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ENTREPRENEURIAL ACTIVITY OF AGRICULTURAL PRODUCERS UNDER CLIMATE CHANGES: NECESSITY OF AGRICULTURE INSURANCE[105]

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ABSTRACT

Climate changes are now visible, tangible and quantifiable and are one of the most significant risks facing the entire world. Floods in 2016 and 2014 and the drought in 2012 are a striking example of the manifestation of climate changes in Serbia as well. The aim of the research is to analyze the pattern of climate changes in the world and in Serbia, pointing out the necessity to safeguard agriculture. We present the trends of climate changes in general and their implications for agriculture. After pointing to the effects of climate changes, we analyze the importance of agriculture insurance.

Keywords: agriculture, climate changes, insurance, Serbia.

ENTREPRENEURIAL ACTIVITY OF AGRICULTURAL PRODUCERS UNDER CLIMATE CHANGES: NECESSITY OF AGRICULTURE INSURANCE

Historically, agriculture conditioned evolution of human civilization. Although its decisive significance is diminished from industrial revolution, today agriculture has major significance in the economy of each country. The

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participation of agriculture in gross domestic product (GDP) in developed countries is less than 3%, but in developing countries the average is about 9%.

Agricultural production is exposed to numerous risks. Climate change in which we point in our work, have a direct negative impact on production risk of agriculture production. Climate changes are visible and tangible. In Serbia they have become evident through heat waves, through changes in average temperature and through the floods in 2014 and 2016 and the drought 2012.

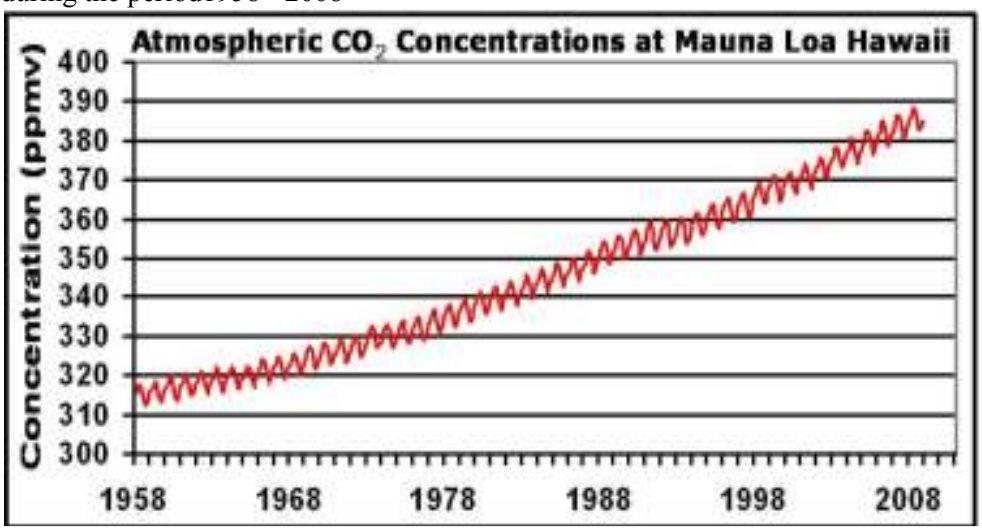
The basic idea in this work that we had during the conceptualization of the topic and the structure of this work is necessity of ensuring agriculture. Climate changes in Serbia have great impact on agricultural production which is apparent in the realization of catastrophic damage, represent the basic need for greater interest of agriculture producers for protection from these risks by concluding contract.

Research work is focused on the analysis of the exposure of agricultural producers to negative effect of climate changes and their impact on existence and long-term sustainability of production. Also, research includes a review of the role of insurance in the alleviation of economic consequences of the damage caused by climate changes in agriculture production.

TRENDS OF ACHIEVING CLIMATE CHANGES

Many studies points to the fact that climate change personified in global warming is the prime result of the impact of carbon dioxide concentration in the atmosphere. Atmosphere returns part of energy to the Earth thanks to the carbon dioxide and it is clear that due to the increased concentration of this element occurs increased greenhouse effect. The increase of carbon dioxide in the atmosphere is shown in Figure 1.

Figure 1: Atmospheric Carbon Dioxide Record from Mauna Loa, Hawai, USA, during the period1958 - 2008



Source: Atmospheric Carbon Dioxide and Carbon Isotope Records.

A similar trend has been measured on other places. According to the United Nations annual emissions of carbon dioxide have risen by an average 6.4 megatons carbon per year during the nineties and 7.2 megatons per year in the period from 2000 to 2005 which contributed to an increase in heat retention and re-radiation of heat to the ground by 20 percent in the period from 1995 to 2005 which represents largest increase in the last 200 years. According to the fourth report (IPCC, 2007) of the Intergovernmental Panel on Climate Change (Intergovernmental Panel on Climate Change- an international group of experts formed by World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP) which have published research results of the climatic changes in the form of report every five to six years since 1990) in the period from 1970 to 2004 it has recorded 80 percent increase in carbon dioxide emission, which represents 77 percent of total emission of gases that cause greenhouse effect.

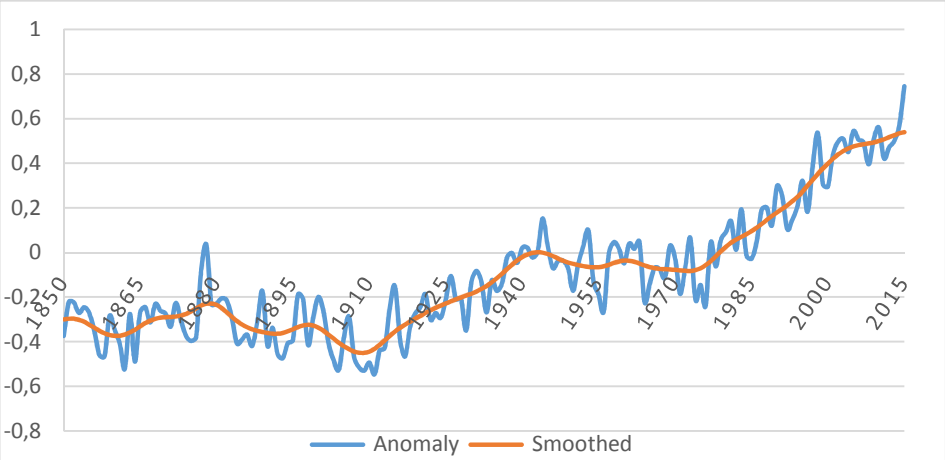
In the long term (IPCC, 2007), industrial revolution has produced climate change problem. Before the report of the Intergovernmental Panel on Climate Change expert group there were different interpretations regarding the intensifying greenhouse effect. However, the conclusion in the fourth report of

the expert group definitely, with 90 percent probability, resolved that the man, or precisely, that the industrial era caused global warming.

Having regard of the evidence for climate changes, agricultural producers and all other subject of economy especially insurance and reinsurance companies are facing the challenges of identifying potential short-term and long-term effects of climate damage, changes to their business and financial performance and finding measures for their minimization.

However, the nature of climate system process is a complex and chaotic. Mechanisms of interaction between the various climate processes make this system nonlinear (Njegomir & Cosic, 2012). Historically, insurance companies was focused on adverse events with local intensity for which there was a relevant historical experience as well as on the climate complexity and its changes on global level, adequate assessment of the likelihood ad the intensity of harmful consequences of extreme natural catastrophic events represent a significant challenge.

Figure 2: Gradual increse in global temperature during the period 1850 - 2015



Source: Climatic Research Unit and the UK Met. Office Hadley Centre.

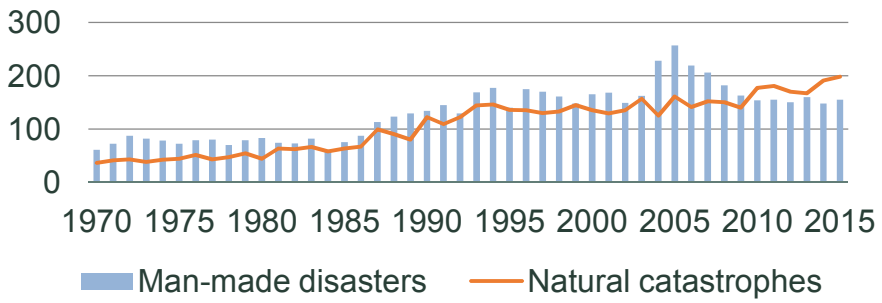
With increased emission of carbon dioxide greenhouse effect has become exaggerated what caused the condition referred as global warming and which is a direct result of ice sheet melting, global temperature rise, rising sea levels.

Temperatures in the northern hemisphere was +0.58 degrees Celsius above the thirty-year average, and fourth in height since 1861 and in southern

hemisphere temperature was +0.26 degrees Celsius above the thirty-year average, and the seventh warmest year in southern hemisphere since 1861. A gradual increase in temperature over the last 150 years is shown in the Figure 2.

Events such as hurricanes (especially hurricane season in 2005), floods (for example, in 2007, in the United Kingdom, floods caused unprecedented damage in the last 60 years), earthquakes (earthquake near Los Angeles, earthquake in Kobe, Japan from 1995 and earthquake in Sichuan Province, China from 2008), tsunamis (for example, the tsunamis that hit Thailand in 2004 and Myanmar Union in 2008), terrorist attacks (for example, attack on World Trade Center on September 11, 2001 in USA) increasingly occur and cause more intense negative consequences for the insurance market and for national and global economy. Figure 3 shows the increase in the number of catastrophic events in the world in the period from 1970 to 2014.

Figure 3: Number of catastrophic events per year during the period 1970 - 2015.



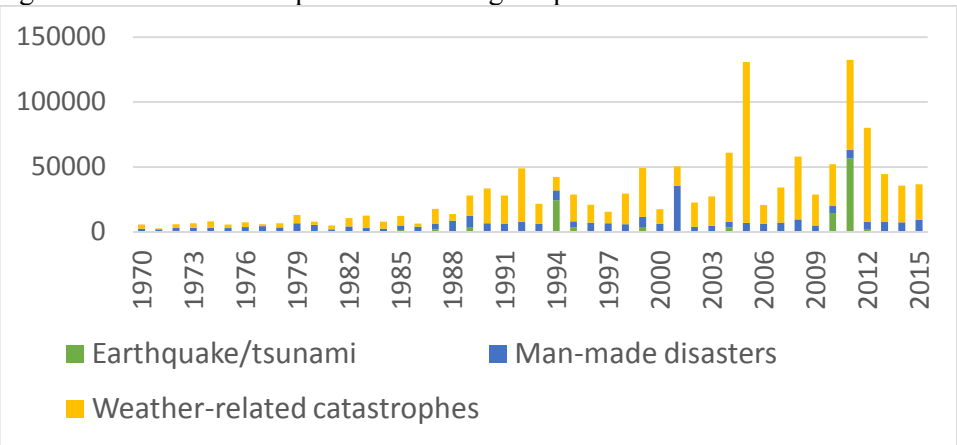
Source: Bevere, Sharan & Vipin (2016)

Data from the chart explicitly shows that the number of catastrophic events increases. Also, it is evident that the number of natural disasters is constantly increasing.

The concentration of people, buildings, factories and infrastructure per unit of land, combined with the increase in population, the value of material goods, technological development and globalization process leads to situation that economic adverse events of the same intensity can threaten a growing number of people and cause more property damage than ever before. According to the estimates by the OECD, repetition of earthquakes in Tokyo from 1923 would cause damage up to 75 percent of Japan's gross domestic product, or damage up

to 3000 billion dollars (OECD, 2003). Figure 4 represents the growing impact in terms of the size of losses, catastrophic events caused by the action of natural forces on the insurance market in the period from 1970 to 2012.

Figure 4: Insured catastrophe events during the period 1970 - 2014



Source: Bevere, Sharan & Vipin (2016)

The data from the chart shows a continuous increase in harmful consequences of catastrophic events, especially in the last decade. The impact of natural disasters caused by weather conditions, or caused by climate changes is evidently increasing.

THE IMPLICATIONS OF CLIMATE CHANGE ON AGRICULTURE

The impact of climate changes that are reflected in increase of atmospheric temperature, sea temperature, melting ice and rising sea levels on agricultural production is not the same in all areas of the world nor is it easy predictable. However, there are consequences that can be associated with a higher temperature. All effects can subjectively be divided into positive and potentially negative to agricultural producers and production risks insurers of agricultural producers.

Positive effects of climate change on agricultural production may include (Heintz, 2008):

- Rapid expansion of thermophilic plants, or plants that require a warmer environment for the normal development, in northern areas;
- Agricultural producers will be able to grow crops with longer growing stages, which will result in increased yields;
- Extended growth phase of the pastures will extend the grazing period;
- Higher levels of carbon dioxide support photosynthesis;
- Increased precipitation in certain areas increases yields.
- The negative consequences of climate change on agricultural production may include (Heintz, 2008):
- Extended periods with temperatures above 35 degrees Celsius cause thermal stress to flowering plants that reduces yields in subtropical areas to 70 percents;
- Higher temperatures in the northern areas increase evaporation, significantly disrupting the water balance in the soil and in plants;
- Higher rates of evaporation in tropical and subtropical areas dry land and cause salinisation and reduction of arable land;
- Higher temperatures accelerate the process of flowering fruit trees which will increase the risk of late spring frosts influence on flower;
- Higher temperature of seas and oceans have direct impact on aquaculture which represents the most dangerous effects on the spread of seaweed flowering, jellyfish and on heating flows which are related to aquaculture. With heating the water contains less of oxygen, and can cause a negative effect on fish and other organisms;
- Patterns of animals infection may change and increase in density of the organism or geographical scope;

- Decreased precipitation in some areas reduces yields;
- Increased precipitation in some areas increases the humidity and reduces yields;
- Increased temperature leads to less snowfall which will cause lower spring moisture that plants need in the spring. In North America, it can lead to an increase in forest fires.
- Areas where climate change caused a complete cessation of rainfall, agricultural production is not possible (agricultural production will move from Southeast Australia to the northwest part of the country).

Some dangers in Serbia but also in the word have great impact on agriculture production. Those dangers are more or less caused by climate changes or by climatic factors:

- floods,
- droughts,
- extreme temperatures,
- storms,
- precipitation of hailstones,
- soil erosion,
- landslides,
- frost,
- fire.

Global climate change not only has direct influence on the increase in catastrophic events such as hurricanes and winter storms but also has numerous other effects, such as impacts on the availability of food, habitation, human health, ecosystems and water resources.

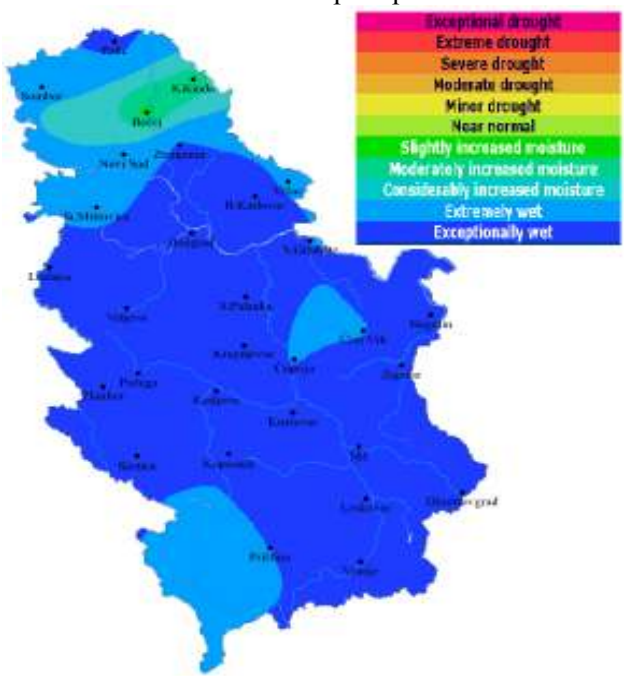
Early spring arrival has an impact on the Earth biological system, including changes such as blossom of trees, bird migration and egg-laying and also changes in the species of plants and animals. In the Alps, for example, it is noted that certain plant species migrate upward by one to four meters per decade, and some plant species that were previously found only on mountaintops are completely extinct.

In Serbia, annual precipitation increase in average with elevation. In lower regions annual rainfall varies between 540 to 820 mm. Areas with altitude above 1000 m have an average from 700 to 1000 mm of rainfall and some mountain peaks in southwestern Serbia have heavier precipitation up to 1500 mm. Most of Serbia has higher quantities of rainfall in warmer part of the year, except southwestern areas which have the most rainfall in autumn. Most rain falls in

June, with an average of 12 to 13 percent of the total annual rainfall. The driest months are February and October. The occurrence of snow is characteristic for the colder part of the year from November to March, and the highest number of days with snow is in January (RHSS, 2016).

Especially disastrous year in Serbia was 2014 due to the unprecedented floods. The most recent study of the Global Climate Risk Index, which was launched at the World Summit on Climate in Paris in December 2015 showed that Serbia was first ranked country that were most vulnerable to extreme weather conditions in 2014. These floods have affected negatively on about 1.6 million people in Serbia, caused mortality of 51 person and damage to property worth over 2.1 billion dollars. Humidity in the period between April and September 2014 in Serbia is illustrated in Figure 5.

Figure 5: Humidity in the vegetation period (april – september) in 2014, based on standardized index of precipitation



Source: Republic Hydrometeorological Service of Serbia

The figure shows that floods, or extreme humidity in the vegetation period, which covered the period from June to September 2014 affected almost all Central and South Serbia, while in the biggest part of Vojvodina expressed strong to extreme humidity, except in the southern Banat, western Srem and the wider area of Subotica expressed extreme humidity, as in the rest of Serbia.

The term "drought" has different meanings. In Serbia, drought is usually qualified by the state of the crop and natural disasters are declared in case of major damage to crops. Problem of identifying and defining the intensity of drought occurs due to the fact that all regions are not treated with the same irrigation system, and there is an irregularity in Vojvodina because agricultural drought and socio-economic drought may occur at the same time as climatological drought, but due a large number of transit river, hydrological drought does not have to hit the region. In the case of agricultural drought rainfall deficit is taken into consideration along with the physical and biological aspects of plant, interactions within the system soil - plant - atmosphere and balance between the needs of plants for water and available water reserves, which as a result may have a decline in yields.

According to the methodology, on the territory of Serbia and Vojvodina the occurrence and duration of agricultural drought is monitored. According to the previous methodology most historical data have poor description without realistic measurement of drought indicator. Years that was listed as drought are: 1750., 1781., 1802., 1803., 1811., 1822., 1825., 1846., 1988.–1992., 2003, 2007. It is necessary to say that drought sometimes takes decades, when we only notice her top or a year of extreme drought and after that system begins to recover slowly.

An extreme example of droughts that had huge impact on agricultural production is droughts from 2007 and 2012.

In 2007 it was recorded drought interval on the territory of Serbia. Drought has hit Serbia in early spring and mid-summer in 2007. This drought has committed substantial damage because it occurred at the time of autumn sowing in 2006 (Figure 6 and 7).

Figure 6: Early springs' drought of 2007

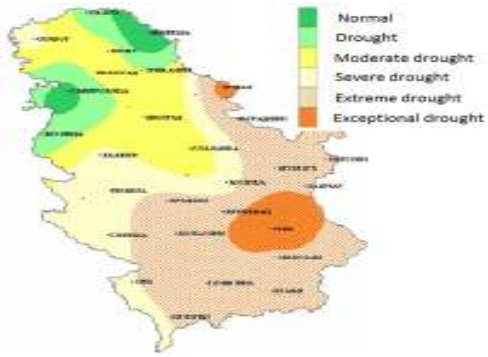
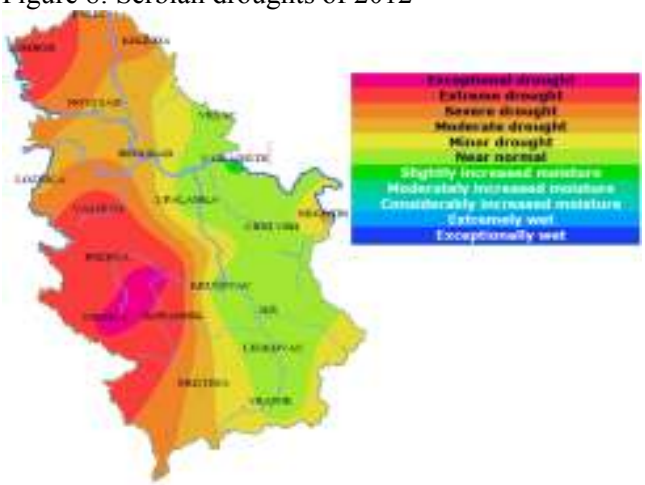


Figure 7: Summer drought of 2007

Source: RHSS (2016b)

Serbia was significantly affected by the drought in 2012. Droughts are mostly manifested in agricultural production and possibilities for preventive measures application are limited and insurance coverage of drought effects is poorly represented. Estimates are that the drought has caused significant damage to agriculture, given that in 2000 realized losses were $700 million, in 2003 nearly one billion dollars, in 2007 about 600 million euros and during 2012, which is one of the warmest years with an estimated 60 days with temperature over 30 degrees Celsius, estimated losses ranged up to two billion euros. The estimated amounts were later corrected and "false" to one billion euros. It is estimated that the drought caused a reduction in yield by an average of 30 to 50 percent. The best illustration of the drought manifestation in Serbia in 2012 is shown in Figure 8.

Figure 8: Serbian droughts of 2012



Source: RHSS (2016c)

Extreme temperatures are related with climate change and they are very characteristic for Serbia. Increasing air temperature leads to changes in the diversity of animal species, especially insects, because it is found that butterflies, dragonflies, moths and other insect live in large space, both in terms of latitude and altitude, where they couldn't survive before because of cold. Increased water temperatures, combined with changes in the surface of the ice cover, salinity and oxygen levels influence the change in the diversity of both marine and freshwater flora and fauna.

Summer 2012 in Serbia was the warmest since the beginning of the measurement, with a very small amount of rainfall that usually covered the small part of the country. Extremely high and minimum and maximum temperatures began in mid June and retained by brief interruptions throughout whole summer. The warmest and driest period (June 30-July 25) coincided with the major generative stages of spring crops over most of the territory and caused big damage in agricultural crop production.

With certain deviation, during most of the 2014/2015 production year, especially from October 2014 to September 2015, the weather had mostly average characteristics for our climate area. Cold, wet and windy weather in the early spring period had certain adverse effect on agriculture, mainly fruit production but the worst effect had manifested in crop production, with the

spring crops, due to the very hot and dry weather in the summer, during July and August (Radičević et al, 2015).

Warmer and drier years will contribute to higher probability of achieving heat waves and droughts on one side and floods on the other side. This is indicated in studies by Bernard Lehner and his colleagues at the University of Kassel in Germany, which was published in the scientific journal Climatic Change (Lehner et al, 2006) and its dealing with the floods and droughts risks in Europe. Integrated analysis on possible impact of climate changes on realization of future floods and droughts on continent shows that in northern and north-eastern parts of Europe probability of flooding will be higher in future, while in southern and south-eastern parts of Europe will have higher probability of drought, whereby the extreme events of floods and droughts will occur with higher probability (estimates are that they will occur every 10 to 50 years by 2070, and their current frequency of events occurs on average every 100 years). These trends will result in adverse invents such as forest fires and in damages in sectors such agriculture, domestic freightage and energy supply.

Estimates are that at lower latitudes there will be a decline in yields of agriculture production, which can lead to increased risk of hunger in this area (EC, 2008). In higher latitudes, for example in northern areas in northern hemisphere, there will be a modest increase in the yield of agricultural production if the temperature does not rise by more than 3 degrees Celsius, but if a greater increase in temperature happens in these areas there will be a decline in the results of agricultural production (EC, 2008).

Assumed escalation of problems with drought and lack of water will cause the reduction of arable land and an increase in desert areas. Also, the prognosis is that the entire Mediterranean basin will be exposed to severe droughts. Very high temperatures can induce structural changes caused by subsidence of soil in areas where soil structures is dominated by clay, a phenomenon that is already manifested.

THE ROLE OF AGRICULTURE INSURANCE

Modern insurance as a form of risk management arises and develops with the development of private ownership and the development of mathematics and statistics, although we can find risk pooling, the basic characteristic of insurance, in the primordial human community when people joined together in groups or tribal communities to share risk with each other. Insurance is risk pooling of

random losses by transferring such risks to insurers who agree to indemnify the insured for such losses, to provide other financial benefits when damages occur, or to provide services related to such risks, according to the Commission's definition of the terminology of the American Association for insurance risk and insurance (Rejda, 2005). From the perspective of risk management, insurance represents risk transfer technique from individuals and legal entities to insurance companies who are professionally engaged in the business of risk management in exchange for a certain premium amount. From the perspective of agricultural producers, in exchange for a certain amount of the fixed cost in the form of premiums, the insurance as a form of risk management provides protection from significantly greater damage whose occurrence is uncertain and it is predicted by terms in the insurance contract. It enables risk pooling in agricultural production such damage to crops due to hailstone or fire, death or illness of animals and death or illness of agricultural producers.

Insurance is one of the key forms of risk management but for risks of agricultural production to be transferred to the insurance companies, certain conditions must be met. Insurability conditions that must be met are: 1) the risk must be random, and its realization must be beyond the control of the insured, 2) the risk must be definable and measurable in the sense that there must be a possibility of determining the probability of occurrence and intensity of harmful effects and also the possibility of defining and measuring the actual damage, 3) there must be a large number of insured objects or persons exposed to the same types of hazards so that the law of large numbers could be applied, 4) with its realization, risk must cause economic damage. Economic availability of insurance premium is cited as an additional condition in literature (Skees and Barnett, 1999). However, we believe that the economic availability of the premium is already contained in these conditions, given that without economic affordable premiums it would be impossible to attract a sufficient number of insured to be able to apply the law of large numbers. Finally, it is necessary to strive for creating a portfolio of risk that will have low potential for realization of catastrophic damages and that is possible if risks involved in the insurance portfolio are less correlated with each other.

Entities on the insurance market of agriculture are agricultural producers as the insured, insurance brokers and agents, insurance and reinsurance companies and the capital market. Mediator or brokers associate agricultural producers with insurance companies in order to conclude insurance contract which primarily protect the interests of the insured. Representatives or agents are authorized to

conclude insurance contracts on behalf of insurance company that primarily protect the interests of the insurer. Insurers are professional managers of Risk Communities of associated agricultural producers (Marović, Kuzmanović & Njegomir, 2009). They are usually organized as stock companies, profit organizations whose capital is divided into at least two legal entities or individuals - shareholders who basically take the risk to their capital. Other, less common forms of organization are mutual insurance companies that are established in order to provide insurance coverage to their owners who are also insured. For example, in Netherlands, there are companies that have mutual insurance for infectious diseases in crops (horticulture and tomato) and animals (fowl) (EC, 2011). Reinsurance companies perform reinsurance that insurance companies traditionally use in order to diversify risk, or off-balance sheet exchange for capital "bound" in the balance sheet. Reinsurance represents a transfer of parts or whole risks that are accepted by insurance companies from the insured to reinsurance companies, thereby reinsurance is an extension of the insurance concept and basically represents insurance for insurance companies (Njegomir, 2006; Njegomir & Maksimović 2009). Reinsurance is particularly used for the higher levels of risk whose potential negative impact can overcome available funds of insurer's retention. Except reinsurance, insurance companies can disperse risk by using capital market instruments (Njegomir, 2008).

Insurance reduces the uncertainty for agricultural producers and also the need to create individual savings accounts or funds, given that the need for cash reserves is reduced (Raulston, et al., 2010). By releasing the need for accumulation of surplus funds which thanks to insurance can be profitably engaged, insurance further supports the development of agriculture. Insurance provides indirect economic protection for the destructive effect of natural forces and human activities and also insurance represents a form of security pledge (collateral) that allows agricultural producers easier access to capital through loans at lower costs. With sudden changes in prices of agricultural and food products in 2007 and 2008, it is highlighted that security of food supply is very important and Inter-American Institute for Cooperation on Agriculture pointed out that food safety is the most important issue of our time. The World Bank indicates that lack of agricultural insurance, which is one of ten key factors in solving problems of food security crisis, is barrier to productivity, investments and efficiency of marketing system in agriculture (WB, 2008). The exclusion of state subsidies for the payment of insurance premiums from the Free Trade Agreement from 1994 by World Trade Organization testifies about importance

of agriculture insurance. Condition was that insurance provides financial compensation for the climate and natural disasters (Baez & Wong, 2007).

Agricultural insurance is a special type of insurance that is a part of property insurance. Separation of agricultural insurance follows the specific features that characterize it. Key specificity of agricultural insurance is the reduced ability of diversification due to high correlation between risks. Correlated risks are risks whose negative impact is realized at same time on very large number of agricultural producers. For example, crops are located in geographical areas that are under the influence of the same types of risks of natural forces, whereby the likelihood of a large number of minor damage or catastrophic damage from the realization of a harmful event is significantly increased. Miranda and Glauber (1997) found that the risks in the portfolios of crop insurer are about ten times higher than for insurers that offer casco and fire insurance. Also, they found that the risk portfolio of the crop insurers in the USA is twenty to fifty times more risky than it would have been if the yields of farms are stochastically independent. The high degree of correlation between individual risks of agricultural production and the need to determine the risk exposure of each farm, often geographically dispersed, causes high operating and administrative costs, much higher compared to other types of insurance.

Historically, agricultural insurance has evolved from an hail insurance, when during the last century farmers associated in societies to share risks in order to protect their crops from the risk of fire. Over time, the scope of coverage spread in the terms of the risks but also in terms of type of agriculture insurance. Insurance premium of agriculture at the global level has reached 18.5 billion dollars in 2008, of which the largest part (about 62%) came from North America, 18% from Asia, 16% from Europe and the rest from Latin America, Africa and Australia. Emerging markets in total realized premium of agricultural insurance in 2007 participated with less than 20 percent.

The basic division of agricultural insurance is division on crop insurance and animal insurance. Crop insurance provides coverage for all types of crops, fruits, flowers and vegetables and animal insurance covers damages that may arise due to death or unplanned destruction due to illness or accidental injury of horses, pigs, sheep, bulls, cows, calves and goats and other domestic animals and in some cases can be included some wild animals. Crop insurance is the most represented type of insurance which in 2008 accounted for about 90% of the total global insurance premiums from agriculture (Iturrioz, 2009). In developing countries, the focus is primarily on the crop insurance, given the dominant role

in total agricultural production, and animal insurance is limited to insurance from sudden deaths and it is often associated with obtained loans.

Table 1: Types of agricultural insurance

Type of Agricultural Insurance Product	*Payouts*	*Availability*
a) Indemnity Based Agricultural Insurance ***(insurance payouts based on the actual loss at the insured unit level)***		
1. Named Peril	Percentage of Damage	Widespread
2. Multiple Peril	Yield Loss	Widespread
b) Index based Agricultural Insurance ***(insurance payouts based on an index measurement)***		
3. Area-Yield Index	Area-yield Loss	USA, India, and Brazil
4.Crop Weather Index Insurance	Weather Index payout scale	India, México, Malawi, Canadá, USA
5.NDVI[1] Index Insurance	NDVI Index payout scale	Mexico, Spain, Canada
6. Livestock Mortality Index Insurance	Livestock mortality index payout scale	Mongolia
7. Forestry Fire Index Insurance	Ignition focus/ burnt area payout scale	Canada, USA
c) Crop Revenue Insurance ***(insurance payouts based on yield measurement and crop prices)***		
6. Crop Revenue Insurance (CRI)	Yield and Price Loss	Limited to USA

Izvor: WB (2009)

Beside the crop insurance, agricultural insurance covers insurance of animals of high individual value (usually, the most thoroughbred race of horse are insured from illness or accidents that cause mortality or permanent disability), forestry insurance (trees and plantation are insured from the risk of fire and storms as the most important risks and also risks from floods, hailstones, the weight of snow, explosions, damage caused by insects, volcanic eruptions, freezing, domestic and wild animal), aquaculture insurance (insurance to

growers of aquatic flora and fauna includes insurance from mortality or loss of fish due to meteorological events, disease, pollution, algae flowering and escaping due to the damaged installation), and insurance of production in greenhouses (comprehensive cover for material damage to buildings, glass, equipment and crops that may arise as a result of fire, storm, explosions, earthquakes, equipment failure and the weight of snow). Insurance products that are used in the insurance of agricultural production cover: 1) traditional insurance, based on the compensation to the insured of the actual damage caused by the designated risk, 2) crop insurance and 3) insurance based on the application of the index.

Traditional insurance coverage can be applied to all types of agricultural insurance. It refers to insurance of crops, animals, pure-bred animals, forestry, aquaculture and production in greenhouses. These insurance products are based on compensation of real damages sustained by insurer under condition that damage is covered by insurance conditions. Indemnity may not exceed the amount of the sum insured nor the amount of real damage or the value of insured item. Traditional insurance coverage is divided into individual insurance or insurance of all risks. Insurance for known risks implies that the insurance policy explicitly state the insured risks from which the insured item is secured. In most cases, it is insurance from hailstones. Sum insured times percentage of real damage based on production costs or expected yield of crop represents the insurance indemnity. Franchising is used to control moral hazard and adverse risk selection. Insurance provides compensation to agricultural producers for any decline in yield below the level defined in the insurance policy for all risks. In insured risk for this type of insurance are included factors that influence agricultural production unless if they are not explicitly excluded. Latitude of coverage premiums is much higher than in case of insurance against named risks. The sum insured is usually determined as a percentage of the expected yield and it is usually in the range of 50% to 70% of the expected yield. It can be based on the future market price of the guaranteed yield if there is interest in the insurance or on the amount of the loan if the funder has an interest in insurance. The amount of insurance is determined on the base of a percentage deviation of the actual relative guaranteed yield at an agreed price or application of the percentage reduction in yields in relation to the guaranteed sum insured. Traditional insurance provides protection against the production risk of agricultural production but not from the price risk and the general drop in revenues. In US, insurance products of agricultural revenue represent a

combination of insurance for all risks and protection of price risk. Unlike traditional, insurance products of agricultural revenue only appear in the field of crop insurance. The use of this type of insurance is limited to the United States because it requires a developed product and financial derivatives markets that can provide protection of exposure to price risk to insurers.

In Serbia, agricultural insurance market traditionally offers products of indemnified character and its application is in the form of crop and animal insurance. The dominant type of insurance in the structure of agriculture insurance premiums is insurance of crops and fruits. Characteristics of crop and animal insurance are almost identical for all insurance companies in Serbia. Also, to a large degree is returned confidence in the institution of insurance is restored to the great extent.

In the observed ten-year period of agriculture insurance development from 2004 to 2014, the premium of crop insurance has manifested a continuous upward trend until 2008, then in 2009 we had a significant drop due to the impact of the global economic crisis that began in IV quarter of 2008. In 2010, there was a slight but positive growth. Also, the end of the observed period is characterized by continued growth in premiums. The entire observed period in the field of crop insurance ends with significantly higher premium compared to 2004. Tendencies in the movement of the total insurance premiums of agriculture are fully consistent with the movement of the premium crop insurance, type of insurance whose share is dominant in the structure of agricultural insurance premiums.

When it comes to the animals insurance, there was also an upward trend until 2008 and fall in 2009. In this type of agricultural insurance decline in the total volume of insurance premiums continued in 2010 and 2011. In 2012 was achieved a remarkable growth over 62% compared to the previous year, but already in 2013 there was a decline in the level of premiums and in 2014 there was a slight growth in premiums.

The share of agriculture insurance in total insurance premiums of insurance companies in Serbia at the beginning of the observed period amounted 3.70% at the end 2.95%, while the lowest level of participation reached in 2010, when this share was only 1.48%. Share of claims on the agricultural insurance in total claims of insurance companies in Serbia at the beginning of the observed period was 7.57% and 4.66% at the end, except that during the entire period of only five years was below 5%.

CONCLUSION

Data presented in this paper clearly indicate on evidence of the climate change achievement. Also, it is clear that climate changes are not only a "distant" problem in other countries and that negative effects are seen in Serbia. Agricultural production is the most directly threatened by climate change, both in Serbia and in the world. If current trends of climate change manifestation continue, agricultural production will be under strong negative impact which may compromise food safety.

Floods, droughts and rainfalls with hailstones in the last five years in Serbia showed that climate changes had enormous impact on the damage caused to agricultural producers. The realization of damage to agricultural production imposes the necessity of concluding the insurance of crops and fruits as well as other insurance which will enable the protection of index insurance and the financial results of agricultural producers.

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