



# **TECHNOLOGICAL REVOLUTION-INSURANCE**

## **ASIA-PACIFIC INSURANCE CONFERENCE AIDA**



**18-20 OCTOBER 2017  
SINGAPORE**

### **MERCOSUR GROUP**

María Kavanagh – Argentine  
Pery Saraiva Neto – Brasil  
Ana Rita Petraroli – Brasil  
Ivy Cassa – Brasil  
Ricardo Peralta Larrain- Chile  
Roxana Corbran – Uruguay  
Andrea Signorino Barbart – Uruguay  
Miryam Aragón Espejo- Perú  
General coordination María Kavanagh  
**S4 AGTECH**

<b>TABLE OF CONTENTS</b>	<b>Pag</b>
Summary	3
Acronyms	4
Introduction	5
Index-Based Agricultural Insurance	6/7
Argentinian Republic	8/11
Federative Republic of Brazil	12/16
Republic of Chile	17/19
Republic of Peru	20/22
Eastern Republic of Uruguay	23/24
Parametric Insurance in Asia	25/26
Papua New Guinea	
Conclusion	27/29
References	30

## **SUMMARY**

In this research, we have outlined each of the region's parametric or index insurance and in the law compared to Papua New Guinea of Asia Pacific, which are part of this technological revolution in the world.

In most MERCOSUR countries, and in Papua New Guinea, agriculture has significant economic potential, and the insurance sector plays a predominant role, especially for small farmers.

The Parametric or Index insurance represents a relevant element in the production chain of Latin American countries and Asia Pacif, reduces the vulnerability of the economy, creates conditions of greater solvency in the productive unit, avoiding its decapitalization by the effects of fortuitous events and decreases the need for public resources to finance the losses generated by catastrophic losses.

Climate-based insurance is not a stand-alone solution, but an additional tool in the risk management portfolio.

## **ACRONYMS**

<b>IDB</b>	Inter-American Development Bank
<b>BSE</b>	State Insurance Bank
<b>CEI</b>	Center of Entrepreneurship of Computing
<b>COMSA</b>	Construcción y Montaje Sociedad Anónima
<b>CORFO</b>	Corporation for the Promotion of Production
<b>ENA</b>	Natural Energy Tributaries
<b>ENESA</b>	State Agency of Agricultural Insurance
<b>ESALQ</b>	Luis de Queiroz High School
<b>GDP</b>	Gross Domestic Product
<b>INIA</b>	National Institute of Agricultural Research of the Ministry of farming
<b>LATUV</b>	Remote Sensing Laboratory of the University of Valladolid
<b>OCCD</b>	Office of Climate Change and Development
<b>ONS</b>	National System Operator
<b>PNG</b>	Papua New Guinea
<b>SAC</b>	Catastrophic Agricultural Insurance
<b>SAP</b>	Systeme Anwendungen und Produkte
<b>SSN</b>	National Insurance Superintendence
<b>TSU</b>	Technical Support Unit
<b>UFRGS</b>	Federal University of Rio Grande do Sul

## **INTRODUCTION**

The insurance industry is one of those affected by climate change and in this sense it is faced with three fundamental aspects: The first is the adaptation of the sector to the direct impact of this change in terms of frequency and breadth of claims, second is the role of insurance and reinsurance to accompany society in its process of adaptation to climate change, and the third is the nascent opportunities or markets generated by the new context.

It is estimated that the changes projected by global warming will affect climate variability towards higher frequencies of extreme events that will harm society as a whole.

In the face of these changes, the development of the insurance market emerges as one of the most efficient tools to accompany society in the process of adaptation.

In this context, the agricultural activity indispensable to satisfy the human demand for food, is incorporated to the technological revolution, this new paradigm opens a new possibility to the digital world for the sector. The tendency to work with performance monitors, devices that allow adjustment of the application of inputs, according to the specific needs of each environment.

On the other hand, the insurance sector, together with Ag technology companies through Web-Gis platforms, focus on the development of data analysis for decision-making tools that can improve agricultural performance and cover the losses caused by the change climate.

In the Mercosur Region, the insurance sector has incorporated the parametric or index climate insurance, which are being implemented gradually, since these contracts require meteorological information systems with high density of stations and with sufficiently long series.

Insurance companies now have the tools to start this process and respond to the challenges facing Climate Change in this century.

Finding the balance to strengthen their mission to protect society and face greater vulnerability will be the future key to their business.

## **Index-based Agricultural Insurance**

Index-based insurance is characterized by indemnities based on the value of an index and not, as in the case of indemnity-based insurance, in quantifiable losses. A threshold or parameter is established below which the insurer must indemnify the insured. There are two types of categories, the direct and indirect indexes.

Insurance based on yield indexes by area, for which the index is directly an average of yield per area, livestock mortality or income.

Indirect index based insurance, based on other underlying data types, such as rainfall, temperature or vegetation indexes (computed from satellite imagery or weather station data), correlated with the losses in which farmers on the ground.

The United States, Canada, Brazil, Ukraine and India have been experimenting with area-based insurance for some years, while indirect indices are relatively recent and exist only in some countries under pilot projects.

The two important preconditions for index-based insurance are the existence of data, both sufficient and reliable for its design. The objectivity and transparency of the underlying index helps stakeholders (eg farmer, insurer, and government) to trust the index. Objectivity implies that no actor (the insured, insurers or reinsurers) can influence the measurement of the index. Transparency, meanwhile, means that the data and methodology used for the design and measurement of the index are reliable.

The main advantage of index-based insurance is that it avoids the problems of moral hazard and adverse selection inherent in classic claims-based insurance. Each farmer represents an entity within a large group of producers whose combined yield (calculated by means of objective measurements provided by meteorological stations, satellite information or regional performance data) determines the value of the index. Likewise, individual loss assessments are not required, which reduces administrative costs and streamlines the settlement process. The transparency of the system can also facilitate access to international reinsurance markets.

Despite the associated advantages, the aggregate volume of index-based agricultural insurance premiums remains very low and markets remain underdeveloped, with few insurance contracts offered and a low level of penetration. The sustainability of these programs requires, however, the subscription of a very high number of policies in order to

keep the premiums at a reduced cost. With the exception of India and Mexico, most index-based crop insurance programs continue to pilot implementation, with a very small number of insured farmers. Another drawback is that index-based insurance is not adequate for complex or multiple risks, such as price risk.

## **ARGENTINIAN REPUBLIC**

The Argentine Republic is in the Southern Hemisphere, with respect to Ecuador. And it is in the Western Hemisphere, with respect to the Greenwich Meridian.

Argentina is located at the southern tip of South America. It is the second largest country in South America and the eighth largest in the world. It has a continental surface of 2.791.810 Km<sup>2</sup> counting the Malvinas Islands, other islands of the South Atlantic and a sector of Antarctica. Counting the Antarctic sector has a total area of 3,761,274 Km<sup>2</sup>. It has an extension of north to south of 3,800 km and east to west of 1,425 km.

Located in the south of the continent, it forms next to Chile, Uruguay, Paraguay and the south of Brazil what has been called in the "Southern Cone".

It limits to the north with Bolivia, border fixed on the mountain of Cochino, the rivers Grande de San Juan, Bermejo, Grande de Tarija, Itaú and Pilcomayo and the parallel 22; by the treaty of 1889, by which Argentina ceded its claim on the province of Tarija a change of the Puna de Atacama; and with Paraguay, from which the Pilcomayo, Paraguay, and Paraná rivers separate it according to a treaty and an award (Hayes Award), both of 1876.

It limits to the east with Brazil (rivers Iguazú, San Antonio, Pepirí Guazú and Uruguay), border established in 1895 by the Cleveland award, and with Uruguay, crossing the river of the same name and the one of the Silver, borders agreed by the treaties of 1961 and 1973. At the border with Brazil, the Iguazú and Uruguay rivers serve as boundaries.

The border with Uruguay is also of the fluvial type: passing through the Uruguay River and the Río de la Plata.

In the case of the border area on the Uruguay River, the dividing line passes through the navigable channel of the river, by its deepest zone

It was agreed that the island Martín García by its historical tradition, although from the drawing of the limit, was of the Uruguayan side.

It limits the west with Chile, whose common border is constituted mainly by the mountain range of the Andes, demarcated according to the treaties of 1881, 1899 and 1995, and the British reports of 1902 (Patagonian Andes) and 1977 (Beagle channel) and (Beagle Channel), the latter being ratified by a referendum in 1984. The southern tip of Argentina reaches the Drake Passage, which links the Atlantic and Pacific Oceans.





Argentine agriculture is one of the main economic activities, the country has a continental area of about 2.8 million square kilometers and has about 34 million hectares with agricultural crops. Agricultural GDP represents 8.31% of the country's economy.

### **Parametric Insurance**

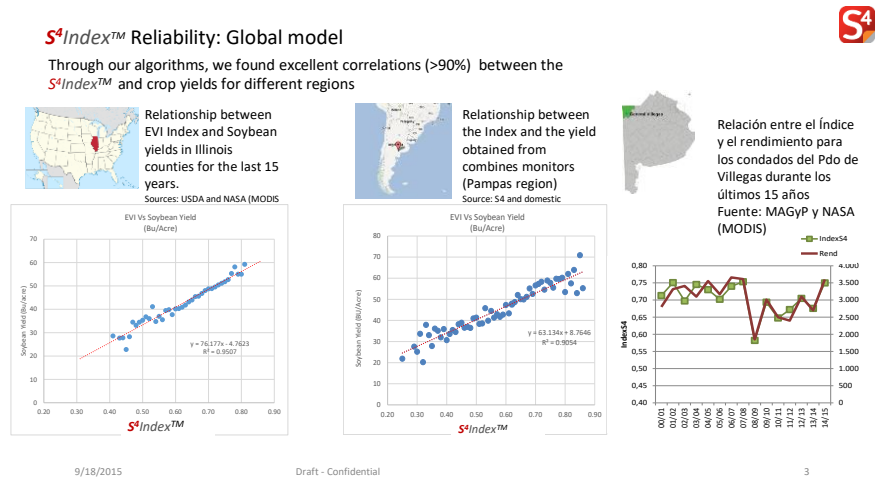
In October 2014, the Ministry of Agriculture, Livestock and Fisheries, together with the Superintendency of National Insurance (SSN), signed collaboration agreement N ° 295, with the aim of generating joint policies aimed at achieving greater penetration of insurance in agricultural activity.

In the aforementioned agreement, it is stipulated that insurance based on indexes, whether of climate, average yield of a geographical area, or satellite information, constitute a novel contractual model in insurance. To achieve the development of this type of insurance, it is necessary to have the new technologies available in the field of climate information, applying them to the daily life of agricultural companies. On the other hand, it is necessary to design critical indexes that determine, with a high degree of reliability, a relation with the yields of the agricultural activity in question. For the development of these insurance, the intervention of specialists in the field of climate and agriculture, together with agrobusiness agents and specialists in developing insurance products.

At present, there are two types of index insurance: performance and climate, where the local market is looking.

In this context, S4agtech is an Argentine agronomic study dedicated to the management of agronomic information facilitating processes and developing a Web-Gis platform. The company S4agtech in its international expansion, is entering the insurance market of Singapore. S4agtech was recognized by the specialized CB Insights site in the United States as one of the 77 startups with development potential for agriculture.

The farmer takes too many risks for production, but with available technologies, especially satellite information, you can build indices of what happens at the plants and create hedge ratios and transfer the risk to the insurance or financial market.



**IntegraSoja™ brinda servicios de alto valor a través de tecnología satelital, gestión de riesgo y conocimiento agronómico.**

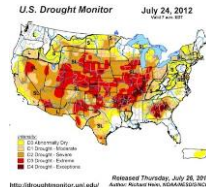
- 1) Recomendación técnica para el lote del productor**  
El productor dibuja fácilmente el lote en la plataforma.  
Recomendación: 15 años de historia del lote + fenología de las variedades SYT.  
Variedad y tratamiento: SYN EX3 IPRO, PienusMax  
Densidad: 25 pl/m2  
Fecha de siembra: 14  
Alerta de aplicaciones: Enfermedades & Plagas
- 2) Cobertura de los productos Syngenta en base al índice Verde.**  
Partido: Pergamino, Buenos Aires  
Trigger S4 index: 0.78, 0.60  
Ejemplo: -0.18 → 45% reembolso  
El seguro se calcula con el IV de soja del Partido del productor medido en el periodo crítico.  
Cada Partido tendrá un IV trigger basado en su historia. S4 calculará el IV de esta campaña para determinar si aplica la cobertura.  
El reembolso se aplica en escalones. A mayor distancia del trigger mayor será el reintegro a recibir.

ANTES DE LA SIEMBRA → DURANTE EL CULTIVO → Riesgo climático → DESPUES DEL CULTIVO

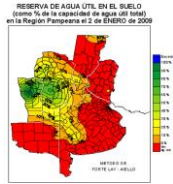
Classification: INTERNAL USE ONLY      S4Index™      syngenta

**S<sup>4</sup>Index™ Drought Parametric Protection**

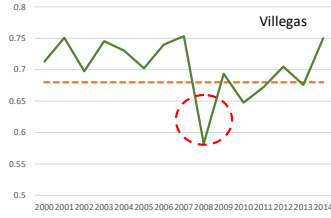
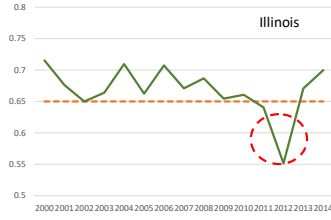
“What if?” Analysis for Illinois (US) and Villegas, Bs.As province (Arg)



Released Thursday, July 26, 2012  
 2012 Drought in US, worst in 50 years  
<https://www.ncdc.noaa.gov/sotc/drought/201206>



2008 Drought in Arg, worst in 50 years



9/18/2015

Draft - Confidential

10

## **FEDERATIVE REPUBLIC OF BRAZIL**

Brazil is the largest country in Latin America and the fifth largest in the world, with an area estimated at more than 8.5 million km<sup>2</sup>

Its limits are: to the south, Argentina, Uruguay and Paraguay; to the east, the Atlantic Ocean; to the north, Venezuela, Colombia, Guyana, Suriname and French Guiana; and to the west with Bolivia and Peru.

The relief of Brazil is solved in three large topographic units: the Amazon river basin, which occupies the northern third of the country, the Brazilian massif, occupying almost the remaining thirds and serving as a boundary by the south and the Guianese Shield, which limits it in the northern part and only part of which is Brazilian. The altitude of the Brazilian territory is generally moderate. It does not have large mountain ranges, ridges or similar.

Most of the country is comprised between the terrestrial tropics, reason why the climatic stations do not feel in a radical way in much of the same. The Amazon rainforest covers 3.6 million km<sup>2</sup> of the territory. Thanks to its vegetation and climate, it is one of the countries with the most species of animals in the world.



## **Parametric Insurance**

Recently the first contracting of parametric insurance was announced in Brazil, an insurance modality that aims to reduce exposures to climatic events, their extremes and changes. The object of the insurance, in the case, is to limit potential loss in sales operations of energy by the marketer.

According to reports, energy supply contracts for large consumers are generally made with pre-established values, so that "large variations in the price of energy can impact the marketer's box: sales prices are predefined, purchases are produced in the market in the short term, generating a possible decrease in cash flow. "

This price variation can be derived from unpredictable weather and its atypical variations, a factor that can significantly interfere with energy production.

According to the matter, drought in 2010 drastically reduced the flow of the country's main rivers, damaging the supply of Brazilian hydropower deposits, forcing the operation of thermoelectric power stations, which are operationally much more expensive. In this way, the price of energy soared, directly impacting the price of energy in the short term.

Without intending to exhaust the concept at this time, it must be clear from now on that parametric insurance has a different trigger of traditional insurances. Regardless of the occurrence and demonstration of the damage, the variation of the index (parameter) stipulated in the contract, for indexes higher or lower than the fixed measure, is sufficient enough for the actuation of the insurance, according to the levels set in contract.

In the case, "the index monitored to determine the payment of compensation will be the ENA (Indirect Natural Energy) of the sub-markets Southeast and Center West, responsible for generating more than 65% of all electricity in the country." According to the interviewee,

the ENA corresponds to the energy that is obtained from the natural flow of a river. The index is measured daily by the National System Operator (ONS), an independent body responsible for coordinating and controlling the operation of electricity generation and transmission facilities in Brazil. In case the ENA falls below 90% of the long-term average, the insurer will pay the indemnities provided in contract, securing the financial compensation to the insured company. The insurance is adjusted to the local market and is

based on parameters measured by an independent agent, in the case of ONS. Thus, compensation is done with much more agility. "

This modality of contracting insurance is innovative, recent in Brazil, as it is seen, and it is the encounter of a new context of risks, derived from the climatic change. In the most, the most diverse activities or estates exposed to climatic risks are applied, far beyond the activity of energy production.

In view of the advantages presented, parametric insurance imposes at first glance some difficulties, especially related to its understanding and application, in a pre-comprehension scenario, generally linked to traditional insurance, such as the assumption of insured damages or its assets, which may even generate legal issues.

One of the possible situations will be when a certain insured suffers with a certain climatic weather during successive number of days, but in all of them in parameters inferior to the levels foreseen in the contract of insurance, still causing losses. For example, a certain rural property, with insurance for its agricultural production, suffers with excessive rains for days, but always in rainfall indices lower than what is foreseen in the contract, and yet, at the end of the rainy season, losses are recorded. Parametric insurance, in principle, will not provide a response to this situation, because none of the rainy days reached the expected parameter, not characterizing the trigger of insurance.

Unless there was a clear understanding of the object of the contracted insurance, with informational symmetry between the parties - or having contractual forecast excepting the abovementioned anomalous situation - probable the frustration that will be generated, in relation to the insured's expectation, generating probable litigation between the parts.

The opposite, but also can occur, and there will be the activation of the trigger, when an index is reached, even though it has not generated the occurrence of damages to the insured and to his patrimony. Thus, considering the application of parametric insurance to so-called damage insurance, the question arises about the possibility of damage insurance without damage.

As regards risk, as an essential element of the insurance contract, it states that "in essence, the risk is defined

## **Agtech Brazil**

In Brazil, Agtech technology was incorporated into the world of agribusiness. In this context, agricultural management software and an irrigation management application provide technology to the agricultural sector.

**Aegro - Agricultural management software**

The productivity in the field goes directly by the good collection and analysis of information on stock control, cultivated areas and soil preparation. The problem is that this type of record is usually done analogically.

Aegro, an incubation plant in the Center for Entrepreneurship in Informatics (CEI) of the Institute of Informatics of the Federal University of Rio Grande do Sul (Ufrgs), intends to solve this question.

The company developed an agricultural process management software, which assists from sowing to harvesting. By acting on production, financial and commercial activities, the program helps reduce waste and increases crop productivity.

Founded in 2015, the company was founded by Pedro Russo, Paulo Vitor Silvestrin, Thomas da Silva Rodrigues and Francisco Gerdau de Borja. In June of this year, the company ranked second in the Next Generation Apps category, the SAP Hana Innovation Award 2016.

The winners were chosen from more than 100 entries from 36 countries in four categories. The award was presented during Sapphire, a global event organized in May in Florida by the US technology company.

**Agrosmart - Irrigation management application**

The solution to save water consumption in irrigation can be on a smartphone. Agrosmart, a São Paulo launch company founded in 2014, developed an application that makes plantation management smarter.

The program connects the rural producer to the tillage. The technology works from scattered sensors in the field capable of monitoring soil moisture and the existence of pests, among other resources.

The information collected is processed, and the application recommends the farmer the most appropriate intervals to irrigate the plantations. In this way, according to the startup, it is possible to obtain savings of up to 60% in water consumption.

This year, Agrosmart received funding from the Paulista Innovation Fund, led by development company Desarrolla SP. The fund has a net worth of R \$ 105 million and makes contributions ranging from R \$ 2 million to R \$ 6 million per startup.

In 2015, Agrosmart partnered with EsaldTec, an incubator of the Luiz de Queiroz High School (Esalq). In the same year, Mariana Vasconcelos, founder and CEO, won a scholarship at a university linked to NASA because of Agrosmart, because the application helps to deal with one of the biggest global challenges, the water issue.



## **REPUBLIC OF CHILE**

Chile is located in the southern hemisphere, the territory is divided into continental Chile, insular Chile, subdivided in turn into "continental Chilean island" and "Chilean insular oceanic", and Chilean Antarctic Territory.

The country is located in the southwestern extreme of South America, within the region known as Cono Sur, continental Chile presents a high latitudinal development and little longitudinal development, extending for 39 degrees latitude - from the tripartite point with Peru and Bolivia to the Diego Ramirez islands, mainly in the area of middle latitudes - the Tropic of Capricorn crosses the north of the country. Antarctic Chile is located in the high southern latitudes, from approximately 61 ° to the geographic South Pole.

Chile is bordered on the north by Peru, on the east by Bolivia and Argentina, on the south by the South Pole, and on the west by the Pacific Ocean. Its land borders total 6339 kilometers, disaggregated as follows: 171 km with Peru. 860 km with Bolivia.

The country is on the edge of the South American and Nazca plates, which at the southern end gives way to the Antarctic plate. It forms part of the "fire belt" of the Pacific, is a highly seismic and volcanic zone. In Chile alone there are more than 2,900 volcanoes, of which 80, according to experts, register activity. In addition, the national territory owns 15% of all the active volcanoes of the world. Among all the Villarrica stands out, with 64 eruptions throughout its "active" history.

According to experts, it is estimated that of the total of 80 active volcanoes, 42 may erupt in the immediate future; that is, from now on and up to 200 more years; another 16 in the next nine thousand years and another 20 in several tens of thousands of years.

The surface of the continental country totals 755 776,4 km of the national territory, 51,695,732 hectares constitute the area associated to the agricultural and forestry farms, of which no more than 35.5 million hectares are under agricultural, livestock and forest. However, due to geographic and economic factors, the surface of cultivated soils is quite restricted, currently reaching only 2 million 123 thousand hectares. This area is distributed in 1,303,210 hectares used in annual and permanent crops, 401,018 hectares in fields planted and 419,714 hectares in fallow and rest. As for other land uses, a total of 17,070,776 hectares are covered by native forest and bush; 12,549,478 hectares, for natural

meadows; 2,707,461 hectares for forest plantations and 1,062,352 hectares for improved grasslands.



### **Parametric Insurance**

The State is addressing this challenge from a new vision: that of parametric insurance, complementing the offer of traditional insurance. In this sense, COMSA and the National Institute of Agricultural Research of the Ministry of Agriculture (INIA) are working on the development of an Indexed Insurance in conjunction with the State Agrarian Insurance Agency (ENESA), the Spanish Association of Combined Agricultural Insurance (AGROSEGURO) and the Teledetection Laboratory of the University of Valladolid (LATUV), Spanish institutions that are in charge of transferring the knowledge and technology necessary to correctly develop this type of Insurance in Chile, which is financed by the IDB and COMSA.

The pilot project has been carried out thanks to the collaborative relationships that COMSA and ENESA have maintained for years, meaning the opening for this type of Insurance in Latin America.

The objective of this insurance will be in the first stage to establish a system of protection against drought in pastures, under an experimental modality of Indexed Insurance, managed under public-private alliances, in two regions of Chile (Maule and Biobío), which will contribute to guarantee the economic stability of sheep farms managed under grazing, under an extensive regime, facilitating access to credit and favoring the possibilities of promotion, innovation and productivity improvement in the livestock sector.

This particular insurance will use satellite technologies combined with data from meteorological stations, to be able to determine the damages caused by the drought to the prairies.

### **Agtech Chile**

It is a platform of companies that are part of the solutions to the climate change, incorporating the new agricultural technologies.

The industry of new technologies for agriculture is composed of many areas: precision agriculture, information technologies for agriculture, biotechnological inputs, bio-inputs, biostimulants, e-commerce of food, sustainable proteins, new irrigation systems, biomaterials, bioenergy others.

Through a project funded by Innova CORFO (Chile) and private companies, we will work by training and transferring technology to a set of bioconsumers and precision agriculture companies.

## **REPUBLIC OF PERU**

Peru is located in the western and intertropical part of South America. It is made up of a territory of a continental surface of 1.285.215,60 km<sup>2</sup> of surface, which makes it the 20th largest country in size of the Earth and the third of South America. In addition, the sea surface in the Pacific Ocean, called the Sea of Grau, is part of the territory of Peru, extending along the Peruvian coast in an extension of 3080 km and an imaginary line 200 nautical miles away from the nearest point of the coast.

Peru has land borders with five countries: on the north with Ecuador and Colombia; on the east with Brazil, on the southeast with Bolivia, and on the south with Chile, totaling 7,073 km of land border line.<sup>1</sup> Additionally, it has maritime borders with Ecuador and Chile. The land and maritime borders of Peru are perfectly delimited and protected by the respective international treaties that are unilaterally irreversible.



### **Parametric Insurance**

In Peru, parametric insurance is offered that offers the opportunity to mitigate and develop adaptation strategies in the face of the problems of the extreme El Niño phenomenon, such as crop loss and road destruction.

The Peruvian government and the Ministry of Agriculture have opted to expand the Catastrophic Agricultural Insurance (SAC) program, which includes five more regions, with the launch of an international tender.

In response to the high volumes of floods caused by the El Niño climate system, many Peruvian farmers saw their crops destroyed and subsequently lost money and, in the absence of insurance and reinsurance protection, reduce the social and economic stability of the Peruvian agricultural sector.

In the case of a powerful episode of the El Niño phenomenon, intense rains and severe flooding can occur, so the need for risk transfer to protect against this phenomenon and other climatic threats that damage crops is essential to protect the agricultural sector .

Reports indicate that Peru is now seeking to expand Catastrophic Agricultural Insurance (SAC) for the period from July 2018 to August 2018, to cover five other regions after the recent episode of El Niño that hit most of the north of the country.

The new regions that will be included in the coverage of SAC are Tumbes, Piura, Lambayeque, La Libertad and Ancash. This would bring to 13 the number of regions covered by the SAC, with Huancavelica, Cusco, Apurimac, Huanuco, Cajamarca, Ayacucho, Pasco and Puno already covered by the initial program of the SAC.

Peru has launched an international tender to attract global insurance and reinsurance companies to develop partnerships with Peruvian companies to provide risk analysis or know-how and support.

Curiously, Peru is also one of the South American countries seeking to sponsor a catastrophic bail bond to cover earthquake risks, along with Chile, Colombia and Mexico, which form the Pacific Alliance (a Latin American trade bloc). An agreement that would allow them to take advantage of the capital markets as a source of risk capital and reinsurance.

Peru is clearly aware of its exposure to a series of catastrophic events that have the potential to affect several industries and promises to see the country embark on risk transfer to minimize its financial exposure and ultimately boost economic stability and safety.

Peru has become one of the top ten food-supplying countries in the world and its agriculture contributes 7% per year to GDP.

Family farming is very important for the country, it produces 70% of the food consumed in the country. It is important to give attention to the small producers and the native products, who have transmitted from generation to generation wisdom and techniques to develop their products, many of them medicinal, for a healthy diet.

The variations of the climate that Peru exhibits from year to year, known as interannual variability, are largely determined by the presence of El Niño. The extreme events associated with this are those that cause impacts, affecting the living conditions of the population.

Peru shows great vulnerability to drastic climatic variations, such as extreme rainfall events and high temperatures associated with El Niño. Evidence of this is economic losses involving events such as El Niño 1982 / 83 (losses of US \$ 3283 million) and El Niño 1997/98 (caused damages estimated at US \$ 3.5 billion), losses equivalent to 11.6% and 6 , 2% of the annual GDP of 1983 and 1998, respectively.

The lack of rain especially in areas located on the Pacific side of Central America, affects the first and last plantings. When there is "Child", in the last one the greatest impacts are observed, since the exit of the winter usually takes place, causing important losses to the farmers.

### **Agtech Peru**

Peru enters a new agricultural era, through digital marketing, precision agriculture, drones use are part of the new trends that are making way for the agricultural and food industry.

## **EASTERN REPUBLIC OF URUGUAY**

Uruguay is located in the eastern part of the South American Cone. It limits the northeast with Brazil - state of Rio Grande of the South -, to the west with Argentina - provinces of Entre Ríos and Corrientes - and it has coast in the Atlantic ocean to the southeast and on the River of the Silver towards the south. It covers 176 215 km <sup>2</sup>, being the second smaller country of South America in territory.

It limits the north and the northeast with Brazil; to the west with Argentina through the Uruguay river; to the south with the River of the Silver and to the east with the Atlantic Ocean.

Its privileged position in the Southern Cone of the continent is very strategic, as it allows a policy of regional integration. In addition to being the gateway to the countries of the Plata basin, it is a bridge country between the great countries of Argentina and Brazil. As for the rest of the world, its coasts on the Atlantic Ocean allow a fluid communication, connecting with the most developed countries of the world.

Uruguay has 450 km of coastline along the Río de la Plata and 220 km of coastline over the Atlantic Ocean.



### **Parametric Insurance**

In the town of Canelones, the State Insurance Bank (BSE) gives the horticultural producer a cover against excessive rainfall during the summer season.

All coupons offered by BSE, have a subsidy equivalent to 35% of its price. The pilot experience of this novel index insurance is being implemented for several crops. It is a very simple instrument that offers a fixed payment or compensation if the event of excessive rain occurs during a period of pre-established coverage.

The new insurance allows the producer to buy one or more insurance coupons or sum assured units against excess rainfall. The insurance is triggered when the total rainfall falling for 10 consecutive days, within the month of coverage, is greater than or equal to a certain value, called the coupon trigger.

Rain is recorded in six reference meteorological stations administered by the National Meteorological Office.

### **Agtech Uruguay**

NXTP Labs is the technology investment fund, generating a micro-system and fertile networking for innovation in technology, business formats and business relationships for both entrepreneurs and investors and mentors, providing mentoring, visibility and acceleration to startups in order to turn them into the most disruptive solutions of the agricultural industry.



## PARAMETRIC INSURANCE IN ASIA

### PAPUA NEW GUINEA

Papua New Guinea (PNG) is a low-middle-income country located in the Asia-Pacific region. Agriculture is the predominant source of livelihoods in the country, with the agricultural sector accounting for 67% of the total workforce and 35% of GDP in 2010. PNG has a very high exposure to earthquakes, tsunamis and volcanoes, as well as being affected by climatic hazards including tropical cyclones and the influence of the Southern El Niño (ENSO) swing cycle which brings with it drought extremes and excess rain and floods.



The PNG Government points out that agriculture has been and will continue to be the backbone of PNG's economy by providing food, income and employment to the vast majority of the rural population. It has requested technical assistance from the World Bank for an agricultural insurance pre-feasibility study to assess the feasibility of market-based agricultural insurance in PNG.

The pre-feasibility study has concluded that the potential for developing crop and livestock insurance products and programs is currently quite restricted in PNG for a number of factors, including the lack of an agricultural insurance culture and a functional market,

subsistence farmers and lack of crop production, crop damage and climate data on which to base and design such programs.

However, the study has identified a number of possible traditional crop insurance products based on compensation and / or parametric or index-based for export crops / plantation export crops and food crops that could be developed. These products include individual producer (micro-level) insurance products and macro level products that are designed to insure the PNG Government against weather events of catastrophe.

Possible next steps include the implementation of a comprehensive feasibility study for agricultural insurance, the design and implementation of crop insurance pilots, the establishment of an Agricultural Insurance Committee and the creation of a Technical Support Unit (TSU).

The main stakeholders are the National Meteorological Services, the Office of Climate Change and Development (OCCD), the Insurance Commission and the corporations of the coffee, coconut and palm oil export industry.

## **CONCLUSION**

In this research work, we have outlined in each region, the parametric or index insurance that are part of this technological revolution in the world.

It should be noted that in most MERCOSUR countries, agriculture represents an important economic potential, and the insurance sector plays a predominant role, especially for small farmers.

In this context, the technological revolution accompanies insurers and agricultural producers, with the different tools provided by Agtech companies, and meteorological information systems, giving rise to Parametric or Index Insurance.

Index-based insurance reduces moral hazard and adverse selection problems, leading to significant economies of scale and design problems. In particular, these programs require high-quality data on climatic and productive variables, must be generated ensuring their reliability for the design of contracts and eventually to face legal procedures in case of disputes. The development of a system of insurance based on indexes of the climatic type, requires the existence of a meteorological information system with high density of stations and with sufficiently long series.

On the other hand, this innovative modality of insurance has a different trigger for traditional insurance, which makes the legal nature of insurance difficult, since they do not respond to the legislation in force to be classified as safe. Mercosur, are mostly implemented as pilot experiences, the same is true of Papua New Guinea in Asia Pacific.

Mexico's experience is different, index insurance is purchased by the government, with the aim of compensating small producers in the event of climate catastrophes that affect their livelihood.

On the other hand, parametric insurances have led to the creation of new climate data markets in India, for example, the private sector is struggling to set up new weather stations and then sell the data to insurance companies. This demonstrates that the private sector can play an important role, although in the most developing countries will certainly be more important public investments. Governments should support their meteorological services so that they can collect, process and provide quality data.

As far as subsidies are concerned, they are a complex issue and their use raises many doubts. In practice, in India, for example, development-indexed insurance subsidies have succeeded in getting these products to a much larger number of poor people.

Climate-based insurance is not a stand-alone solution, but an additional tool in the risk management portfolio. They work best when they are targeted at a clear and well-defined risk; the other risks must be covered by other risk management options. There are also many practical reasons why indexed insurance works best as part of broader disaster management and development strategies.

As a tool for adaptation to climate change, index-based insurance has three possible uses. They can function as a risk transfer mechanism within a comprehensive strategy for the management of climatic risks arising from climate change; as a mechanism to help people access the resources they need to escape climate-related poverty; and as a mechanism to encourage risk reduction.

It is important to have sound regulations to prevent abuse and to build trust, and therefore an effective regulatory framework is necessary.

Regulators should actively participate in the development of the insurance market on the basis of climate indices, ensuring that products and their management are fair to both buyers and sellers. Since compensation does not necessarily correlate with actual losses, a sound regulatory framework is essential to mitigate legal and other risks that might arise with the introduction of such insurance.

Interest in insurance based on climatic indexes as a tool for development and disaster management is on the rise, as reflected in the 2nd Agricultural Outlook Congress of the Cereal Exchange and the 4th International Conference on the agroindustrial projections of the INA Foundation, held in Buenos Aires Argentina on September 27, 2017. As the community of practice grows, it will become increasingly important - and will be more difficult - to use and share the knowledge acquired by the different actors.

The participation processes of the community of experts are useful, but the knowledge generated must have a wider availability. It is recommended to establish a knowledge management system to promote a rapid and effective implementation of innovative practices and technologies and the results of the research undertaken.

In conclusion, the Parametric or Index insurance represents a relevant element in the productive chain of Latin American countries, reduces the vulnerability of the economy, creates conditions of greater solvency in the productive unit, avoiding its decapitalization by the effect of fortuitous events and decreases the need for public resources to finance the losses generated by catastrophic losses. Uncertainty about the impacts of climate change in the future, both insurers and potential insurance beneficiaries face the challenge of ensuring an optimal level of protection against the risks of climate change. A more rigorous risk assessment, taking into account future uncertainties, and not just past experience, should help to meet this challenge.

Successful expansion of these insurances can only take place in an enabling policy environment established by governments. One of the main problems identified is the lack of a normative and normative framework and an environment conducive to micro and parametric insurance.

## REFERENCES

Brenes, C. El fenómeno de El Niño y el sector agropecuario . Conocerlo para adaptarse mejor. Consejo Agropecuario Centroamericano. CAC

Salvo, J. Estudio de Caso. Seguros Climáticos. La experiencia de Perú y Argentina en Seguros Indexados. Centro Regional de Cambio Climático y Toma de Decisiones. Marzo 2015

Sandmark, T. ; Debar, J.C. ; Jaleran. C.T. Surgimiento y Desarrollo de los Microseguros Agrícolas. Microinsurance Network 2014

Tecnología satelital aplicada al análisis y detección de contingencias agropecuarias. Mercado Asegurador Revista Año XXVII N° 304 Junio 2005

[www.minagri.gob.cl](http://www.minagri.gob.cl)

[www.agricultura.gov.br](http://www.agricultura.gov.br)

[www.mgap.gub.uy](http://www.mgap.gub.uy)

[www.ssn.gob.ar](http://www.ssn.gob.ar)

[www.svs.cl](http://www.svs.cl)

[www.jstor.org](http://www.jstor.org) Promoting Risk Financing in the Asia Pacific Region Lesson from Agriculture Insurance in Malaysia, Philippines and Vietnam R.V.R.V. Prabhakar, A.