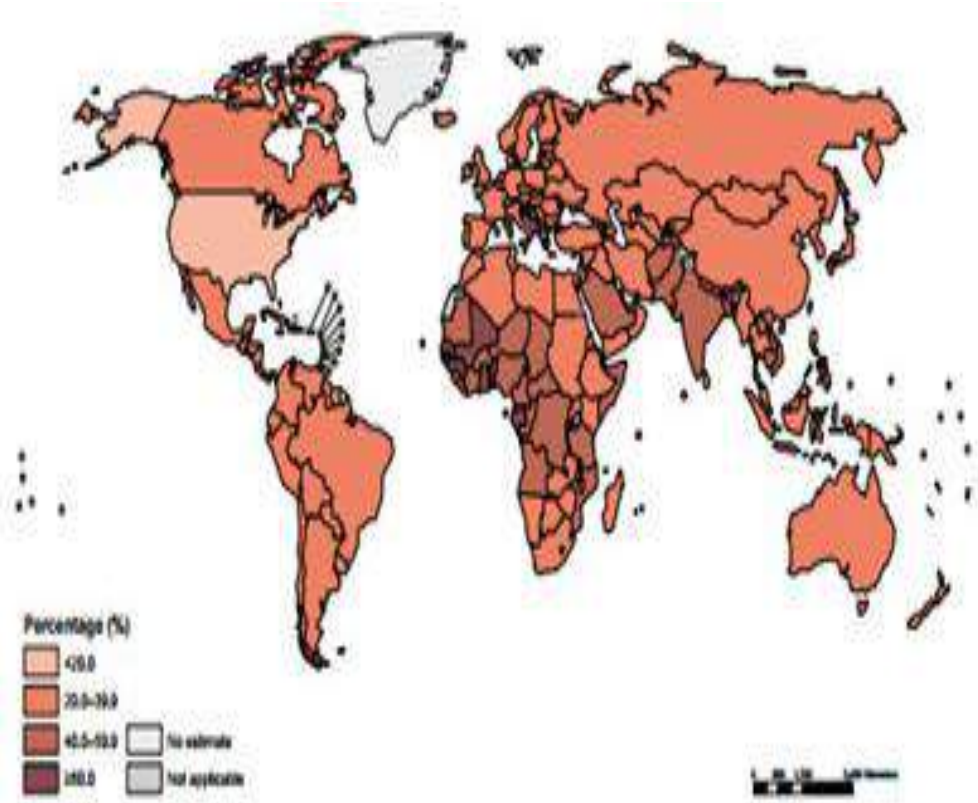


Figure 3.8. Prevalence of anemia in pregnant women aged 15 to 49 years. WHO (2011). Source WHO (2016)

In the city of La Paz (2016) belonging to one of the departments of Bolivia, it was possible to evaluate university students (young people) who donated blood, most were women; of which 5% of them suffer from anemia states, the main cause, as revealed nutritional imbalance, improper diet effect.

The interest of the international community quinoa, going towards promoting not as an export crop, but contribution to food security and sovereignty of countries with high rates of malnutrition, which would be highly favorable when consumption is applied quinoa as part of the daily diet in Bolivia and other countries.

3.2.3. The footprint to adaptation and climate change mitigation

The ecological footprint defined by Wackernagel Mathis and Rees William quoted by Madrid Mejia (2015), as the area of ecologically productive land (crops, pastures, forests and aquatic ecosystems) needed to produce the resources used and to assimilate the waste produced for a defined population with a standard of living specific indefinitely, wherever this area are.

In its measurement takes into account the total population living space (locality, region, city, country, planet) in a given period, while estimates the dedicated productive surfaces, among other crops, to produce food, fiber, oils.

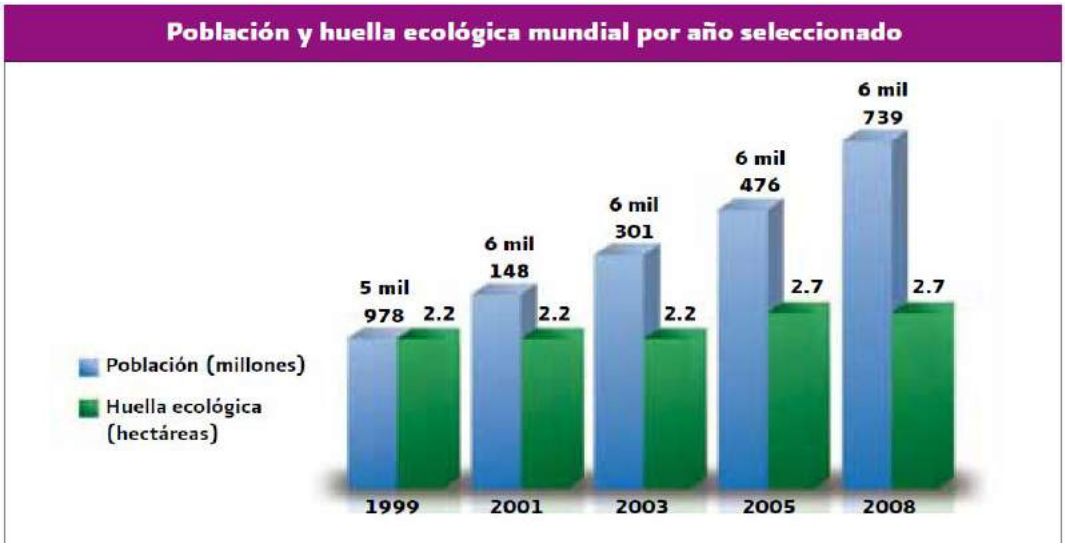


Figure 3.9. Ecological footprint. Sources: WWF. *Living Planet.* Reports: 2002, 2004, 2006, 2008 and 2012.

The ecological footprint shows the direct relationship between habits, lifestyles and environmental problems caused by anthropogenic effect on the planet.

About 80% of the world population has a footprint below 1.8 hectares, that is, is a surplus; Unlike the remaining 20%, mainly in developed countries, which is attributed a mark higher than the biocapacity of the planet, which would cause greater economic deficit.

At present the ecological footprint exceeds 33% of its regenerative capacity; ie that consumed in a year on the planet can renew sustainably, in sixteen months.

It is considering that the planet's biocapacity is 1.8 ha / person and that developed countries have footprints that exceed the planet's capacity; for example the per capita US footprint that is 9.6 Ha; It can say that there is huge difference between developed countries and developing countries, with the latter low population level so the ecological footprint reaches only a third of the world's population, representing 7% of emissions CO_2.

The above data make the ecological footprint is considered as one of the important aspects that are part of the environmental assessment and environmental constitutes a useful indicator to know about the different types of damages to the health of the planet; For information on inequalities between countries; know the impact of consumption and waste produced and to modify in favor of the environment.

Also, the ecological footprint helps measure how man uses nature to meet their needs within their lifestyles; to study sustainability of populations and territories; to plan activities of a company, the economic sector, community, region, city and country; to design, implement and evaluate public policies on sustainable development and, when combined with the Human Development Index, establish minimum conditions for progress on that path.

However, the responsibility for global ecological deficit caused by anthropogenic effect can not be attributed to all inhabitants of the planet; but you have to make a distinction between those living in developed countries and in development; the population difference and the different consumption habits and waste generation.

While it is possible to determine the footprint by different actions taken by the human being, they can be modified after decreasing the footprint with various actions.

The actions to be applied are: prefer locally produced, bulk sale; use efficient and safe public transport for short and medium distances. Also, formulate and propose policies to guide our community towards greater efficiency and reduced energy consumption by promoting the use of alternative and renewable energy; promote the development of sustainable cities, promote architectural designs saving energy, ie bioclimatic architecture; construction of buildings and cities that produce energy rather than consume an example of this is the lighting with wind and solar power a city of Mexico; purify the air rather than contaminating; that the materials used are REUSE, producing electronic equipment with solar energy charge;

In the perspective that the ecological footprint is a reference to change the mode of production and economic and social models, and the ability to achieve the reduction of the ecological footprint by producing foods with high nutritional value, use of energy obtained from environment, and the product constituted located in near production and consumption catching up other products and media markets become unnecessary spaces; It arises that quinoa can be one of those products that change and improve the food situation, whose nutritional characteristics lies in its composition, high protein, with all essential amino acids, trace elements and vitamins without gluten; Suitable for those who suffer from celiac disease,

The ecological footprint in educational processes, can be a reference for the educational community to reflect on current lifestyles and values on which rest their habits and behaviors as an entity that inhabits the planet.

Regarding the footprint and the production and cultivation of quinoa, it has an extraordinary adaptability to different agro floors with relative humidity from 40% to 88%, and withstands temperatures from
-4 ° C to 38 ° C. It is efficient to be produced with little use of water, is tolerant and resistant to lack of soil moisture, and allows acceptable productions with rainfall from 100 to 200 mm floor.

Among the varieties or ecotypes, there are about three thousand, normal crops, such as cultivated and wild; They are the same as summarized in five basic categories according to the altitudinal gradient: eco rates of sea level, the plateau, the valleys, the salt flats and the Yungas.

As for producing countries, are major producers like Bolivia, Peru and the United States (2011), currently constitutes Bolivia's second largest producer; however, cultivation is expanding to other continents and currently being cultivated in several countries in Europe and Asia with high levels of performance and important strategic value for food and nutritional security of mankind.

Efficient energy management, artificial intelligence could also help the industry related to the threshing, cleaning, washing and drying of quinoa achieving a more intelligent energy management in companies that currently operate with large centers where they store their data relevant information, in which power consumption is quite high. The possibility may be for the purpose of predicting effectively the time in which data centers become too hot and where the cooling systems would be activated when needed and can achieve savings of up to 40% in energy costs, as in the case of Google.

Moreover, the work done by The Software Alliance highlights new intelligent tools for data analysis that the first positive energy building in the world that produces more energy than it consumes developed in the United Arab Emirates.

This model can be implemented globally and thereby create an impact that decreases the overall carbon footprint, which adapted the present study concerning the production of quinoa which constitutes a nutrient with high protein, it is possible to apply a similar methodology above mentioned lines for harvest.

Regarding the domestic market of quinoa, marketing is still very limited. Consumption of it, is on the rise by advertising campaigns in Bolivia.

The importance of quinoa is higher in international markets, where prioritize organic foods that reduce the negative impact on the environment (Lopez, 2011) for the risks posed by agrochemicals health as they are in healthier and insurance, corresponding to a healthy and harmonious way of life to avoid

Major General population aging and decline in family groups; particularly in Europe.

Since 2009, in Bolivia it started the process to establish a national priority the cultivation and consumption of quinoa, through the National Policy Quinoa, which is established as policy internal and external consumption. Improvement and insertion of quinoa in the market for consumption of the national population, have access to and use on the basis of actions of public institutions that stimulate consumption, especially the most vulnerable.

So that quinoa is incorporated in food subsidies and bonds aimed at the mother and child / a in the nursing allowance, or school breakfasts (even gradual insertion), missing their attention on rural areas in tropical regions.

Management	1993 kg / hab / 2007 and 2009 Ton Total	2012 Kg / hab / year	2013 kg / hab / year
Quinoa consumption	5.4	4000	1.1	2

Table 3.1. Consumption of quinoa in Bolivia. Based on data from ABI 2013.

According to the table data show that consumption of quinoa in the Bolivian population has not yet reached levels higher expectation. However, there is difference in consumption of quinoa department, being higher in the department of Oruro of 7.25 kg / capita / year (2007) and in the city of Potosi consumption of 2.3 kg / year in the same management. Consumption in the department of La Paz reaches 64% of the youth population (see Annex)

As for prices in the past remained low, as it was just the staple food producers, being part of the surplus for marketing in the domestic market. At present, the domestic market prices are still high, which is a limiting factor for local consumption in general, this effect of higher international demand.

The following table shows the huge difference in prices between quinoa and other cereals; In addition to the places where the product is marketed.

COCHABAMBA			
Mercado 25 de mayo		Mercado Cancha Zapata	
Tipo de producto	Precio Bs	Tipo de producto	Precio Bs
Quinua fraccionada. Bolsa de 445 g "El principe"	22,00 - 25,00	Quinua fraccionada. Bolsa de una libra. Los Andes	24,00
Quinua fraccionada. Bolsa de 454 g Los Andes	28,00	Libra de quinua amarga para semilla, a granel	20,00
Hojuela de quinua, bolsa de 400 g	15,00 - 18,00		
Bolsa de quinua granelada SAITE, 225 g	18,00		
Libra de trigo a granel	5,00		
Libra de lenteja a granel	7,00		
Kilo de arroz a granel	10,00		
LA PAZ			
Mercado Chasquipampa		Mercado Sopocachi	
Tipo de producto	Precio Bs	Tipo de producto	Precio Bs
Quinua fraccionada. Bolsa de una libra. Los Andes	24,00	Quinua fraccionada Blanca. Bolsa de una libra. Los Andes	24,00
Quinua fraccionada. Bolsa de una libra. "Quinua Real"	22,00	Quinua fraccionada Roja. Bolsa de una libra. Los Andes	22,00
Mdo Sopocachi		Quinua fraccionada Negra. Bolsa de una libra. Los Andes	20,00
Tipo de producto	Precio Bs	Quinua fraccionada. Bolsa de una libra. "Quinua Real"	22,00
Quinua fraccionada Blanca. Bolsa de una libra. Los Andes	24,00 - 25,00	Hojuela de quinua. Bolsa de 230 g	10,00
Quinua fraccionada, Bolsa de una libra. Superior	22,00 - 25,00	Lenteja y poroto rojo y negro fraccionado. Bolsa de una libra	7,00 - 8,00
Porotos en general y lentejas. Bolsa de una libra	8,00	Trigo pelado fraccionado. Bolsa de una libra	4,50
Garbanzo fraccionado Bolsa de		Maní pelado fraccionado. Bolsa	

Table 3.2. Quinoa prices and products sold in popular markets in Bolivia

Nevertheless, the inclusion of quinoa for domestic consumption was increased in the form of processed products for institutional markets, and the school breakfast, the composition of which are processed products such as biscuits, bread and nutrition bars. Food processing companies developed new products and formulas also launched on the market competitively. By increased demand, some companies have developed export products for the domestic market under the same quality standards required by export markets.

3.2.3.1. environmental policies that reduce the footprint

According to F. Gachet (2002), reducing the ecological footprint it is seen from an approach built on the basis of consumption, population, performance.

It is the priority of implementation of policies carried out by countries that have ecological deficits like the United States, Germany, Belgium and Italy.

However, according to Pearce (2000), published by Gachet F. (2002), mention that in the short term will be difficult to implement policies primarily by developed countries so that they are able to reduce their material consumption of goods and services in addition to the requirements of natural capital (ecologically productive land), being difficult to increase their performance, having reached its highest rates of technological growth. By

which according to the idea of shared Pearce
Wackernagel (2001) one of the creators of the ecological footprint, developing countries should invest in technology in order to improve performance and reduce the environmental footprint.

This implies that more investment, applying the idea to the present investigation for planting, harvest, domestic consumption and export of quinoa is necessary primarily to reverse the effect of the drought that has occurred in Bolivia (2016), as a result of climate change which has caused global warming and consequently the lack of rain, useful for irrigation in areas where water is scarce mainly in the highlands where it occurs in a high percentage the pseudocereal. investment is also needed in technology makes through the application of sensors possible pose challenges that allow to track quality planting, growing, harvesting as part of the production; product positioning and internal and external marketing as part of competitive prices; and storage for distribution in the domestic and international market for consumption.

Figure 3.10 quinoa in Oruro. 2016. Photo and own edition.

Among the policies identified in response to problems associated with the low level of productivity, environmental and social sustainability of the crop; Quinoa limited consumption locally, and others, are the policies formulated in Bolivia: (according Risi J, Rojas Pacheco W and M, 2015; and Yugar
E, 2017):

• Policy Innovation, Technology Development and Transfer of Technology, whose purpose is to rescue the ancestral local knowledge articulated science, innovation and technological modernization of production systems;

• Policy Preservation and Sustainable Use of Natural Resources and Environment, which seeks to balance the need for development, environmental conservation, biodiversity and culture;

• Policy domestic and foreign trade, which gives priority to food security and sovereignty of the national population target of the Bolivian state, and in this context aims to improve the inclusion of quinoa consumption of the national population, while opening is promoted new international markets and combat smuggling;

• Credit and financial policy, which aims to establish financial and credit services, able to meet the needs of all stakeholders articulated the quinoa production complex;

• Policy Institutional Strengthening Public, Private and Community, sponsored formulation, management and action aimed at improving its institutional and operational capacity to enable an obvious support of national public institutions to the development of quinoa; Y

• Policy Productive Infrastructure and Services, which aims to promote
quinoa production by improving and
implementation of productive infrastructure.

• Policy commitment and leadership positioning in the local and international markets, towards improving sales and a better seat with high competitiveness and sustainability of one of the products with high nutritional value.

When good practice in terms of calculation, measurement and reduction of the carbon footprint of food exports mentioned, must be understood as those public and / or private, in relation to the environmental footprint of products that have been successful in terms of improving environmental management and sustainability of business. The process of calculation and communication can promote changes in inefficient practices established many years ago. Specific figures give the possibility to convince companies

reduce unnecessary use of fertilizers, for example, which brings environmental and economic benefits.

On technological advances, they change the footprint due to improved energy efficiency, the more efficient use of raw materials, the reduced need for bioproductive areas, and thus lower carbon.

On the ecological footprint, Latin America faces a triple challenge:
1) address the physical impact of climate change,
2) benefit from growing demand for food and
3) maintain a low rate of power consumption.

As providers, Latin American companies investing in management and carbon footprint calculation can achieve multiple benefits, including immediate internalization of costs and risks of climate change and accelerated investment in clean technologies.

The research on the ecological footprint, which are brought to the attention of a powerful teaching tool that enables awareness of the habits and lifestyles of the population; through which it is possible to model changes in habits and technology through which prevention events occur.

Also, it is possible to identify the negative impact produced by waste produced by consumption, which is reflected in the ecosystem.

Another important aspect is used to define the differences in social levels and use the planet's resources, according to different lifestyles.

3.2.4. Economic and environmental impact

Considering the economy, it is inevitable to note that knowledge of the advanced economies is a key to view and relative comparison of the levels of progress and economic growth factors in a given region.

The relationship with the environment and production, is many times less than the environmental impact through lower costs in the production and distribution of the finished product to the point of arrival to the consumer, the greater the possibility of achieving levels production at low costs and benefits for humanity. Therefore, it is necessary to consider the production of the finished product.

In relation to economic growth, Latin America has experienced strong growth, achieving high levels of export production, with good economic and social impact; which was higher growth rate between 2009 and 2013, being noticed a slight decrease in 2014 (see Annex II)

Figure 3.11. official figures. Source: ECLAC

According to projections until May 2015, there has been an improvement in exports in Latin America. However, between June and December 2015, a recovery of 5% of the price of food, tropical drinks and oil would occur.

However, the effect of economic growth, has also produced an increase in environmental pollution, which is detrimental to the environment which has caused air pollution peripheral urban area and increased greenhouse gases more climate change trend; whose water, non-renewable resources, forests, water have been damaged. Therefore, the challenge of climate change is also put into consideration the negative impact can be reversed considering the economy and impact must be sustainable over time.

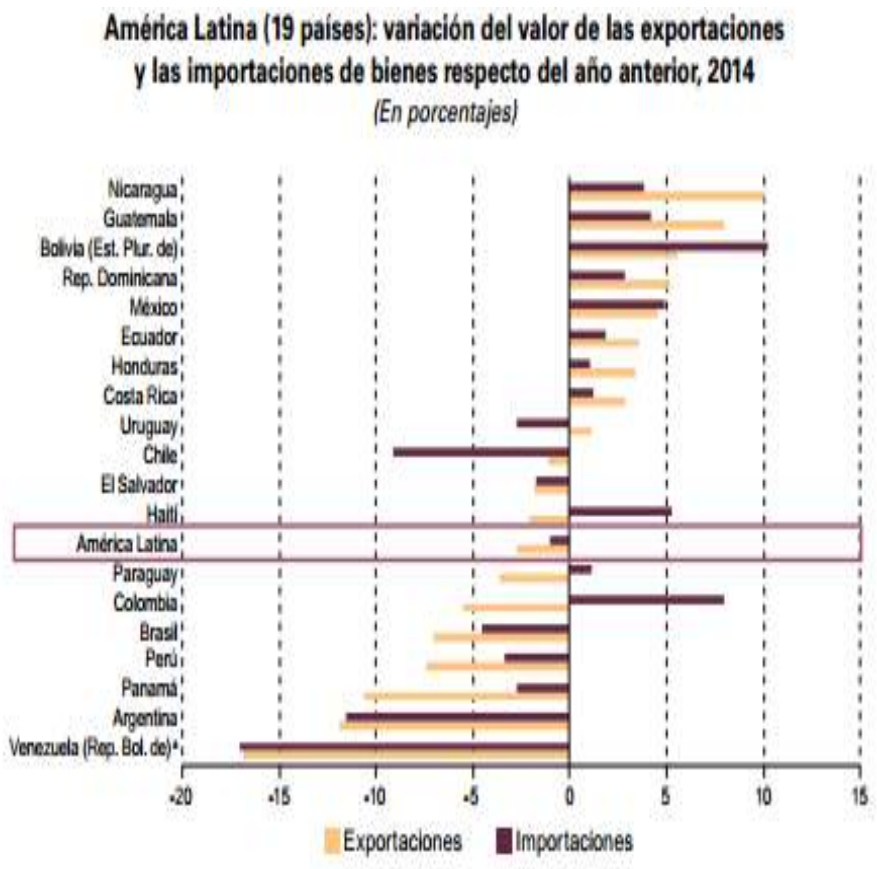


Figure 3.12. Official data (estimates) Source: ECLAC

The graph shows a high trend in export rates of production, highly favorable for improving the economy of the region.

Agricultural production in Bolivia, has become more important in recent decades being in the West, producing products for domestic consumption and export products such as quinoa.

In consideration of the above culture quinoa it is generally highly rustic does not require high investment in production inputs. Production costs do not require major investments, so far as production is not very high. The relevance of quinoa production of high nutritional value, are growing sites are usually where other crops do not occur. Furthermore, it should be noted that rustic crop, the risk of loss by adverse factors such as weather, water or microorganisms is significantly lower compared to other crops. Another aspect to consider is the organic quality, the caliber of the grain, the amount of protein that has the Bolivian quinoa, which makes it stand out in offering other countries. however,

it is losing competitiveness in relation to other cereals and production in different countries.

However, it is possible that the key to harnessing production is investment in appropriate production technology, product competitiveness and human resources updated and advanced scientific knowledge in different fields; mainly on process improvement, since the technologies are redefining processes and enable simple automation of all tasks related to the process.

Since it is important to develop coordinated planning processes, organization and implementation of activities prior research to innovation, technology transfer in order to strengthen, change the productive economic base and promote the overall development of society.

According to The Software Alliance (BSA), good use of data based on artificial intelligence would achieve saving lives also in the economic field can generate savings of US $ 300,000 million for health care per year to the health sector. The 'Watson' robot of US technology firm IBM, for its technological capacity - cognitive, identified new genes associated with after thousands of collating data, with the collaboration of the Barrow Neurological Institute disease. So by artificial intelligence, it is possible approach treatments and better drugs to counteract prepare various diseases affecting humans.

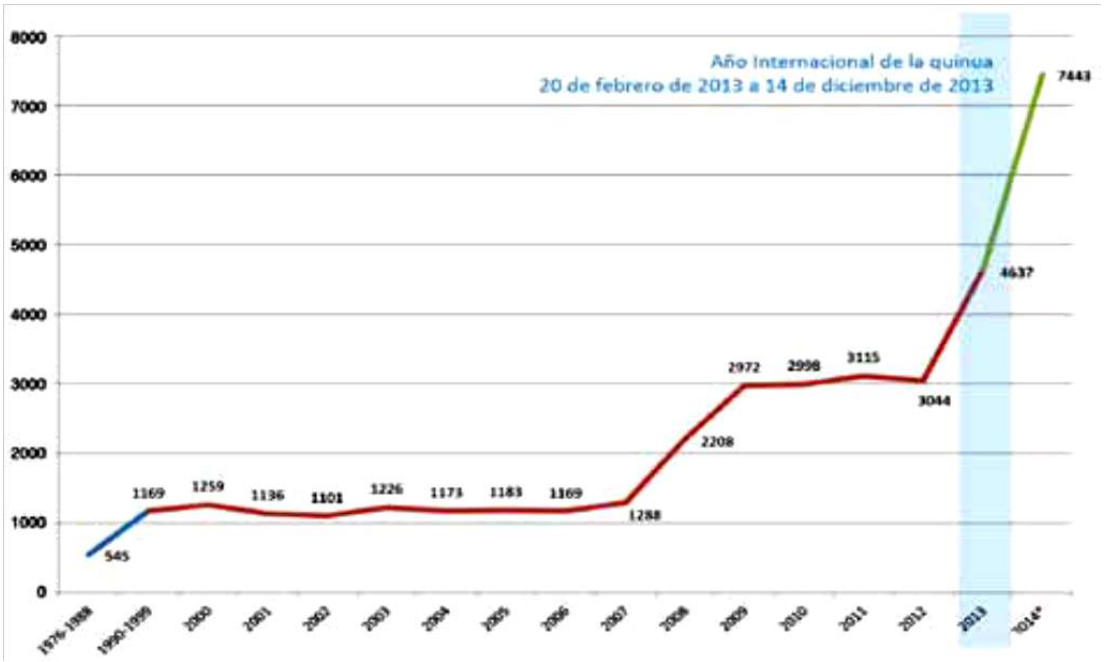


Figure 3.13 Export prices quinoa Bolivia, 2014.

Good use of artificial intelligence in processing and quinoa crops to avoid the presence of pests, cleaner production,
counter the droughts, irrigation technology assistance,
greater awareness of consumption through the application of information technology and communication, lowers health problems, increased production and higher income generation, from domestic consumption and export is achieved.

In the case of quinoa production and export it is known that one of the associations of producers Salinas de Garci Mendoza Oruro about 90% is sold abroad; and export prices, as shown in the chart have had an increasing trend between 2012 to

2014, having declared 2013 as the International Year of Quinoa, achieving the Bolivian product positioning internationally as a leading producer. Although the effect of drought there has been a decline in production in recent years.

Countries which export most Quinoa between 2016 to 2017 was performed were the United States and France, Netherlands, Canada and Germany (INE), being 78% of total production aimed at those markets. 48% of exports in the first quarter of 2017, was to the United States, followed by Netherlands 9%, France 8%, 8% Canada and Germany by 5%.

3.2.5. Technology in the XXI century and its implementation with commitment and leadership

Technologies that will emerge in 2030 are those that might be able to offer partial remedies to problems such as climate change and energy deficit.

By artificial intelligence, manage and control programs (under human surveillance) flying aircraft, systems for air traffic control, surgical operations and military systems. These artificial intelligence systems are robust and extremely useful; and our modern world could not do without them.

The challenges of artificial intelligence in health are areas of epidemic control, allowing to move toward greater innovation,
productivity and economic progress.

The interest generated by artificial intelligence, smart phones, make it possible to find a space of enriching knowledge connected to a platform you can transfer information to other Internet users. Through the platform, it is possible modular syllabi, forums

discussion, make the treatment of case studies related to the environment. As a result of the application of artificial intelligence is achieved such teaching learning a living, dynamic, global state,

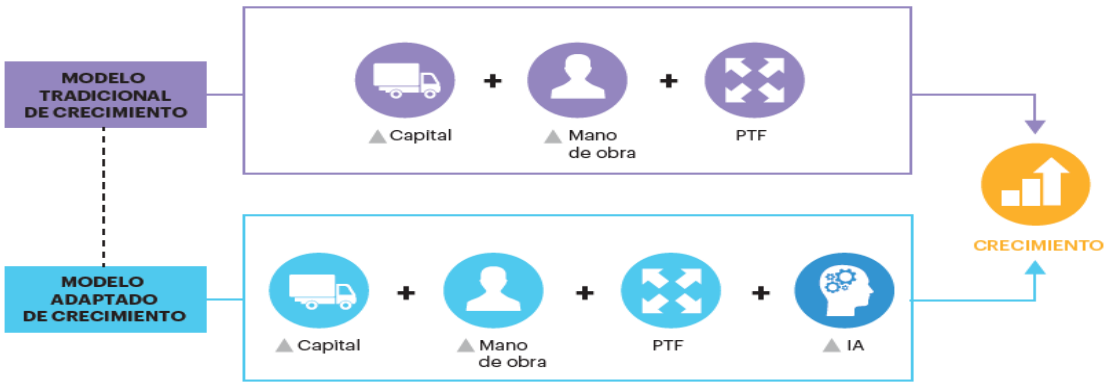
The contributions are being significant in the health of mankind. Another technological tools is the application of robotics, in which it already has achieved the exploration of the human body with small incisions, long-distance surgeries that although they have certain limitations but these will evolve.

In order to move towards this momentous change with artificial intelligence, it is necessary to consider technology improves productivity, transforms thinking about how growth is evidenced with increasing capital or labor is generated, or when they are used more productively.

According to research, in South America, the effective use of capital has declined since a decade and population growth makes working age is slowing rapidly.

The technological advances of the last two centuries, have to do with electricity, rail and computer technology, which dramatically increased productivity; aspects that have to put more emphasis on development.

At present, it is witnessing the launch of another set of transformational technologies,
as a production factor
completely new, considering as a unique hybrid capital and labor,
artificial intelligence that creates a workforce
completely new, which can replicate labor on a larger scale and speed, and even perform some tasks that exceed the capabilities of humans.



Nota: ▲ indica cambio en el factor
Fuente: Análisis de Accenture

Figure 3.14. Artificial intelligence adapted to growth.

Similarly, artificial intelligence can materialize as physical capital, such as robots and smart machines. And, unlike conventional capital such as machinery and buildings, can improve over time, thanks to their ability to self-learning applied to situations of environmental awareness, prevention against climate change to transforming behaviors and habits of human beings.

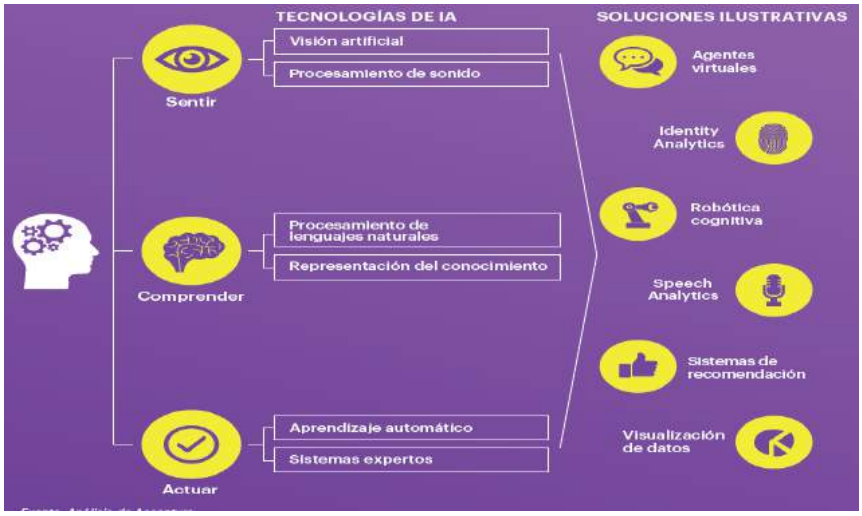


Figure 3.15. Emerging artificial intelligence technologies

Being the true potential of artificial intelligence the ability to complement and enhance the traditional factors of production, the comprehensive structural transformation in economies that use artificial intelligence is that not only do things differently, but make different things.

Seen as a new factor of production, artificial intelligence can generate growth in three ways: You can create a new virtual workforce through intelligent automation; You can complement and enhance the skills and capabilities of existing work forces and physical capital; and can stimulate innovation in the economy beyond its direct action.

Automation self-learning, is made possible by the repetitiveness scale.

Regarding another benefit of artificial intelligence is the ability to drive innovations as spreads in the economy.

However in the case of Latin America, there are still persistent structural deficiencies that hamper the ability to absorb the benefits of artificial intelligence and other digital opportunities. Among which are the poor quality of the education system, including a very low population of young adults in tertiary education and institutions engaged in scientific research weak; strengthening of institutions engaged in scientific research and increased investment being needed. In addition to the lack of improvement frameworks and government institutions, research weak ecosystems and limited access to capital for businesses. Another aspect is that the talent shortage undermines the development of artificial intelligence in some countries. As for the quality of education in some countries should be improved and businesses; through

boost their investments in research and development. In certain situations some companies imported foreign experts to meet these needs.

Regarding the issue of climate change, artificial intelligence is involved in the improvement through more efficient transport, poor access to health services by reducing pressure on overloaded systems; access to a sophisticated infrastructure of information technology and communication, a reliable regulatory framework and substantial public and private investment in the digital economy.

Artificial intelligence, to become productive and sustainable source of social and economic growth for all; It should be promoted worldwide.

Technological advances are evident today in the high-precision instruments, testing, satellites and related technology supercomputers used to explore our planet, temperatures and weather, which is achieved with hundreds of research and theories they develop.

As the cost and processing times that are drastically reduced by automation greatly, it is possible to avoid much of process inefficiencies.

By having a clear map of the processes it is necessary to analyze the impact of technology on each of them, and more importantly among them, to improve their effectiveness and efficiency and therefore be closer to excellence in operations.

The process map, is a graphical representation of the sequence and interaction of different processes takes place.

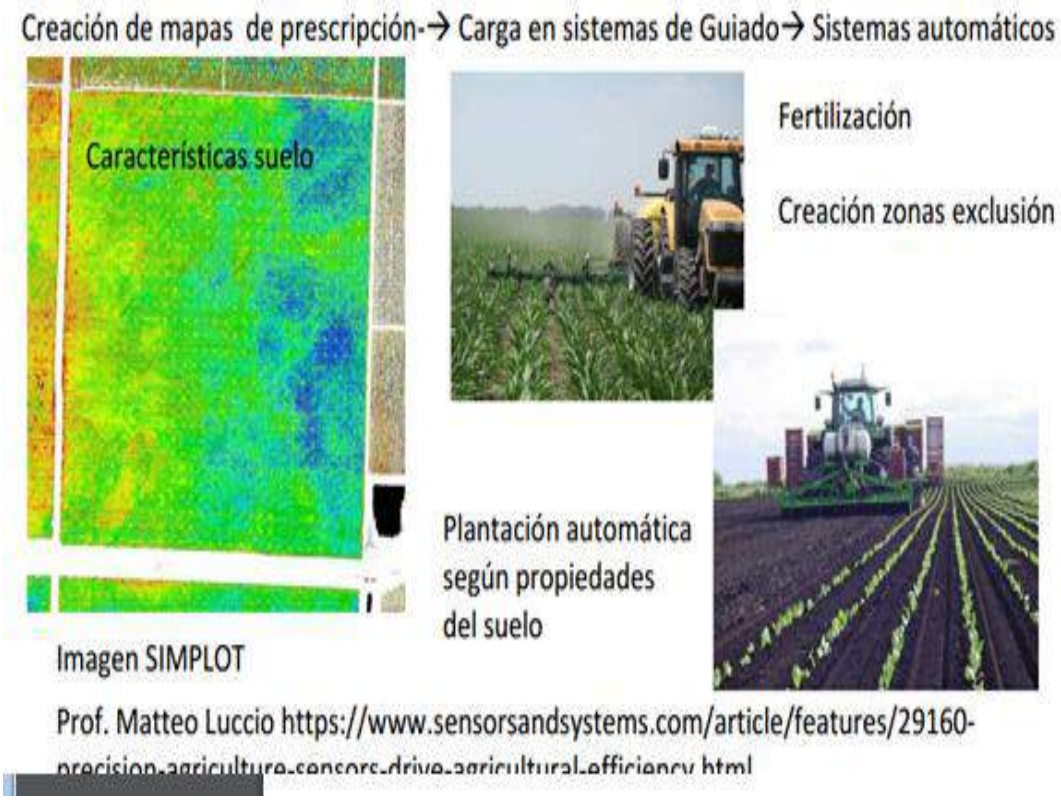


Figure 3.16. Precision farming. GNNS. Global navigation systems.

Biotechnology applied to food production of as part nutrients, including genetic engineering and the production of genetically modified organisms (GMOs) in suitable combination with other technologies, which provide effective tools for sustainable development among others agriculture, in addition to meeting the food needs of a growing and increasingly urbanized population; whose applications of biotechnology should be used wisely to progress and positive contribution to humanity.

Technological advances such as artificial intelligence introduced in the fourth industrial revolution tries to solve global problems, although it would be causing job losses as the publication of the World Economic Forum (WFF), but it is useful when some Global challenges require its assistance to improve the lives of people in many ways.

One of the sensors for irrigation applications and field testing, includes a digital communication system designed under an automatic control system, which acts on a pump and irrigation valves, in order to maintain soil moisture.

Among other challenges posed by Gray that could be solved with artificial intelligence, they are:

- Save lifes, which until a few years health professionals had to perform the comparison of an amount of data to conclude with a diagnosis.

- Shortening the task, because the machines are able to perform this task in seconds.

- Protect ecosystems, with artificial intelligence tools with the possibility of conserving wildlife and improve field productivity with the help of data analysis in real time and a future decision making. Also, according to Software Alliance, agriculture farmers could as from Iowa (United States) to India, use seed data, satellites, sensors and tractors to make better decisions about what to grow, when to plant, how to track the freshness of the food and how to adapt to changes in climate .

3.2.5.1. Commitment and leadership for market positioning

Commitment and leadership, how is raised above purposes and positioning in domestic and international markets will be through management and implementation of environmental policies and international trade are achieved.

Leadership, at a level of commitment that assumes the need leaders there transfer the ultimate reason for each of its activities, being motivation, learning to work, and identify the mission and vision; important. The process of directing and guiding the activities of members in a group, influences to channel their efforts towards achieving a goal or specific goals.

The basis for the change with commitment and market positioning of quinoa, is the individual and participation of the entire population, whose varied skills and procedures leading to functional excellence and processes. Being flexible operation networks, with emphasis on workflows with ongoing training, whose commitment is the benefit of the general population.

The application of leadership has to do also with reengineering involving actions to be undertaken in the various institutions that are related to the essential processes whose changes reorganization involves finding local and international markets for marketing quinoa, It is that product positioning

be sustainable; using the means that currently relate to the application of information technology and communication.

A website dedicated to topics of the subject referred to quinoa varieties, nutritional content, their consumption in comparison with other cereals, nutritional health effects, local and international marketing, among others; It can be an invaluable resource to keep cool or extend the message. The secret to successfully build a virtual community (e-community) lies in giving people a reason to visit the website, which carries a periodic renewal of the information contained therein. In another area, transparency should govern virtual communities and information is shared freely, although in some cases you can create access levels.

The lead the process of entrepreneurial discovery, involves encouraging the participation of committed agents where the capacities of organizations, partners and financiers for the acquisition of technologies which also involves define, design and develop joint actions toward growth are incorporated, consolidating the innovation ecosystem local and international public-private collaboration, positioning, marketing and generation of economic surplus product management nutritional element, such as quinoa.

To get the leadership in addressing production, marketing and consumption of quinoa, as Kanter, men and women have to adapt to e-culture, so it is necessary to have mental qualities, including curiosity and imagination, communication, sensitivity are the set of needs human, understanding the complexity or being cosmopolitan. Since also to ensure understanding of the information related to the product should be governed by four key: simplicity of information disseminated through ICT, consistency, repetition and demonstration if the case arises.

3.2.5.2. Environmental management

Transcendental environmental management for environmental health, according to (ISO 14001: 2004), applies to those environmental aspects that the organization identifies that can control and those over which the organization can have influence. It does not set itself specific environmental performance criteria.

Figure 3.17. Glass tank obsolete. Environmental education. Photo and own Edition: Madrid Spain 2017.

Among the terms and definitions according to ISO 14001: 2004 necessary to understand the model is:

Environmental policy, which is related to that:

a) it is appropriate to the nature, scale and environmental impacts of its activities, products and services;

b) It includes a commitment to continuous improvement and pollution prevention, as follows:

The standard whose base is in the methodology known as

Plan-Do-Check-Act (PDCA).

In PDCA methodology, it described as:

- Planning: is to establish the objectives and processes necessary to deliver results in accordance with the environmental policy of the organization.

- It does: is to implement the processes.
- Check: it is related to the implementation, monitoring and measurement of processes regarding environmental policy, objectives, goals and legal requirements and other requirements, and report the results.
- Act: it is to take actions to continually improve system performance environmental management.

Plan Do Check methodology Act

Figure 3.18.Fuente: Deming Cycle. Model environmental management system for the International Standard 14001

The application depends on senior management and the compliance of each of the active participants knowingly committed and dependent on the organization.

Figure 3.19. Integrated Systems Management: Total Quality Management, Environmental Management and Prevention Management.

3.2 Continuous improvement

recurring process of enhancing the environmental management system (3.8) to achieve improvements in overall environmental performance (3.10) consistent with the environmental policy (3.11) of the organization (3.16)

Many organizations are managing their operations through the implementation of a system of processes and their interactions, called process approach. ISO 9001 promotes the use of the process approach. Since the PDCA can be applied to all processes, the two methodologies are considered compatible.

The successful implementation of environmental management system as the rule states, depends on commitment from all levels and functions of the organization and especially senior management.

Regarding its use and application in an organization, the standard enables the development of an environmental policy, establishing objectives and processes to achieve the policy commitments, taking the necessary actions to improve performance and demonstrate the conformity of system with the requirements of this International Standard. The overall objective is to support environmental protection and prevention of pollution in balance with socio-economic needs. Since many of the requirements can be addressed concurrently or revisited at any time.

However, if organizations have implemented management systems, it may be extended to other fields including cross references and interrelationships between the various specific elements of the different systems.

As the ISO 14001 standard specifies the requirements to be met by a system of environmental management it is necessary to consider the elements and as set forth below in your application:

3.18 Pollution Prevention

Using processes, practices, techniques, materials, products, services or energy to avoid, reduce or control (separately or in combination) generation, emission or discharge of any pollutant or waste, in order to reduce environmental impacts (3.7) side.

CHAPTER IV. MODEL CHALLENGE TO CLIMATE CHANGE

Research resulting in the construction of a model as a theoretical construct, rests on the materialist dialectic method, genetic characteristics. The model being the highest form of theoretical construction, which requires a capacity of abstraction and full application of the principles of logic dialectic; moving closer to scientific truth if made following certain principles.

To be considered to principles of theoretical modeling: logical consistency, the analogy, the systemic and simplicity in design.

Abstraction is possible considering the evolution characterized by a process of discontinuous and abrupt changes in the brain, considered as the highest organization of matter, consciousness as a new qualitatively different reality of matter arises.

Quantitative changes of matter under dialectics produce consciousness is an emergent phenomenon that is guided by other than determinists governing the evolution of matter laws. Thus, without abandoning materialism.

Vygotsky (1934, posthumous) and Luria, two psychologists who maintained contact with Western science, studied the formation of personality in the community and groups and claimed a historical psychology. His thesis on the dialectical unity between language and thought, is based on the premise that man is a product of history at the same time an active social relations subject, and higher psychological processes (consciousness, will , etc.) are developed with individual interactions with their peers and with the culture of their environment, paving the way for the revolution. According to Politzer (1975), the true revolutionary is one who, as dialectical, creates favorable conditions for promotion to the new.

According to dialectical materialism, the movement has double form: evolutionary or revolutionary. It is evolutionary when small changes, product quantitative modifications occur. It is revolutionary when it causes qualitative changes.

For dialectics and under the law of dialectical change, all nature, from the elementary particle to man, it is in constant flux, in motion and constant change, in constant state of

birth and death (Engels, 1925/1981), for the dialectical there is nothing definite, absolute, everything is in a constant process of transformation. The law of contradiction, first formulated by Hegel (1973) explained the development saying that the self is driven by its internal contradictions.

GENÉTICA	ORGANISMO VIVO	SISTEMA TEÓRICO
Composición genética.	Celular (la célula humana es eucariota).	Fundamentos filosóficos, pedagógicos, psicológicos, sociológicos y otros de carácter social
Composición celular.	Núcleo, citoplasma, membranas citoplasmática y nuclear.	Marco teórico general de la investigación (conceptos, categorías, métodos, leyes y principios).
Material portador de características hereditarias.	Cromosomas.	Objeto de la investigación particular.
Unidades de la herencia.	Genes.	Campo de acción compuesto por la teoría o construcción teórica específica.
Constitución de los genes.	Segmentos de ADN (ácido desoxirribonucleico) de varias longitudes.	Propiedades y relaciones inherentes al objeto / campo investigado.
Propiedad principal del gen.	Capaz de autorreplicarse preservando su especificidad funcional de una generación a otra.	Capaz de revelar sus caracteres esenciales en la nueva propuesta teórica.
Representación de la transmisión de genes y caracteres.	Árbol genealógico o estudio de los datos familiares mediante símbolos.	Modelación teórica.

Table 4.1. Gene as a reference for theoretical investigation. Source: Reyes P et al 2006

Objects and phenomena of nature always carry an implicit internal contradictions and the struggle of opposites that is brewing inside everything is the engine of all dialectical change (Stalin, 1968).

The whole thing is both it and its opposite, as life carries within it some death because if only life one hundred percent could never become death. This does raise the dialectical Hegelian idea that every assertion (thesis) implies a negation (antithesis) that lead to the negation of the negation (synthesis) which, in turn, is thesis for another antithesis, and so on (Politzer, 1975). Thinking reflects reality after a process of analysis, synthesis and generalization. Rational activity operates with the material supplied by the senses, but in reality reflects other dimensions that do not occur directly on the perception that are unobservable. Thought penetrates to the essence and deeper relations of things.

The concept the essence of the object, inaccessible to knowledge immediately reflected. the trial It is a reflection of the connections between the phenomena of reality. The word symbolically it reflects reality, according to many levels of abstraction; is the conventional sign of reality acquired through the historical and social experience.

The model built in this thesis shows how methodological resource established by Lenin and released by Reyes et al (2006), determining how a new system of knowledge inherits the essential features of another that serves as a source, establishing an analogy between the evolution of living organisms and the development of theoretical systems using as a reference, genetics as a science of heredity.

4.1. Research design model

The construction of the theoretical model to present in this postdoctoral thesis, constitutes an abstract design in some way reflects the qualities of an object and the ways in which the relationships between its components are produced and theoretical suppositions that will base. For which the capacity for abstraction is applied, since the entire universe object or part of it, depending on what is built, is almost always in a chaotic environment that needs separation into parts for its reflection in the thought.

Being, knowledge of general theoretical framework, on the basis of research identifies the fundamentals that will sustain the theoretical construction of the investigated object, which will be scientific by sustaining the laws applied including the law of formal logic sufficient reason, which is based on a theoretical construct that is valid

whenever outbreak and therefore is underpinned by a system of knowledge accepted as true by the scientific community.

To design symbols, special codes and other graphic character elements are used.

With the construction of the model is achieved, the reality represented.

The composition model is structured on the basis of the application of information technologies and communication; attention to the ecological footprint, digital technologies that are part of artificial intelligence and sensors.

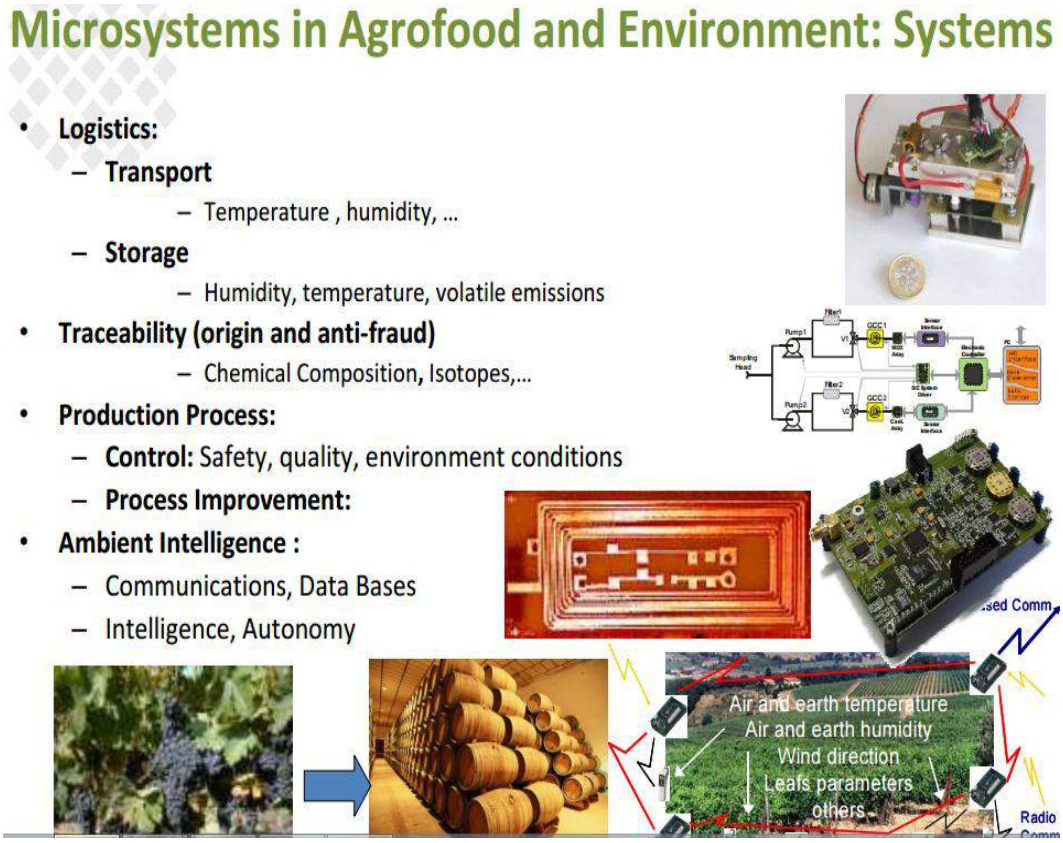


Figure 4.1. https://www.inti.gob.ar/jornada_nanotecnologia/pdf/cane_carles_sens_maq_agri.pdf

The basis of the conceptual structure, puts into consideration the component elements, which are human beings as a fundamental part of the model it is represented nutritional status that the consumption of quinoa produced in Bolivia, the footprint decreases ecological.

To which is added to the challenge of climate change with commitment and leadership is achieved by using sensors that identify specific moments, type of seeds to produce quinoa (nutrient high protein), quality soils, rainy seasons, harvest time suitable.

Technologies information and communication facilitate their positioning in the local and international market, putting into account their nutritional value and consumption by Bolivians and international contexts.

Decreasing the ecological footprint, with commitment and leadership, is achieved by preventing environmental pollution that goes against environmental health, reducing the transfer of the product and what it entails that activity (emanation and increased gases in the environment, increase cost of freight transport, transactions importers and exporters involved tasks, costs, risks, responsibilities; economic and financial situation relocation expenses; time spent exceeding investment costs in marketing, lack of seaports for transfer and contamination storage and emission of gas by ships) over long distances.

Awareness of the population for local consumption as part of the main consumers, is achieved by artificial intelligence used in the education of the population that enables awareness, with positive impact for environmental health part The humanity. According Lopez F, cited by Yugar E. (Thesis

2012) by spreading education, science, culture future, must give everyone the ability to think like human sers in time, to reconcile with its past and build the future according to the challenges Of each time.

The basis of artificial intelligence, becomes the new production factor that opens at least three important pathways to growth. One of which has to do with creating a new virtual workforce; referred to as intelligent automation. The second, which can supplement and enrich the knowledge and skills of the current workforce and physical capital in production. And like previous technologies, innovations can boost the economy, reducing unnecessary expenses.

This plotted, shows the essence of the model, the theoretical foundation enabling understanding and operation model exemplifying implementation.

Because to achieve structural transformation, you should try to do things differently and different things, as evidenced by the new education as noted students of the Institute of Technology of Georgia, where the new educational model projected future with the help of robotics by its actions has been used as an assistant and tutor being your answers to questions with 97% effectiveness , so learning people could be much more personalized by differences and rhythm of each.

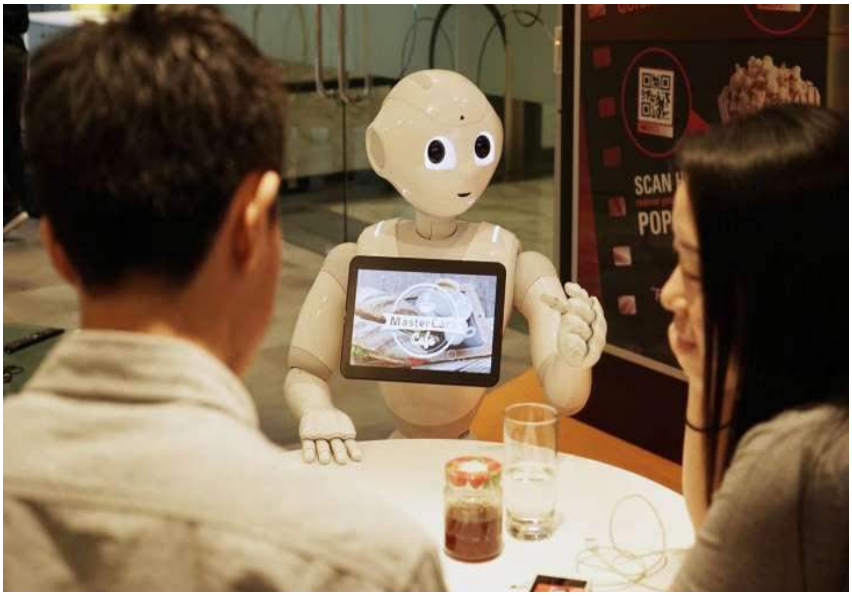


Figure 4.2. Solve global problems with artificial intelligence. Source: www.msn.com.es (2017)

The good nutritional status as part of the model to build, is achieved through food security, for what must implement strategies, policies participation and interaction of the central government, departmental, municipal, research centers and the whole population, to ensure productivity, markets and the arrival of quinoa as food for consumption with nutritional value as.

Decreasing the environmental footprint and economic improvement in the region have as support the implementation of the mixed economy that allows decisions to market and state; freedom of action for producers and consumers; where the state intervenes to correct market distortions; public and social participation, where equity involving equitable food distribution, investment capacity,

economic stability, social stability, political stability; are the basis for building the model.

The approach of contradictory phases of dialectics care put into this research are: thesis, lack of use of artificial intelligence in environment, health, education; the antithesis, incorporating artificial intelligence technologies as part of the twenty-first century; and synthesis, incorporating food with high protein value that goes against malnutrition states and produced in Bolivia aims at reducing the ecological footprint, that applying ICTs to compromise positions the product and take the leadership in the context local and international, enhancing communication, date knowledge, awareness that the theory of action are the factors involved in the formation and practice; which added more,

XXI.

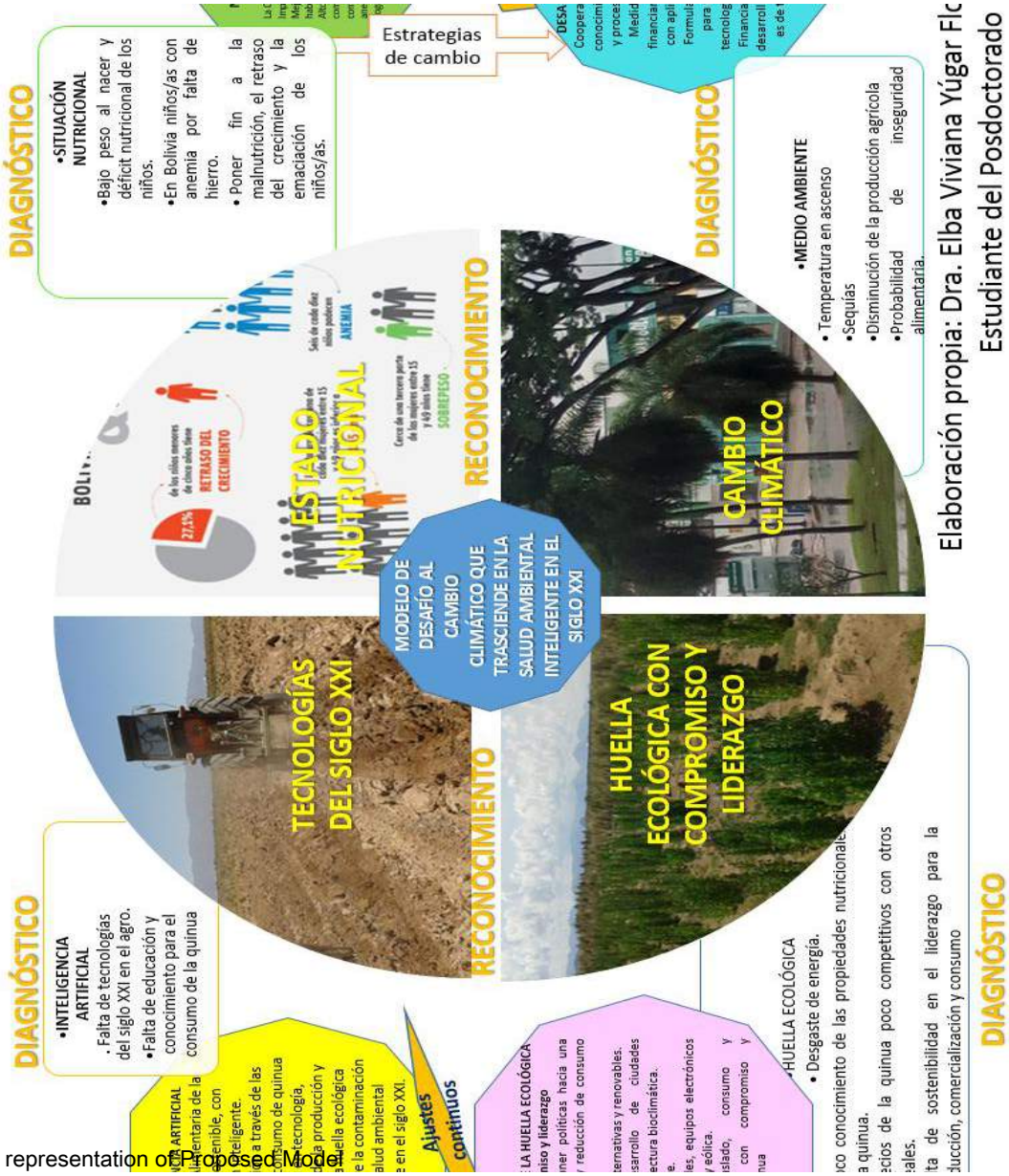


Figure 4.3. Schematic representation of Proposed Model

Chapter V. CONCLUSIONS

The problems of malnutrition, environmental pollution, assurance of production and consumption of protein nutritional foods of the region, application of technology, focusing on the prevention of processes and attitudes of the population, are achieved on the basis of projected overall goal: to design a model climate change challenge, the commitment, leadership and reducing the ecological footprint, transcends the smart environmental health in the twenty-first century; and specific objectives:

- The first objective posed know the nutritional status of the youth population, and its impact due to climate change, we have the following conclusions:

  For existing records the low birth weight of children is noted that reaches a comparatively high percentage among countries in the Latin America and the Caribbean; Bolivia is the state with the highest prevalence with this deficit; this delayed intrauterine development associated with nutritional deficit, which brings problems in the future.

  It is noted that there micronutrient deficiencies affecting the child population to 5 years old, in the region. Bolivia would be the most problematic children affected with iron deficiency anemia, being about 50%.

  So it is encouraged to end malnutrition, achieving meet the internationally agreed targets on stunting and wasting among children under 5 years, and address the nutritional needs of adolescents.

  Whereas even in the region, one third of the available proteins derived from cereals, primacy observed in the Caribbean and Central America; and in South America, the main source of protein is meat, cereals also important; and being the effects of increased pollution from fossil remains, it has the best alternative propender consumption pseudocereals the Bolivian population ; being necessary to establish a setting new matrix production and consumption of products towards a society whose nutritional protection is that the production and consumption of protein products pseudocereals is in equilibrium with starch.

  Quinoa, a high protein, is an alternative to solve nutrition problems, hunger and food security. It is a product that by its composition, must become as essential in food, comparatively with wheat, rice and corn that is higher in protein content; there is also the possibility of improvement in protein content, once it has deciphered the genetic code.

  Continued use of quinoa, provides a high iron intake in the diet, favoring the nutritional status of the population; and it may be implemented as part of one of the efficient and feasible strategies for food, to counter

states of malnutrition and anemia; whereas the lack of iron causes cognitive and physical loss overall.

So it is possible to foresee major changes in developing countries, which will also protein foods in greater demand as a result of population growth and per capita income, plus production by lower oil prices being favored.

- The second aim of the thesis is to assume the challenge of climate change, with commitment and leadership; by applying technologies that enable the implementation of preventive measures possible to transfer educational information, motivation, personal skills and self-esteem; unmissable towards continuous improvement of health, is met by:

Cooperation in the promotion of effective modalities for the development, implementation and dissemination of technologies, skills, practices and environmentally sound processes in relation to climate change and implementing feasible to promote, facilitate and finance measures, according appropriate;

what favor financially and move after the improvement of the environment as part of the implementation of clean technologies.

It is also important to consider the formulation of policies and programs the effective transfer technologies ESTs that are publicly owned or in the public domain for private sector creation of a favorable climate.

Climate finance from developed countries aimed at developing country, is of significance. Following international agreements, many developed and developing countries expressed their commitment to improve environmental temperatures and reduce the negative impact on the environment; They are aware that it is a long process but maintain the interest to continue working on the issue.

- Regarding the third objective is to establish mechanisms decreased ecological footprint and impact on the process of adaptation and mitigation of climate change, it is possible to conclude that:

The footprint can be modified with actions such as preference of locally produced; use efficient and safe public transport for short distances and medium for conveying the nutritional product.

Also, formulate and propose policies to guide the community towards greater efficiency and reduced energy consumption used in the process of industrialization, promoting the use of hydropower and alternative energy (such as wind, solar, biomass, geothermal) ; promoting the development of sustainable cities, promoting bioclimatic architecture; constructing buildings and cities that produce energy rather than consume, purify the air; reuse of materials, producing electronic equipment with solar energy charge; applied to the production, transfer and consumption of nutrients such as quinoa.

- The fourth goal set, which based on a model structure considering the aforementioned components, which gets the challenge of climate change and transcends the Intelligent in the twenty-first century, environmental health is key to:

Artificial intelligence as part of technology to smart environmental health of the XXI century, helps the food industry in threshing, cleaning, washing and drying of quinoa and achieve a more intelligent energy consumption management, so that countries They must invest in developing technology to improve performance and reduce the ecological footprint.

- Similarly, through the application of sensors may pose challenges that allow to track quality planting, growing, harvesting as part of the production; product positioning and achieving internal and external marketing as part of competitive prices; and storage for distribution in the domestic and international market through ICT; leadership and according to PNCTIB with valuation of environmental components that relate to the goods and services of biodiversity, considering the social and organizational component, the. Production - tecnoestructura

- Energy; also conservation biodiversity and environment to build priority conservation areas, best practices for management and use of products, establishing a balance between the relationship man - nature.

- Educational processes through scientific knowledge made available to the community with a view to contributing to its sustainable integrated development, achieve the reduction of the ecological footprint, so that the educational community to reflect on current lifestyles and values that their habits and behaviors as beings that inhabit the planet are developed, on which still needed further work.

- Whereas the Bolivian youth population affected with states of malnutrition and anemia still lacks knowledge of the nutritional elements that has one of the domestic products such as quinoa, it will be necessary to focus on the use of products that nature provides, also on behaviors and balanced nutrient intake for better quality of life.

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Page seven La Paz in July 2016. Anemia affects five out of 100 universities. 05/26/2017 query.

ANNEX I

Matrix operationalization of variables

issue	goals	variables	Indicator	Dimensions
Which It is the model what I can get he challenge to the climate change whose commitment, leadership Y reducing the footprint, prioritizes the Intelligent environmental health in the twenty-first century?	Know the situation nutritional from the young people, and their aftermath by effect of the change climate.	Analysis of the nutritional status on the base from some nutrients.	Presence or absence of variation in nutritional status.	nutritional level
	Take the challenge climate change, with commitment and leadership; Through the application preventive measures educational potential of to transfer information, motivation, skills personal Y self esteem; unmissable to continuous improvement Of the health.	Application from surveys situational awareness and actions they engaged.	Find from information about the problems of climate change.	Education level
	Establish the mechanisms from decreased footprint ecological Y the impact on the adaptation process and mitigation by climate change.	Skills acquired on ecological footprint.	Consumption situation of nutritional elements each region.	economic scenario
	Propose a model I get the challenge climate change transcends the Health Intelligent environment in The 21st century.	Sketch of a model from challenge to the climate change.	differences in Enviromental health	modeling

ANNEX II

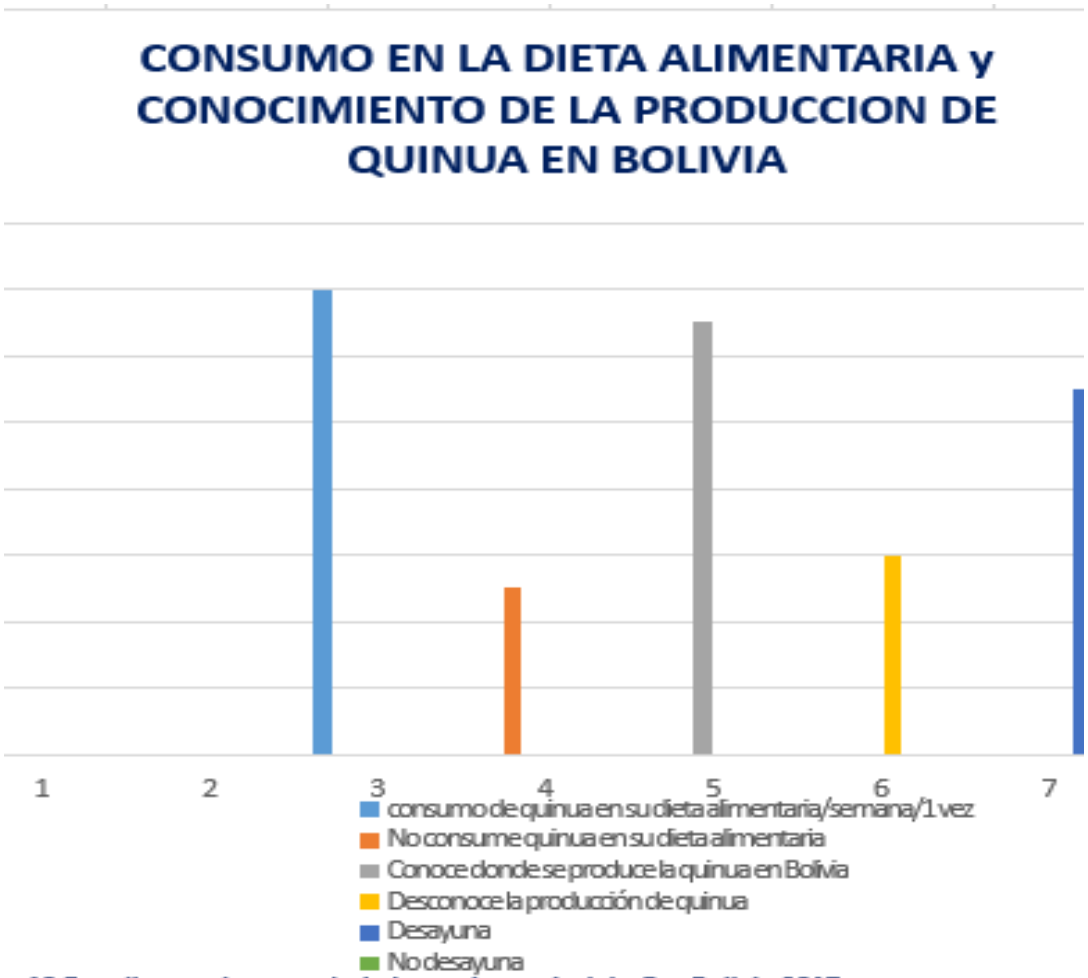
América Latina y el Caribe: principales indicadores económicos

	2006	2007	2008	2009	2010	2011	2012	2013	2014 [a]
					Tasas anuales de variación				
Producto interno bruto total [b]	5,4	5,8	3,9	-1,2	6,2	4,7	2,9	2,9	1,1
Producto interno bruto por habitante [b]	4,1	4,5	2,8	-2,3	5,0	3,6	1,8	1,8	0,1
Precios al consumidor [c]	5,1	6,5	8,1	4,6	6,5	6,9	5,7	7,6	9,5
					Porcentajes				
Desempleo urbano abierto	8,6	7,9	7,3	8,1	7,3	6,7	6,4	6,2	6,0
Deuda externa bruta total/PIB [d e]	20,8	19,5	17,5	20,6	19,7	19,3	21,5	22,2	24,5
Deuda externa bruta total/exportaciones de bienes y servicios	87,1	85,4	78,2	105,7	100,6	91,9	99,2	103,7	116,3
					Millones de dólares				
Balanza de pagos [e]									
Balanza de cuenta corriente	47 078	6 601	-39 126	-29 392	-64 406	-81 715	-107 008	-163 431	-167 659
Exportaciones FOB	697 738	785 648	906 137	704 960	893 325	1 105 395	1 121 120	1 116 348	1 083 027
Importaciones FOB	605 487	723 079	867 055	653 930	844 665	1 034 475	1 077 755	1 104 135	1 091 421
Balanza de servicios	-10 881	-17 935	-32 996	-34 670	-50 756	-66 163	-71 803	-78 732	-74 820
Balanza de renta	-98 310	-104 291	-112 594	-103 372	-124 080	-149 861	-140 850	-158 498	-147 782
Balanza de transferencias corrientes	64 018	66 259	67 382	57 620	61 770	63 390	62 280	61 776	63 492
Balanzas de capital y financiera [f]	16 560	118 332	77 204	76 259	150 314	188 057	163 529	178 844	205 241
Inversión extranjera directa neta	34 250	94 471	102 215	70 987	87 105	127 954	134 856	160 562	137 435
Otros movimientos de capital	-17 690	23 861	-25 011	5 272	63 209	60 103	28 673	18 281	67 806
Balanza global	63 853	124 445	38 078	46 867	85 698	105 927	56 808	15 413	37 581
Variación en activos de reserva [g]	-51 327	-126 698	-42 099	-50 623	-87 097	-106 314	-57 886	-16 226	-37 313
Otro financiamiento	-12 526	2 253	4 021	3 757	1 401	387	1 079	814	-268
Transferencia neta de recursos	-94 276	16 295	-31 369	-23 356	27 635	38 583	23 757	21 159	57 191
Reservas internacionales brutas	138 193	145 525	134 590	567 070	655 672	773 910	835 727	830 009	857 400
					Porcentajes del PIB				
Sector fiscal [h]									
Resultado global	0,0	0,2	-0,5	-2,8	-1,9	-1,6	-1,9	-2,4	-2,8
Resultado primario	2,2	2,1	1,1	-1,1	-0,3	0,0	-0,2	-0,7	-1,1
Ingreso total	18,1	18,5	18,6	17,5	17,8	18,3	18,6	18,9	18,6
Ingresos tributarios	13,9	14,3	14,2	13,6	13,8	14,4	14,8	15,0	15,0
Gasto total	18,1	18,3	19,1	20,2	19,7	19,9	20,7	21,3	21,4
Gastos de capital	3,3	3,6	4,0	4,1	4,1	4,1	4,3	4,5	4,5
Deuda pública del gobierno central	35,9	30,6	29,1	30,7	29,0	29,0	30,6	32,0	33,0
Deuda pública del sector público no financiero	38,2	32,9	31,4	33,0	31,7	31,3	32,9	34,4	35,7

Fuente: Comisión Económica para América Latina y el Caribe (CEPAL), sobre la base de cifras oficiales.
[a] Cifras preliminares.
[b] Sobre la base de cifras oficiales expresadas en dólares de 2010.
[c] Variación de diciembre a diciembre.
[d] Estimaciones sobre la base de cifras en dólares a precios corrientes.
[e] No incluye Cuba.
[f] Incluye errores y omisiones.
[g] El signo menos (-) indica aumento de los activos de reserva.
[h] Gobierno central. Promedios simples de 19 países.

Source: NN.UU 2015.

ANNEX III Figure 1 Consumption of quinoa in Bolivia. 2017



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18 años

Elaboración pr