

# CLIMATE CHANGE ADAPTATION ACTION PLAN OF CARPINENI VILLAGE

Executive summary

This document has been developed by Public Association „SPERANTA“ in the framework of the project "Development of local Climate Change Adaptation action plan for Carpineni Village" with the financial support of the NGO EcoContact under the program "Climate Forum East" (CFE II). This program is financed by the European Union, Austrian Development Cooperation and the Austrian Red Cross.



# CLIMATE CHANGE ADAPTATION ACTION PLAN CARPINENI VILLAGE

REPUBLIC OF MOLDOVA

EXECUTIVE SUMMARY

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## INTRODUCTION

### Purpose

The purpose of the plan is to:

- Identify the main challenges and sectors in the community that are affected by climate
- Propose realistic solutions and approaches to allow the community, local government and civil society to adapt to the current and future challenges of climate change

The plan provides clear guidance for community and local government for actions they can take to reduce their vulnerability to climate change and extreme weather, and adapt to future changes.

The local Action Plan for Adaptation to Climate Change was developed and integrated in the main local strategy and environmental protection action plan for the Carpineni Community. The strategy and the action plan was officially recognized and adopted by the community council on April 1<sup>st</sup>, 2016.

### Methodology

The Climate Change Adaptation Action Plan of Causeni was developed in a participatory manner by involving community leaders, civil society organizations representatives and local authorities thus creating a strong sense of community ownership which will ensure the plan's implementation, monitoring and further evaluation.

The key steps in the process of its development were the following:

- Assessment through desk research based on existing data and interviews with local experts from relevant institution and community members followed by analysis of strengths and weaknesses resulting from assessment;
- Establishing community overview meaning its vulnerability level and sartorial risks analysis
- Data validation and feedback collection through several public hearings with different target groups;
- Drafting a series of recommended adaptation measures divided per sector for the implementation by the local authorities, civil society organizations and community.
- Lobby for official approval by the mayoralty and adoption of the plan.

# CARPINENI VILLAGE AND CLIMATE CHANGE

## General overview of the community

### *Geographical location*

Carpineni is a commune from Hincesti district, situated approximately at 36 km from Hincesti and 67 km from the capital of the Republic of Moldova, Chisinau. The commune has an area of approximately 10.22 square kilometers, with a perimeter of 27.01 km and it's under the administration of Hincesti city.

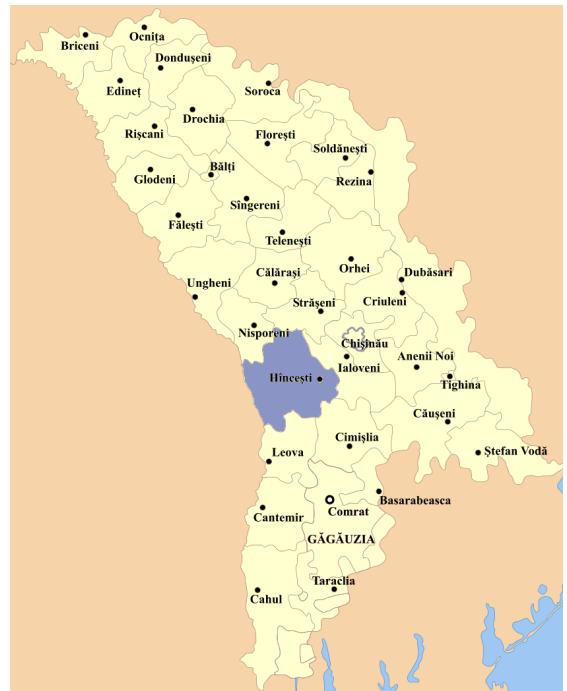
### *Population*

Cărpineni village has a population of 10,600 inhabitants and is the largest rural region from the Hincesti district.

According to data provided by the Statistics Department of Hincesti district, the number of population decreases from year to year.

Carpineni has a diversity of nationalities, but many of them are Moldavians, and only 6% are constituted of Ukrainians, Russians, Bulgarians etc.

One common problem of Carpineni and majority of the villages from Moldova, is the higher number of the elderly, and high number of youth that migrates.



## Local trends of climate change

Moldova's climate is moderately continental and is characterized by short and mild winter with little snow and warm long summers, with a low amount of precipitation. Basic features of Moldova's climate are formed under the influence of the influx of solar radiation, atmospheric circulation and surface active character.

Precipitation is rare, most of them fall while hoses accompanied by hail and lightning. Summer heatwave is causing the drying up of water from wells in areas with high altitude, and in August torrential rainfall causes overflow of rivers and brooks. The amount of rainfall varies drastically with 2/3 of the precipitation that falls during April-September, with the presence of droughts, which are more frequent last years. There is a big difference in temperature between winters and summers, with temperature that often exceeds 38 ° C in summer and with cold winters and extreme situation basically each year, with temperatures lower than 38 (in north mostly).

## Analysis of changes in climate that occurred over the past decade and of future trends (1991-2015)

As can be seen from the table 5-3, the trend of annual average temperature before the 90's of the twentieth century was rather small (0.05 per 0C ~ 0.50C per decade or century). Since the early 90's of the twentieth century this index has a sharp trend towards growth (about 0.630C per decade or ~ 6.30C per century).

Moreover, in comparison with the first period of study (1887-1980), trends of temperature change over the last three decades are statistically significant for thermal values that characterize the summer season and those characterizing average annual values.

**Tabelul 5-3:** Tendințele de evoluție a temperaturii medii anuale a aerului ( $^{\circ}\text{C}/\text{an}$ ) și precipitațiilor (mm/an) și semnificația statistică (*p-valoare*) pentru două perioade de timp distincte la stația meteorologică Chișinău, Republica Moldova

Anotimp	Temperatura medie a aerului				Precipitații			
	1887-1980		1981-2010		1891-1980		1981-2010	
	Tendința	p-valoare	Tendința	p-valoare	Tendința	p-valoare	Tendința	p-valoare
Iarna	0.010	0.214	0.039	0.300	0.472	0.108	1.234	0.258
Primăvara	0.005	0.352	0.061	<b>0.028</b>	-0.059	0.823	0.187	0.873
Vara	0.002	0.578	0.097	<b>0.000</b>	0.619	0.291	-1.406	0.392
Toamna	0.003	0.545	0.048	<b>0.032</b>	0.412	0.256	1.291	0.412
Anual	0.005	0.097	0.063	<b>0.001</b>	1.448	0.073	1.301	0.578

Notă: cu aldin sunt prezentate valorile cu diferențe semnificative din punct de vedere statistic.

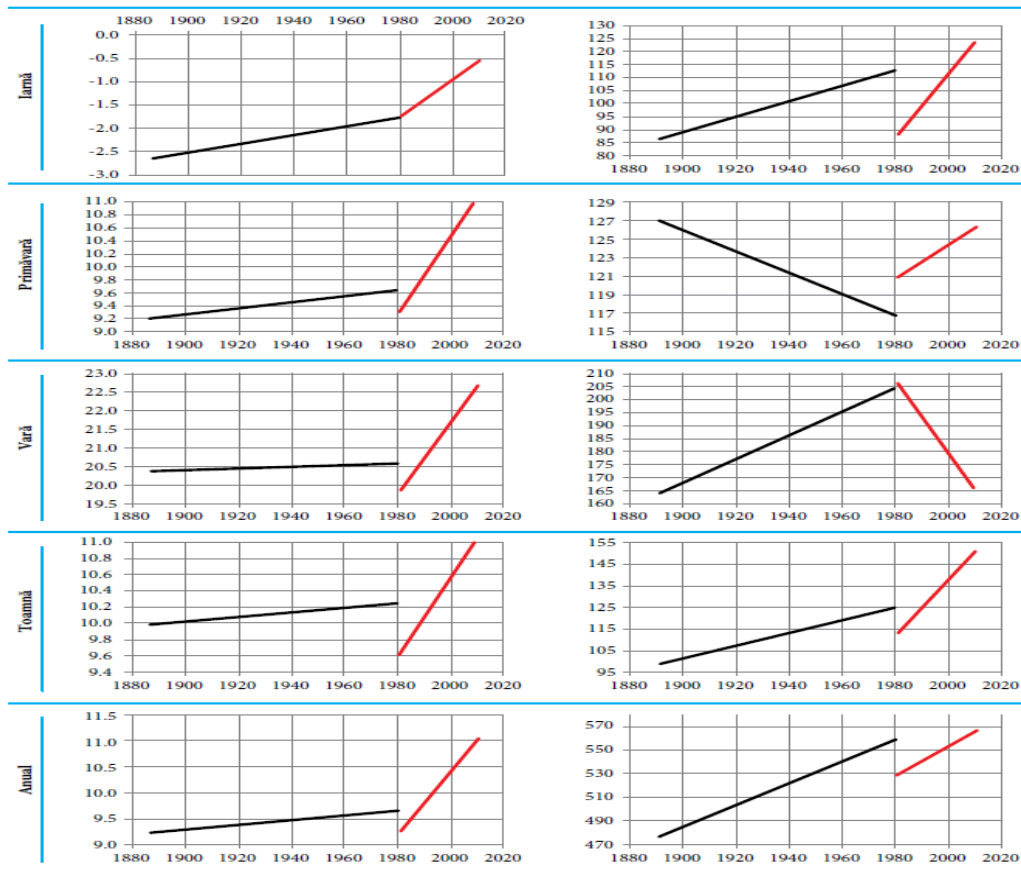


Figura 5-11: Tendințe liniare de evoluție a temperaturii medii a aerului (°C/an — partea stângă) și a precipitațiilor (mm/an — partea dreaptă) pentru perioada înainte și după 1981 la stația meteorologică Chişinău

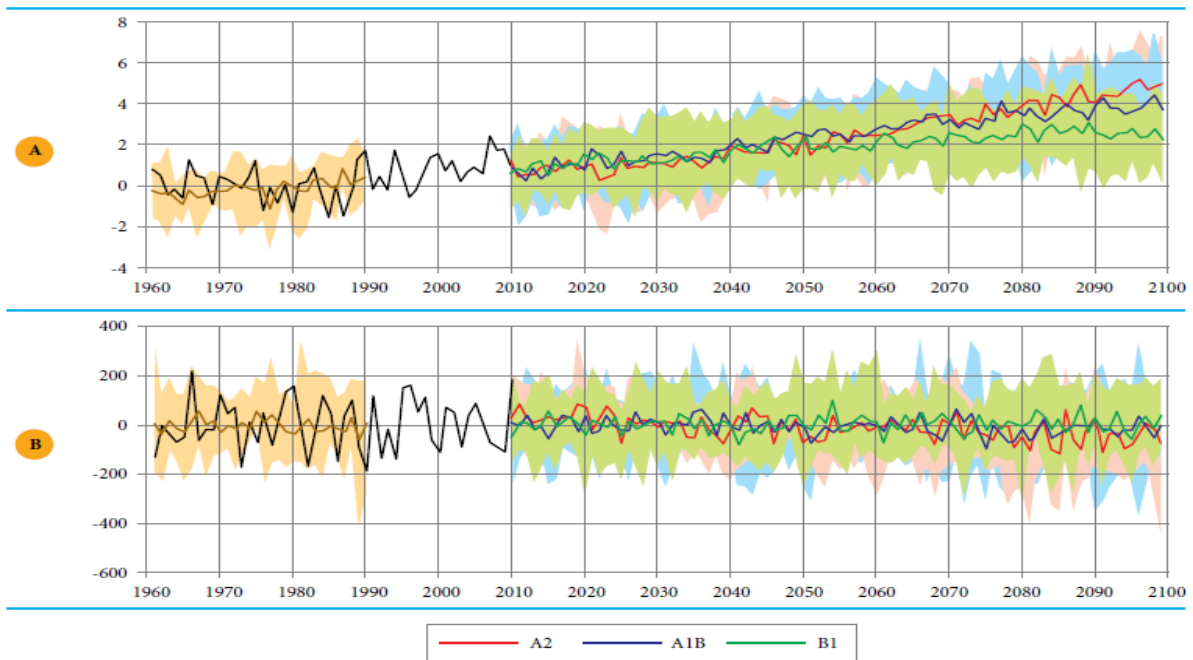


Figura 5-12: Tendințe în anomalii (A) temperaturilor medii (°C) și (B) precipitațiilor medii (mm) anuale pentru perioada din trecutul recent (1961-2010) și cea proiectată pentru viitor (2010-2100)

### Evaluation of the risks associated with climate changes during 2004 - 2014

Disaster could be produced not only by nature itself but also but human interactivity and usage in excess of natural resources. Climate change it's a phenomena more present in Moldova and all its regions, affecting not only at the general level the crops and lifestyle of human beings, but also interface in the cycle of development of civilizations. In this case, the way a population its reacting and adapting to climate change could be an important factor in further development of the communities. Generally, the Assessment Reports on Disaster Risk Reductions made by international agencies in Moldova highlighted in numerous cases the lack of interest of citizens in participating in the management of disaster risk reduction also a high number of them not realizing otherwise the consequences and the changes in ecosystem that could be caused.

**Droughts.** In this context it has been observed that in common Cărpineni droughts are becoming more frequent. Droughts were recorded in 2007 and 2012, which caused damage to agriculture, which leads to the impoverishment of the population. Such a risk was in summer 2013 and 2015 but has not had great destructive impact on crops.

**Floods** are also a risk factor for the population of Carpineni. The frequency of heavy precipitation has increased in recent years and floods are a threat usual in the village, leading to soil erosion and crop losses in wet seasons. A big danger is for people living near the river tributary that crosses the village Lăpușna Cărpineni, especially the region Topor.

#### Hail Showers

Hail are often a natural phenomenon that affects the population and crops. The lack of anti-hail system in Hincesti only, intensify the risk of disaster.

**Summer downpours**, the heat causes the drying up of water from wells in areas with high altitude, and in August torrential rainfall causing overflow of rivers and brooks. About 2/3 of rain falling in the period from April to September.

Name of emergencies	Have been produced		Consequences			
	Year	Date	Affected localities		deceased	material damage (lei)
			Nr	Name		
Torrential rains heavy rains	-		3 398 835			
	2010	29.06	1	Cărpineni	-	1 000 000
Drought	2014	20.01	19 Localities		-	-
Torrential rains	2012	17.07	38 Localities		-	98 042 384
<b>TOTAL 28 cases of exceptional situations</b>			28 Localities		2	



# CLIMATE CHANGE IMPACT AND AGRICULTURE

Impact Category	Impact on agriculture	Socio-Economic Impact	Measures
<b>High temperature, heat stress</b>	The increase in the need for water	The increasing demand for irrigation water Reducing of crops Changes (positive and negative) in distribution, the introduction of new varieties of crops	1. Best practices for agriculture, especially for non-irrigated agriculture; alternative construction of water catchment and reduction of water losses, improvement of irrigation techniques, recycle and water storage; 2. Development of educational activities for the purpose of public awareness on the effects of drought, desertification and water scarcity 3. Drought-resistant crop harvesting. 4. Development of horticulture.
	Multiplication of crops pests and diseases	Reducing water quality due to intensive use of pesticides Reduction of harvesting and its quality diminishing Increasing economic risk Reduction of rural income	1. Detecting other alternatives to mitigate crop pests and diseases. 2. Crop protection through application of herbal, organic substances. 3. Promoting crop insurance.
	Changing crop growing conditions	Environmental pollution through leakages of fertilizer Loss of indigenous plant varieties Changes (positive and negative) in the production of seeds and seedlings	1. Rehabilitation of areas with severe degradation.  2. A better soil management by increasing water retention to maintain soil moisture  3. Adaptation of the periods for conducting agricultural activities 4. Using of animal manure origin. 5. The harvesting of new varieties by preserving the quality of current varieties. 6. Preserving and promoting healthy varieties with high productivity. 7. Informing the population about changes in the production of seeds and seedlings.
	Degradation of conditions for livestock production	Changes in farming systems Considerable reduction of rural income	1. Seeding the land with drought-resistant species of plants, edible for animals, which prevent excessive evaporation of soil water.

Impact Category	Impact on agriculture	Socio-Economic Impact	Measures
			2. Multiplication of bred animals. improving ventilation and air conditioning systems to animal shelters and rural communities; 3. A better soil management by increasing water retention to maintain soil moisture 4. Introduction of species resistant to extreme temperatures and adaptation of nutritional regime of animals at conditions caused by climate change
	Changes in the structure of crops	Changes in agricultural production and livestock activities Reducing rural income Increasing economic risk	1. Using the multifunctional agricultural technologies 2. Diversification of crops resistant to climate change. Improving ventilation and air conditioning systems to animal shelters and rural communities; 3. Organizing hydrological erosion and agricultural land with proper consideration of the suitability of land for different use; 4. Adapting crops by using of existing genetic diversity and new opportunities offered by bio-technology
<b>Changing rainfall patterns</b>	Hydrological regime change Increasing water scarcity	Reduction of water quality Increased risk of soil salinization Conflicts between water users Increased groundwater extraction, depletion of water	1. Efficient use of water through: educing water losses, improving irrigation techniques, recycling and water storage; 2. Creating pools of rain water accumulation. 3. Rational use of water. 4. Information on the hydrological regime change. 5. Collecting rain water and usage of water filtration technologies
<b>Extreme Phenomena - droughts, floods, hailstorm</b>	Decreasing soil fertility as a result of the intensification of degradation	Reduction of water quality due to leakage fertilizer; The reduction of income from agricultural cultures;	1. Using technical solutions to extreme weather events, in order to protect plant and animal breeding: garden / orchard for frost protection.

Impact Category	Impact on agriculture	Socio-Economic Impact	Measures
	processes; reduction of crop; Competition for water; High risk of desertification	Abandonment of agricultural land; Increasing costs for emergency and soil remediation; Reduction of food security in areas with poor economic development; Worsening poverty due to rising food prices;	2. Introducing of crop rotation 3. Formation of a mandatory system for organic fertilization of soils by using green manure and organizing the collection of individual household's manure for composting and its subsequent implementation at commune level

The main risks and benefits of agro-climatic zones of Hincesti, Moldova

Details on risks / benefits		Central Zone warm and semi humid
		Plateau of Central Moldova, Hincesti
<b>Risks</b>	Changes in the area occupied by crops, which will decrease due to degradation of optimal conditions for agriculture	MEDIUM
	Reduction of harvest of wheat and corn	MEDIUM
	General reduction of grape harvests	MEDIUM
	General reduction of fruit crops	MEDIUM
	Appearance of pests, diseases and weeds farm	HIGH
	Reduction of of crops quality	MEDIUM
	High risk of drought and water scarcity	MEDIUM
	Increasing the need for irrigation	HIGH
	Erosion, soil salinization, desertification	HIGH
	Deteriorating conditions for livestock	MEDIUM
Increased frequency and intensity of floods	HIGH	
<b>Benefits</b>	Changes in the distribution of crops in order to improve optimal conditions for agriculture	MEDIUM
	Increasing the range of horticultural crops for open field	MEDIUM
	Increasing productivity of crops	
	Increasing the quality of grapes	HIGH
	Lower energy costs for cultivation under greenhouse conditions	HIGH

## CLIMATE CHANGE IMPACT ON WATER

### The impact of climate change on water resources

Water resources in Moldova are represented by surface water and groundwater.

The main source of drinking water in the village Cărpineni are centralized networks from 2 sources: Tîrlîchici and Margelati through the Municipal Enterprise and Consumers Association of drinking water, Gagarin ". The commune has 361 wells mine, which do not meet quality and quantity. In most cases water quality in wells do not meet chemical and biological indices, missing Passport wells, in which should be indicated chemical and biological components of water. The biggest problem detected in this chapter is the lack of drinking water and sewerage system and wastewater treatment.

In the village there is no centralized sewage network, a sewage treatment system. Private households have built their own sewage alone, which is purified by a special machine.

**Water basins:** The commune is crossed by river Lăpuşna who once had a lake in the commune center.

**Lăpuşna River** (also called Lăpusnita River) is a stream, a tributary of the river Prut. It rises 2 km northwest of the village Iurceni, Nisporeni and flows into the Prut river, near the village of Sarata Razesî, Leova. The River has 30 tributaries that do not exceed the length of 10 km. River valley is V-shaped, its width varies between 2-3 km. The slopes are steep valleys interspersed with strong, height of 80-120 m. The riverbed Lăpuşna is moderately curved and has a width of 2-5m.

In some sectors (Lăpuşna, Cărpineni Mingir) it was artificial recess to 1-1.5 m. Lăpuşna River crossing several localities, the main ones being - in Nisporeni: Iurceni, Cristeşti; in Hincesti Corneşti, Secărenii Paşcani Lăpuşna, Sofia, Negureni, Cărpineni Mingir, Voinescu; Leova: Tochile-Răducani. Hincesti territory Lăpuşna river flows over a length of about 45 km.

On 24 August 1994 due to heavy rains Lăpuşna Valley lakes overflowed, causing great floods of destruction of property. The river is in a deplorable state. Residents living on the banks of the river or around do not appreciate this heritage. They built right on the riverbank cages for birds and animals. More serious is the fact that they have made water leaks from the bathroom, toilet near the river. You can also see corpses of birds and animals discarded, leading to water pollution of the atmosphere. The Lake that was in the village dried up because of frivolous attitude towards its operation. It was sold, and the owner does not care for it. Currently in place is a pond of 54 hectares of pasture.

Climate change is only one of the factors that will determine future indexes of availability and use of water. Non climatic factors could aggravate or mitigate adverse effects of climate change on water availability and quality. Non climatic factors could have a significant impact on increasing water demand. Increased pollution and economic development (and thus, changes in lifestyles and consumption) will play a dominant role (as mentioned above, the economic

downturn is a significant factor in the stability of water resources at present and thus is anticipated the volume of water extracted will increase with economic development).

Non climatic impacts could arise from several areas, starting with policies and legislation and ending with the technologies and infrastructure, land use patterns and farming / irrigation.

### The potential impact of climate change on water resources sector

impact category	Impact on water resources	Socio-economic impact	Measures
<b>High temperatures, heat waves</b>	Annual reduction in the flow Deepening the cloth groundwater Changing water quality	Reducing water availability for the use by the population The increase in the need for irrigation Increasing water pollution Adverse effects on health in low-income households Emergence of the requirement for further treatment of the water	Applying water treatment technologies Diversification of plant varieties resistant to drought. Using modern agricultural technologies of processing soils. Using manure. Use of advanced water treatment yourself.
<b>Changing rainfall regime</b>	Hydrological regime change Reducing small rivers flow Emergence of a shortage of water.	Likelihood of declining water quality Emergence of high risk of salinization of water Conflicts between water users	Increasing forested territories. Planting plants that absorb water salinization. Collecting rain water filtration technologies
<b>Extreme phenomena: floods, droughts</b>	Increasing the dilution of the sludge and the volume of sediments Increase the volume of nutrients, pathogens and toxins carried by water	Increased soil erosion Damage to infrastructure and abandonment of agricultural land Increased costs for emergency and remedial	1. Planting species of herbaceous plants impedance soil erosion. Afforestation risk of erosion. construction of dams Post information meteorological preventive forecast rainfall data.
	Dilution capacity reduction because of low flows Reduction of dissolved oxygen Increasing water scarcity	Increased propagation of algae, increasing of bacteria and fungi that affect human health, agriculture, ecosystems and water supply Emergence of high risk of desertification	Afforestation with drought-resistant species Afforestation around water basins.

Source: Strategy of the Republic of Moldova to adapt to climate change by 2020

### The main risks for water resources sector

Details on the amount of risk		Center, Hincesti district
Risks	Impairment of water quality indices (e.g. Mineralization, hardness, dissolved oxygen) due to higher water temperatures and flow variations	MEDIUM
	The change in water demand (increased due to the increase in population, economic development and irrigation needs)	HIGH
	The change in the river flow, both on the upside and the reduction	HIGH
	Registration drought and water scarcity	HIGH
	Irrigation needs increase	HIGH
	Reduced availability of both water from surface sources, and from groundwater	HIGH
	Increased pollution by pesticides and fertilizers, due to higher soil washing	HIGH
	Increased frequency and intensity of floods	HIGH

*Source: Strategy of the Republic of Moldova to adapt to climate change by 2020*

# CLIMATE CHANGE IMPACT ON PUBLIC HEALTH

Life expectancy is generally accepted as a key indicator of the general state of health of a nation. Moldova is currently in a slightly better situation than in the pre-transition period in terms of life expectancy (in 2012, it constituted 71.12 years for both sexes, compared with 1990, when constituted 67.97 years for both sexes).

It is clear that climate change and extreme weather events have a direct impact on health. However, they can also affect forestry, agriculture and economy, which would cause problems in terms of food security and poor sanitary conditions that can produce, in turn, serious effects on health in the short and long term. Drought effects on health could, for example, to decrease food production and nutrition problems of the population, making them more vulnerable to disease.

The share of older people unable to work has been decreasing in the last three years due to the favorable population age groups, which is generally favorable trend of dominance of younger people. However, over the last 10 years has seen a steady reduction in the number of children. This trend will result in future increased share of older persons in the total population.

Infrastructure for healthcare is far less accessible in the village, because the technique is very old and cannot provide quality first aid services. A large share of people does not have health insurance mandatory (about 27.3% of the village population). Moreover, every third person who does not have a medical insurance policy is part of the poorest. The rural population (about 59% of the total) is dependent on decentralized water supply and water quality degradation affect rural population (one of the most vulnerable groups are children bowel disease).

*The table below shows the direct impacts of climate change and the potential socioeconomic consequences that are relevant to health.*

**The impact of climate change on socio-economic sphere and on human health**

impact category	Socio-economic impact	Impact on Health	Measures
<b>Extreme air temperatures and heat waves</b>	Declining growth Increasing incidence of diseases, including those transmitted by water Mobility of inhabitants Increased number of cases of mental disorders and deviant behavior due to stress Missing opportunities for education	Excess mortality Worsening health of people with chronic diseases Emergence of changes in symptomatic illnesses caused by food Increasing the spread of infectious diseases Increased incidence of respiratory diseases Increased incidence of vector-borne diseases	Use plenty of water; People at risk of disease to take account of medical advice; The regularly usage medication given by doctors; Examining and strengthening existing disease surveillance systems for inclusion of climate-related health consequences, such as the morbidity and mortality associated with the heat;
<b>Floods</b>	Declining growth Increasing incidence of diseases, including those transmitted by water Mobility of inhabitants	Increased number of deaths and injuries Increased incidence of water borne diseases	Training, guidance and counseling services for health professionals on modern and innovative measures to be taken during extreme weather events such as heat waves, floods and

impact category	Socio-economic impact	Impact on Health	Measures
	Increased number of cases of mental disorders and deviant behavior due to stress Missing opportunities for education		droughts;
<b>Drought</b>	Declining growth Increasing incidence of diseases, including those transmitted by water Mobility of inhabitants Increased number of cases of mental disorders and deviant behavior due to stress Missing opportunities for education	Emphasizing the phenomenon of hunger and malnutrition	1. Identifying, monitoring and keeping in sight the risk groups and vulnerable populations; Develop treatment protocols for medical problems caused by climate; Awareness of health professionals, the public and the most vulnerable groups; Providing increased access to healthcare for vulnerable populations (eg., The elderly, obese or disabled);

*Source: Strategy of the Republic of Moldova to adapt to climate change by 2020*

The impact of climate change on various vulnerable groups can vary in forms and intensity. Usually those affected by climate change are poor people, children, women (especially lonely mothers, or multi children families) elderlies, persons with different forms of disabilities etc. One important factor is that the state does not have any strategy on how to train these types of groups on how to face climate change and its consequences.

Groups particularly vulnerable and susceptible to new climate conditions and their health

Particularly vulnerable groups	Health status and sensitivity to climate change
Older people with chronic illnesses, infants and children, pregnant women, needy, outdoor workers	Diseases and deaths related to heat waves
Children, people with heart and lung diseases, diabetes, outdoor workers	Diseases and deaths related to low air quality caused by pollution
Indigent, pregnant women, people with chronic illnesses, mobility and cognitive limitations	Diseases and deaths related to extreme weather events

*Source: Centre for Health Cărpineni*

### Main risks and benefits o

#### f climate change for health in central Moldova

Details the size of risk / benefit	Center, Hîncești district
------------------------------------	---------------------------



Details the size of risk / benefit		Center, Hîncești district
Risks	Increased number of deaths from heat waves	MEDIUM
	Increased number of diseases caused by air pollution	MEDIUM
	The emergence of changes in phenological phases and high risk of allergies	MEDIUM
	Emergence of high risk of drought and water scarcity, reduce the availability of water for hygiene appropriate - reduce the availability of food for the population that depends largely on agricultural productivity	MEDIUM
	Increased frequency and intensity - floods disrupt water supply and sanitation systems and may damage transport systems and health care infrastructure; floods can create favorable conditions for the spread of mosquitoes, which can lead to outbreaks of disease; floods can multiply the number of posttraumatic stress-related disorders **	HIGH
	Increased number of cases of diseases transmitted through water and food	HIGH
Benefits	Reducing mortality caused by cold winter	MEDIUM

*Source: Strategy of the Republic of Moldova to adapt to climate change by 2020*

It considers that five of the identified risks would be the biggest: Increased number of deaths from heat waves; Increased number of diseases caused by air pollution; Occurrence high risk of allergies; Emergence of high risk of drought and water scarcity; Increasing the number of cases of water-borne diseases, including through food.

Another important vulnerability is the risk of malnutrition that occurs when factors such severe weather such as droughts, floods and hail could compromise the crop, leaving small farmers without food and income, which means the rural population will face severe nutritional risks.

There is an advantage associated with the impacts of climate change on health: reducing mortality caused by cold winter.

## CLIMATE CHANGE IMPACT ON FORESTRY

They are present in the village the following main types of forest species: acacia wood, Oaktree, oak, mixed forest etc. It is also important to highlight, that over 50% of all plant and animal species included in the Red Book of Moldova are part of the biocenosis forest of Cărpineni

Total area (ha)	Agricultural land (ha)	Plot Land (ha)	The forest fund (ha)	Forest (ha)	Land under the reserve fund (ha)
13613.75	7979.54	1039.98	2392.08	77.26	2023

As stated in the strategy of sustainable development of the forestry sector in Moldova, the main function of forest resources is to maintain ecological balance, but woodland area is insufficient to guarantee effective protection of the environment. A problem in the village is small afforestation, which is a major cause of the high levels of soil erosion, landslides and degradation of water resources. This also intensify droughts. Firewood is particularly important for poorer families who cannot afford the costs for procuring wood, coal, higher expenses for gas and electricity.

The causes of forest degradation are:

- growth illegal deforestation due to high prices and fuel wood;
- lack of effective control of the local administrations;
- low level of knowledge and ecological culture;
- overgrazing and lack of proper forest management.

The trend of deforestation lengthy than 100 years has been reversed in the last 50 years and the current forest policy in Moldova urges toward expanding forest area through afforestation and better management of community forests for direct use and watershed protection. Scientists assume that even small changes in temperature and precipitation could affect mostly forest growth and survival in the future, especially in outlying areas and transition of ecosystems such as forests in Moldova. The following presents the main direct impacts of climate change and potential socio-economic consequences, which are important for forests.

### Socio-economic impacts of climate change on the forest sector

Impact category	The impact on the forestry sector	Socio-Economic Impact	Measures
<b>High temperatures, heat waves</b>	Extension of the growing season of vegetation The manifestation of negative consequences for species sensitive to	Reducing the volume for wood production The transition to other forms of energy Additional costs for	1. Creating new protective forest and reconstruction of existing ones; 2. Afforestation of degraded lands, including: - protective forest belts; 3. Windbreaks

	temperature changes Increased vulnerability to forest fires	the population	4. Windbreaks water protection. 5. Establishment of forest plantations for industrial and energy needs; 6. Planting forests to satisfy energy needs of the population of wood for heating, food preparation.
<b>Changing rainfall indices</b>	Changing plant health Changing species composition Changing the types of pests and growth the number of these the increase incidence of diseases	Changing forest habitat capacity to maintain biological diversity, environmental protection and preserving the specific socio-economic functions	1. Forest plantations on degraded lands. 2. Reconstruction of forest belts. 3. Planting species that keep humidity.
<b>Extreme events: droughts, fires, floods and strong winds</b>	The growth and reduced biomass production Increasing the number of forest fires Increased mortality seeds	Economic losses in the forestry sector	1. Planting / afforestation interconnection between massive corridors. 2. Creating / planting green islands

*Source: Strategy of the Republic of Moldova to adapt to climate change by 2020*

The potential lack of summer rainfall with prolonged drought is the main limiting factor of growth and productivity of forest. Rising temperatures and changing of precipitation character are the main factors that expose the forests to the action of various insect pests and fungal diseases. Moreover, the demand for water during the growing season is normally greater than the quantity of rainwater. This shows that if raising the temperature does not coincide with abundant rainfall, water scarcity could affect forest growth in a greater extent than at present.

According to vulnerability assessments report, made at national level for the Republic of Moldova, in the forest sector where registered high changes caused by climate change mostly in the center sector of the country, covering in this way Hincesti district.

***Main risks and benefits for the forestry sector***

Details on the size of the risk / benefit		Center, Hîncești district
<b>Risks</b>	Changing the composition of forest species - Reducing mesophilic forest areas (beech, oak and holm oak) in favor of thermophilic forests oaks, with smoke trees and xerophyle grassland.	MEDIUM
	Possible increase in tree mortality	MEDIUM
	Changing species competition	MEDIUM

	Negative consequences for species sensitive to temperature change	MEDIUM
	Change regeneration rate	HIGH
	Changing forest species with sensitivity to water scarcity	HIGH
	Changing the density of individual trees	HIGH
	Increasing the abiotic damage caused by fire, wind storms, floods and drought	MEDIUM
	Changing phytosanitary conditions	HIGH
<b>Benefits</b>	<p>Changing the production of biomass</p> <p>Among the mixed species, hornbeam and ash could be the most vulnerable species under conditions caused by climate change. Since the second half of the production cycle (60s- hornbeam or 70s -ash) until the end of the century, both species suffered a reduction of 20-40% of the biomass growth.</p>	MEDIUM

*Source: Strategy of the Republic of Moldova to adapt to climate change by 2020*

For the forestry sector, seven of the main risks are identified:

1. The negative consequences for species sensitive to temperature changes;
2. Change regeneration rate;
3. Change of species sensitivity to water scarcity;
4. Changing the density of individual trees;
5. Change phytosanitary conditions;
6. Change in species composition;
7. Increasing tree mortality.



**ANNEX: CLIMATE CHANGE ADAPTATION PLAN OF ACTION**

Strategic Objectives	Measures	Actions	Progress Indicators	Responsible	Deadline	Costs	Potential Sources of Funding	Reporting Procedures
1	2	3	4	5	6	7	8	9

**Problem: The level of ecological culture of the population is low in disaster risk management and climate change adaptation**

I. To make all stakeholders, especially the population, aware regarding climate change risks and adaptation to this change.	1.1. To create a mechanism to ensure public awareness on climate change risk and adaptation to this change.	1. To develop an information programmer to ensure public awareness regarding climate change adaptation.  2. To organize information campaigns regarding climate change risk and adaptation to this change.	The information programmer is developed and approved  The information campaigns on climate change are organized	LPA          NGO, LPA	2016          twice per year	2000          20000	LPA, NGO,          external funding	
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**Problem: Disaster risk management and climate change adaptation in agriculture is insufficient**



II. Risk reduction and climate change adaptation in agriculture	1.2. To identify vulnerable areas and sectors and assess the needs and possibilities of alternative crops and growing resistant varieties in response to climate change.	1. To conduct a study of areas vulnerable to climate change.	The study on vulnerable areas, needs and possibilities in response to climate change is conducted.	LPA	2016	5000	LPA		
		2. To organize seminars for farmers.				2016-2019	20000	LPA, NGO	
		3. To promote the implementation of new technologies in agriculture.		LPA, NGO	2020	1000000	External funding		
	1.3. To develop a programme of water conservation measures in soil and to adjust periods for conducting agricultural activities on	1. To develop a programme of water conservation measures in soil	The programme of measures is developed; certain activities are carried out.	LPA, Entrepreneur	2017	5000	LPA		
		2. To promote new technology- NO-TILL				2016-2019	100000	LPA, NGO	
		Trainings for farmers are conducted.		LPA, NGO,					



	climate change.	3. To inform farmers about planting periods.	Trainings for farmers are conducted.	LPA, NGO	periodic	20000	ACSA	
	1.4. To support farmers in selecting crops and varieties which suit better to new climatic conditions	1. To develop projects on refurbishment of farmers.	Funds have been identified, studies and researches are conducted, experimental projects are implemented	LPA, NGO, research institute	2016-2017	3500	LPA	
	1.5. To build capacity for climate change adaptation through awareness of stakeholders using agricultural consultancy and information on farm management	1. Data center consolidation in agriculture ACSA on climate change. 2. To develop informational materials for farmers. 3. To organize training seminars with experts on climate change in agriculture.	Information campaigns are organized, consultations are offered, informational materials are published.	ACSA LPA, NGO  LPA, NGO	2016  Periodic  2016-2020	10000  25000  20000	External funding  NGO, external funding  NGO, ACSA	



	1.6. To develop irrigation plans based on an assessment of their impact, of the future water availability and water needs, taking into account the balance between supply and demand	1. To develop irrigation plans/projects. 2. To promote the construction of solar greenhouses among people using alternative energy sources. 3. To promote the idea of horticulture.	The irrigation plans are developed and approved  A number of greenhouses are built	LPA  NGO, farmers, civil society	2017  2016-2018  2016	80000  10000  100000	LPA, Entrepreneurs	
<b>Problem: Disaster risk management and climate change adaptation in water resources sector is insufficient</b>								
III. Risk reduction and climate change adaptation in water resources sector.	3.1. To carry out studies on assessment water availability, determination their vulnerability to climate change, water requirements and needs for	1. Assessment of available water resources. 2. To develop a study of water needs for the main categories. 3. Rehabilitation of existing wells. 4. To establish responsible people to take care of wells.	Multidimensional studies on water resources are conducted	LPA  LPA  LPA, population	2016  2016  2016-2020  2016	5000  10000  100000	LPA, Municipal enterprise  LPA, Municipal enterprise  LPA	





	the main categories of consumer	5. Information campaigns on rational use of drinking water.		LPA, civil society  NGO	2016-2020	10000	LPA  NGO, LPA, Municipal enterprise	
	3.2.To provide integrated water management on the basis of river basin	1. To create a sub-basin council of the River Lapușnița 2. To evaluate possibilities of restoring the local lake 3. To perform biological analysis of the Lăpușnița river basin. 4. To plant seedlings of moisture-loving species on the banks of the river Lăpușnița 5. Rehabilitation of the banks. 6. Actions of cleaning	1.1. The basin Council is created; Secretariat is nominated; four annual sessions. 3.1. The criteria for water quality are established. 3.2. The process of wastewater treatment is improved. Regulations limiting the emission of dangerous substances into water are established.	LPA, NGO   LPA, Cărpineni Forest District LPA Civil society  LPA	2016-2020  2017  2017-2019 2016	50000  100000  500000 5000 annual	NGO, LPA  LPA, Ministry of the Environment  LPA, MoE NGO, LPA, civil society  LPA	



		of the river Lapusnita						
		7. To establish rules on the limitation of dangerous substances in water (sheep in the nearby, households, etc.)						
	3.3. To ensure proper management of flood risk	<p>1. To deepen the Lăpușnița river and its affluents.</p> <p>2. To strengthen the banks of the Lăpușnița river.</p> <p>3. To create stormwater discharge system on public roads.</p>	Protective dikes are built/reconstructed.	LPA	2018	100000	LPA, external sources	
				LPA	2019	100000	LPA, external sources	
					2017	50000	LPA	
	3.4. To take measures against drought / water scarcity.	<p>1. To fit the forgotten springs.</p> <p>2. The search for technical solutions and new sources of water.</p>	The capacities for water storage are created.	LPA, civil society	2016-2018	80000	LPA, external sources	
					Permanen	30000	LPA, Municipal enterprise	
					Permanen	10000		



		3. To maintain good conditions of the centralized water supply; expand the existing water supply system; ensure the conditions for wastewater treatment.					LPA, Municipal enterprise	
<b>Problem: Disaster risk management and climate change adaptation in the health sector is insufficient</b>								
IV. Risk reduction and adaptation to climate change in health sector	4.1. To evaluate and identify health risks associated with climate change	1. To conduct a study on health risks associated with climate change.	The study is developed, the risks are identified.	Cărpineni Health Centre	Permanent		Health Centre	
	4.2. To identify and monitor risk groups and vulnerable population to climate change.	1. To develop a diary to record the population vulnerable to climate change. 2. Seminars with health workers and experts in the field of climate change on the identification of risk	The risk groups and categories of populations vulnerable to climate change are identified. A number of seminars were conducted duly. A number of people were investigated.	Cărpineni Health Centre NGO Cărpineni Health Centre Cărpineni Health Centre	Permanent 2016	2000 40000	LPA, Health Centre	



		groups. 3. To monitor the risk groups and vulnerable populations to climate change. 4. Medical investigation of the risk groups twice per year.		Cărpineni Health Centre	Permanent  Twice per year	5000 annual  100000	Health Centre	
<b>Problem: Disaster risk management and climate change adaptation in the forestry sector is insufficient</b>								
V. Risk reduction and adaptation to climate change in the forestry sector.	5.1. To intensify the expansion of territories covered with forest and the ecological restoration of forests, to create interconnection between massive forested corridors.	1. To plant/ afforest interconnection between massive forested corridors. 2. To create / plant green islands.	8000 hectares of land are afforested; green islands are created.	LPA, Forest District, NGO	2016-2019  2017	200000  50000	LPA, MoE  LPA, MoE	
	5.2. Creation of forest strips for protection of the	1. To plant forest strips between	8000 hectares of forest belts are restored/created.	Forest District, LPA Farmers	Forestry	2016-2017	30000	LPA, MoE



	agricultural land, roads and water.	farmland. 2. To organise volunteer events for planting forest strips.	Number of volunteers; Number of organised events	NGO	NGO	periodic	10000 annual	LPA
	5.3. To selection and grow in nurseries the species of trees resistant to various weather conditions.	1. The growth in nurseries of the species of trees resistant to various weather conditions.	The species of resistant trees which are cultivated on various surfaces are selected	Forest District	Forest District	Permanent	50000 annual	Forestry
	5.4. To create green rural spaces	1. To plant / rehabilitate the park in the center of the Cărpineni village. 2. Tree planting on the roadsides.	The park in the village center of Cărpineni is rehabilitated. Number of planted and grown on the roadsides trees	LPA, NGO, civil society	LPA, NGO, civil society	2016-2019	100000	LPA
				LPA NGO, civil society	LPA	2016-2017	50000	LPA, Entrepreneur
<b>Problem: Disaster risk management and adaptation to climate change in the energy sector is insufficient</b>								
VI. Risk reduction and adaptation to climate change in the energy sector	6.1.To promote renewable energy sources which operate	1. Information campaigns, and promotion of sources of renewable energy	PV generators and wind turbines are used biomass is used for heating Number of conducted seminars, number	NGO, LPA	Permanent	20000	LPA, NGO	



	on environment friendly technologies	technologies. 2. To organise seminars / trainings on the construction of solar installations. 3. To organise study visits to other places in Moldova	of people involved Number of visits made, number of people involved	NGO, LPA  LPA, NGO	2017  2017	25000  8000	NGO, Entrepreneurs LPA  Entrepreneurs	
	6.2. To promote efficient use of energy and products with high energy efficiency	1. To design informational materials on the efficient use of products with high energy efficiency.	Energy intensity is reduced by 10%, an annual energy efficiency of 2% is guaranteed. Number of information materials designed and disseminated.	NGO, LPA  NGO, LPA	2016-2020	25000	LPA	
<b>Problem: Disaster risk management and adaptation to climate change in the transport sector is insufficient</b>								
VII. Risk reduction and adaptation to climate change in the transport sector	7.1. To ensure the planning of rural transport system in order to create the	1. Construction and rehabilitation of local roads in the village of Cărpineni with adapted technology	The length of the rehabilitated road routes, km In the village of Cărpineni bicycle lanes are created.	LPA	Permanent  2017	50000	NGO  LPA,	



	necessary infrastructure	<p>application.</p> <p>2. To create special cycle tracks and stops</p> <p>3. To promote a healthy living - cycling.</p> <p>4. To evaluate the fleet of old/polluting cars and trucks.</p>	<p>Number of events promoting a healthy lifestyle;</p> <p>Number of people involved</p> <p>Number of old cars which were scrapped</p>	<p>LPA</p> <p>NGO, LPA</p>			<p>Entrepreneurs</p> <p>external sources</p>	
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