Government of the Republic of Moldova

DECISION no. 1009 of 10.12.2014

Chisinau

On approving the Republic of Moldova's Climate Change Adaptation Strategy by 2020 and of the Action Plan for its implementation

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To implement the United Nations Framework Convention on Climate Change, amended through the Parliament Decision no. 404-XIII of 16 March 1995 (Official Monitor of the Republic of Moldova, 1995, no. 23, Art. 239) and the mechanisms and provisions of the Kyoto Protocol to the United Nations Framework Convention on Climate Change, joint by the Republic of Moldova under the Law no. 29-XV of 13 February 2003 (Official Monitor of the Republic of Moldova, 2003, no. 48, Art. 193), the Government DECIDES:

1. To approve:

   The Republic of Moldova's Climate Change Adaptation Strategy by 2020, according to Annex 1;

   The Action Plan for the implementation of the Republic of Moldova's Climate Change Adaptation Strategy by 2020, according to Annex 2;

2. The Ministry of Environment:

   will monitor and coordinate the implementation of the Republic of Moldova's Climate Change Adaptation Strategy by 2020 and of the Action Plan for its implementation, and will submit by 1st of April every year the monitoring report to the Government;

   will cooperate with international organisations and potential donors to raise the amount of investments needed to implement the provisions of the Strategy and of the Action Plan for its implementation.

3. Ministries and other central administrative authorities:

   will implement according to their competences the measures stipulated in the Strategy and the Action Plan for its implementation;

   will submit by 15th of March every year reports on the implementation of the aforementioned measures to the Ministry of Environment.

4. It is recommended that:

   central public authorities develop sectoral policy documents on climate change adaptation;

   local public administration authorities undertake the measures needed to implement the provisions of the Republic of Moldova's Climate Change Adaptation Strategy by 2020.

5. The control over the fulfilment of this decision shall be the responsibility of the Ministry of Environment.

Prime-Minster ***IURIE LEANCA***

Annex 1
to Government Decision
no . 1009 of 10.12.2014

THE REPUBLIC OF MOLDOVA'S CLIMATE CHANGE ADAPTATION STRATEGY BY 2020

I. INTRODUCTION

The Republic of Moldova is highly vulnerable to climate variability and change. According to the Republic of Moldova's Third National Communication under the United Nations Framework Convention on Climate Change (2013) and the National Human Development Report 2009/2010, the future impacts of climate change on various economic, social and environmental aspects are expected to intensify.

At present, the Republic of Moldova is one of the least advanced countries in Europe and Central Asia, with a high level of vulnerability to such changes. It is confirmed by the Human Development Index for 2012, the value of which was the fourth out of 30 countries in the region. The climate change impact on agriculture is of particular concern – agriculture is a major source of income for a big part of the Republic of Moldova's population. More than half the population of the country lives in rural areas and about one third of the labour force are employed in agriculture.

The socio-economic costs of climate change related natural disasters such as droughts, floods and hail are significant. Both their intensity and frequency are expected to further increase as a result of climate change. During 1984-2006, the Republic of Moldova's average annual economic losses due to natural disasters were about US$61 million. The 2007 and 2012 droughts alone caused losses estimated at about MDL 12 and 5 billion, accordingly. The 2008 floods cost the country about US$120 million, and the 2010 floods had an adverse economic impact on the Gross Domestic Product of about 0.15 percent, with total damage and losses estimated at approximately US$42 million.

Climate change is increasingly recognised as fact of national importance, but so far there is no national strategic framework that would contain integrated and wide measures to adapt to new climate conditions determined by climate change. Therefore, it becomes an imperative of time.

The Climate Change Adaptation Strategy is a strategic document that will have to assure that the social and economic development of the Republic of Moldova becomes resilient to climate change impacts in the future. The Strategy also supports the achievement of the global objectives in this regard established by the United Nations Framework Convention on Climate Change (UNFCCC) to which the Republic of Moldova is a Party. Similarly, it will create the needed strategic national framework to put in place the mechanism through which the Republic of Moldova will receive international support for developing countries that are not included in Annex 1 of the United Nations Framework Convention on Climate Change, offered by the industrialised countries.

The Republic of Moldova's Climate Change Adaptation Strategy has been prepared in accordance with the provisions of the Chapter on "Climate Change" of the EU Association

Agreement and the provisions of the Programme of the Government of the Republic of Moldova "European Integration: Freedom, Democracy, Welfare" (2013-2014), Chapter on "Environment".

Together with the Republic of Moldova's Low-emission Development Strategy by 2020, the Climate Change Adaptation Strategy envisages the development and the beginning of the implementation by the Government of a comprehensive framework of sectoral policies that will guide the climate change-related challenges.

Climate change affects all facets of development – it is not specific to any one sector, but rather all development activities need to take account of the risks that climate change may pose to their success.

Climate change adaptation further requires close cross-sector coordination and a supportive institutional and legislative environment.

The Republic of Moldova's Climate Change Adaptation Strategy is intended to serve as an umbrella strategy that creates the enabling environment for key sectors of the national economy and other fields such as: public health, water resources, conservation of biological diversity and others, to develop their own concrete strategies and/or action plans for climate change adaptation or mainstream climate change adaptation aspects in their existing strategies.

This strategy was developed under the direction of the Republic of Moldova's Ministry of Environment with the Inter-ministerial Working Group steering the process, and with support from the United Nations Development Programme (UNDP Moldova).

The development of the Strategy involved extensive stakeholder consultation with relevant ministries, research institutions, donor organisations, NGOs and civil society.

II. DESCRIPTION OF THE CURRENT SITUATION

Section 1. Overview of Projected Climate Change Impacts

1.1 Description of climate variability in the Republic of Moldova

1. In the Republic of Moldova, the systemic observations on climate indices started in 1886 and have continued via the hydro-meteorological monitoring network of the State Hydro-meteorological Service.

The nature of observed climate changes in the Republic of Moldova was identified through the trends and variability of basic climatic indices (The Third National Communication of the Republic of Moldova under the United Nations Framework Convention on Climate Change. Ministry of Environment of the Republic of Moldova/ UNDP Environment. - Ch.: "Imprint" Plus Ltd. 2013 - 413 p).

2. The early 1990's of the 20th century are considered a "benchmark" for global warming. This was found during the observations made at Chisinau meteorological station (*for which there are available the longest series of uninterrupted instrumental climate data*) which outlined that, during 1887-1980, the mean annual air temperature increased on average by about 0.05 ^{0}C every decade, which, re-calculated for 100 years, is an increase of 0.5 ^{0}C (*Table 1* and *Figure 1*).

Applying the same methodology for 1981-2010, an average growth by about 0.63 ^{0}C was established for every decade, which, re-calculated for 100 years, is 6.3 ^{0}C. At the same time, of note is that the sudden increase in the mean annual temperature for 1981-2010 was determined by a significant increase in the mean air temperature during spring, summer and autumn.

3. The trends in the mean annual and seasonal rainfall values for the two evaluated time spans are positive for all seasons, with the exception of spring (1891-1980) and summer (1981-2010), where the trends were negative. However, the trends of slight increase in the mean annual and seasonal rainfall values are not statistically significant, with the exception of the annual value for 1891-1980 time span (*Table 1* and *Figure 1*).

Table 1: Trends of linear evolution of air temperature (^{0}C/year) and rainfall (mm/year) for two distinct time spans of instrumental climate data observation at Chisinau Meteorological Station

Season	Mean air temperature value for:		Mean rainfall value for:	
	1887-1980	1981-2010	1891-1980	1981-2010
Winter	0.010	0.039	0.472	1.234
Spring	0.005	**0.061**	- 0.059	0.187
Summer	0.002	**0.097**	0.619	- 1.406
Autumn	0.003	**0.048**	0.412	1.291
Annual	**0.005**	**0.063**	**1.448**	1.301

Note: Bold is used to mark statistically significant values

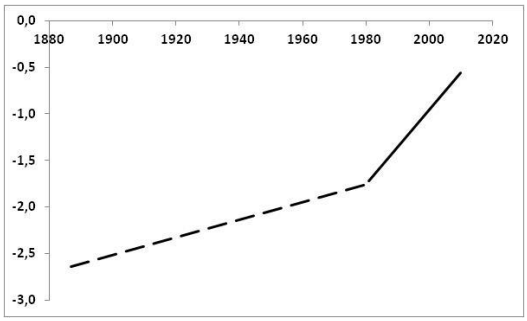
The analysis of mean annual and seasonal air temperature index values found substantial changes in the temperature regimen for two distinct time spans (*Table 2*).

Table 2: Evolution of mean annual and seasonal temperature values (^{o}C) for 1887-1980 and 1981-2010 time spans, and the average annual and seasonal rainfall amount (mm) for 1891-1980 and 1981-2010 time spans at Chisinau Meteorological Station

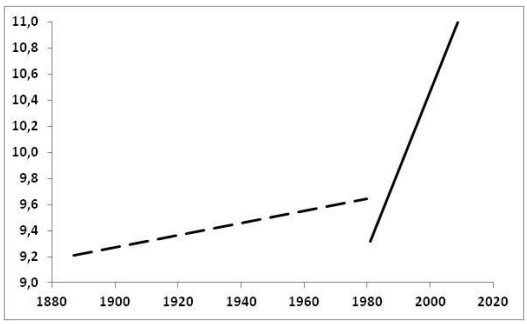
Season	Mean air temperature for:		Mean rainfall for:	
	1887-1980	1981-2010	1891-1980	1981-2010
Winter	-2.2	**-1.1**	100.6	105.6
Spring	9.4	**10.2**	121.5	**123.7**
Summer	20.5	**21.3**	185.9	186.1
Autumn	10.1	10.3	113.1	132.2
Annual	9.5	**10.2**	521.1	547.6

Note: Bold is used to mark statistically significant values

Winter



Spring



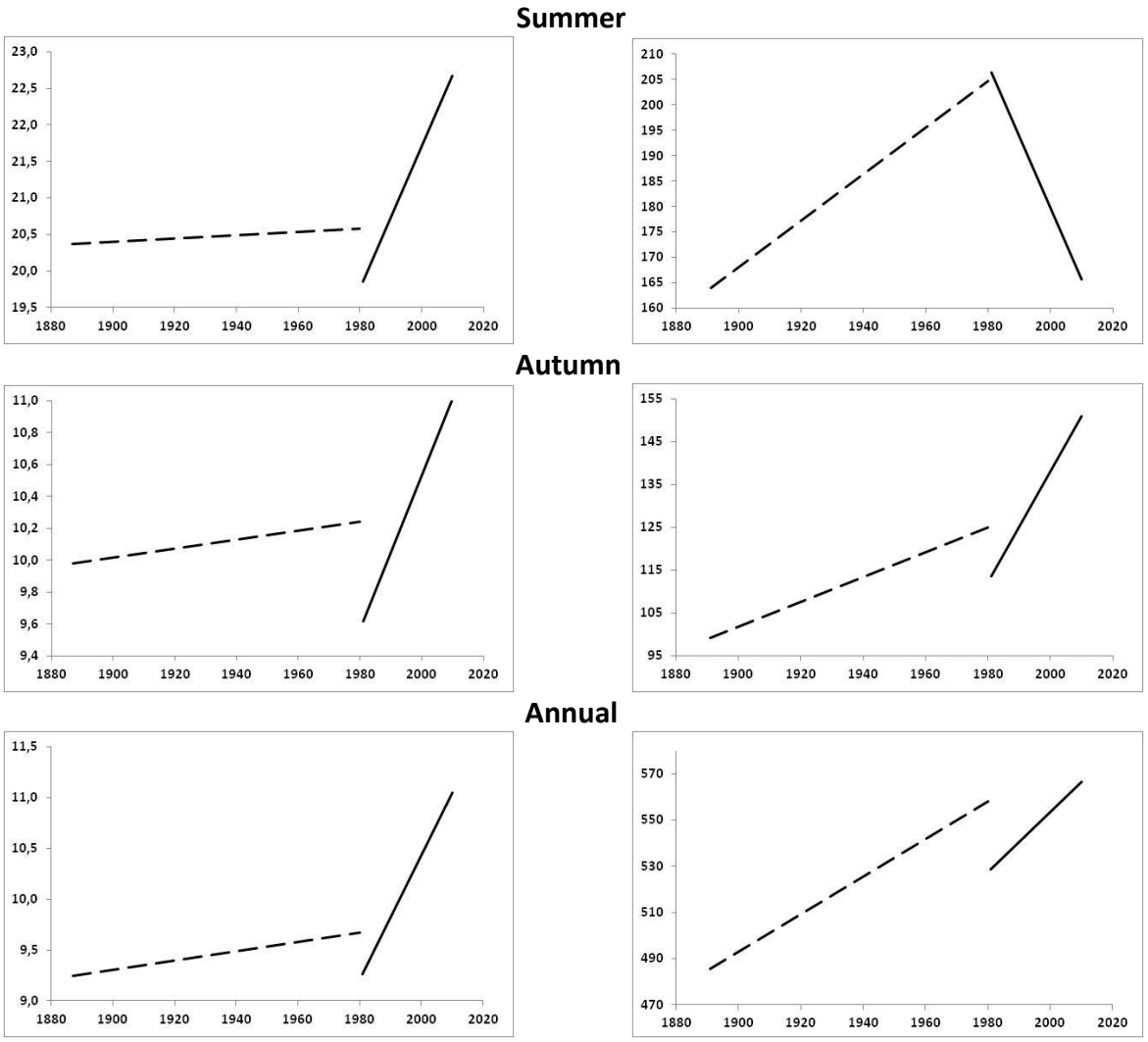


Figure 1: Linear trends in the evolution of mean air temperature (^{o}C/year – left side), and precipitation (mm/year-right side) for two instrumental observation time spans (temperature 1887-1980 and rainfall 1891-1980 - dashed line and 1981-2010 - continuous line) at Chisinau Meteorological Station

4. With a high degree of certainty it has been established fact that climate change has been increasingly growing and advancing at high pace, especially over the last three decades. This phenomenon occurs almost throughout the year, and less during autumn. A particularly large increase in the variability index characterising the mean annual and seasonal air temperature for 1981-2010 time span has also been established. In real time, this variability is manifesting by an increase in the frequency of sudden temperature fluctuations, especially during winter and late spring, and in summer – through heat waves. This weather condition has quite a negative effect on human health and socio-economic components.

5. An analysis of national climate data revealed that the frequency of droughts in the Republic of Moldova in a 10-year time span is 1-2 droughts in the North; 2-3 droughts in the Central part and 5-6 droughts in the South. Their frequency is increasing, especially over the past decades. During 1990-2012 time span, 10 years were marked by droughts, which reduced significantly the crop yields. In 1990, 1992 and 2003, droughts continued during the entire vegetation period (April-September). The disastrous droughts of 2007 and 2012 affected over 70 per cent of the territory of the country, being the most severe droughts in the entire instrumental record period.

6. Floods also affect the Republic of Moldova on a recurring basis. In the past 70 years, 10 major floods on the great rivers of the Republic of Moldova (Nistru and Prut) were reported, and three of those occurred in this decade (2006, 2008 and 2010). Large floods on the smaller rivers in the country are also quite common.

The socio-economic costs of climate related natural disasters are significant, with the greatest impacts coming from droughts and floods (*Figure 2*).

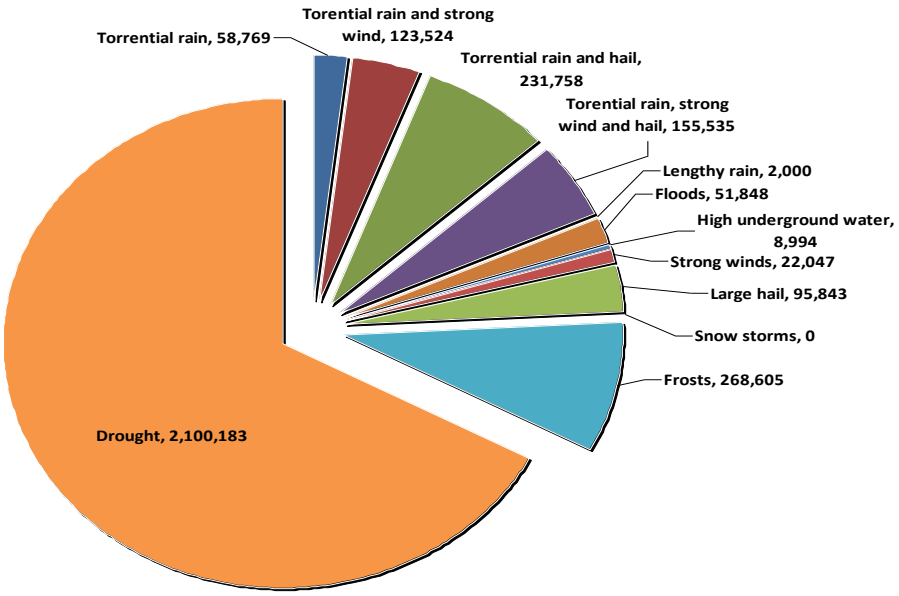


Figure 2: Economic Loses (million MDL) from Weather related Hazards 1998-2005 (World Bank Report, "Rural Productivity in Moldova – Managing Natural Vulnerability", 2007).

1.2. Future Climate Risks

7. In the Third National Communication of the Republic of Moldova under the United Nations Framework Convention on Climate Change (2013), 37 simulations from 10 global coupled atmosphere ocean general circulation models were downloaded and assessed.

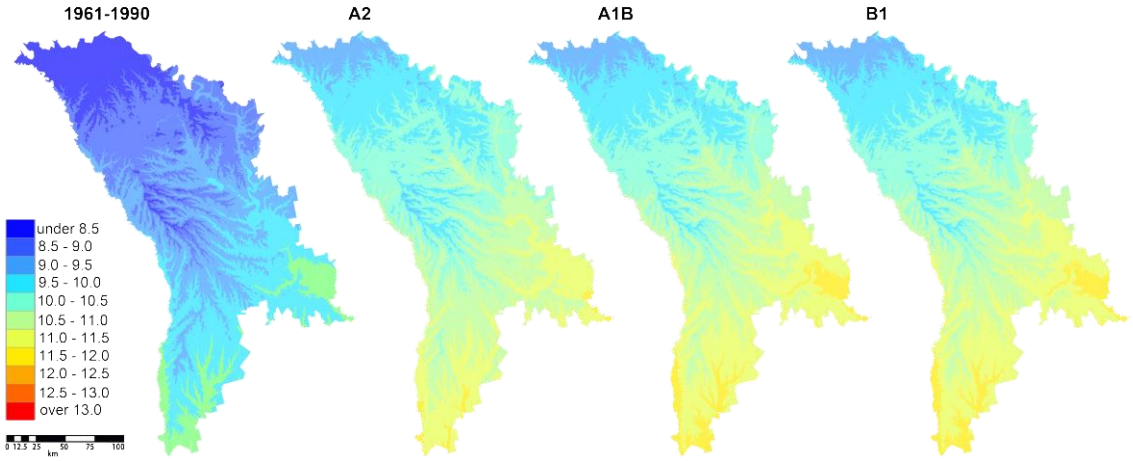
The simulations of General Circulation Models (GCM) were grouped in three model ensembles according to different emission scenarios A2, A1B and B1, available in the Special Report on Emission Scenarios (SRES) of the Inter-governmental Commission on Climate Change (IPCC0, and climate changes were computed for tree different future periods: 2020s, (2010-2039 time span), 2050s (2040-2069 time span), and 2080s (2070-2099 time span) with respect to the control time span of 1961-1990.

8. For 2010-2039, the three emission scenarios project quite homogeneous temperature rise of +1.2 -1.4^{0}C on average over the Republic of Moldova. Only beginning around the 2050s the three emissions scenarios produce temperature patterns that are distinguishable from each other. This is due to both the large inertia of the climate system it takes centuries for the full climate effects of greenhouse gas emissions to be felt. Actually, it takes a lot of time for the greenhouse gas emissions to produce different situations currently considered as future climate scenarios. By 2080', the average temperature increase is higher for all models ensemble within A2 emissions scenario, and can achieve an increase of about 4.3 ^{0}C. For the models ensemble of the A1B emissions scenario the average temperature may rise by about 3.8 ^{0}C and for the B1 emission scenario it can rise by about 2.7 ^{0}C (*Figure 3*).

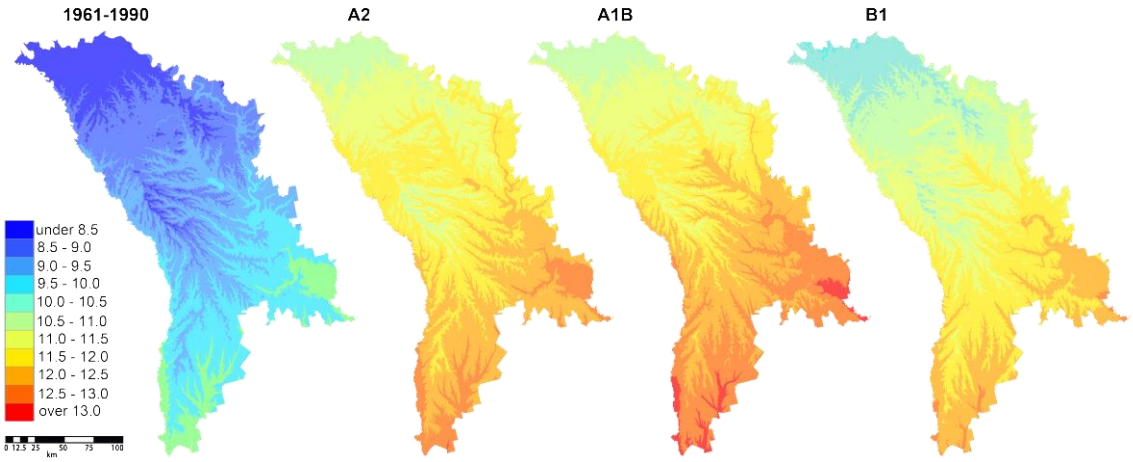
9. With regard to precipitations, the A2, A1B and B1 emissions scenarios project similar slight annual precipitation increase of around 2% over all of the Republic of Moldova Agro-ecological zones (AEZs) over 2020' (*Figure 4*). But beginning from 2050s the three emissions scenarios project annual precipitation patterns that exhibit a general decrease. The rate of decreasing in precipitation is higher under A2 emissions scenario varying from -13.5% over the South to -5.7% over the North AEZs, and smaller under the A1B emissions scenario from -4.4% in the South to -1.5% in the North AEZs (in comparison to the reference time period 1961-1990).

10. ***The seasonality of the warming signal will be different over the Republic of Moldova's Agro-ecological zones (AEZs)***. The models ensemble of the A2 emission scenario estimate that the North AEZ will experience the most significant warming during winter, with temperatures rising by up to $+4.9^0$C by the 2080s. For the rest of the Republic of Moldova territory the temperature increase will be from 0.5 to 1.0 degrees lower. The pattern of change derived from the ensemble B1 models is quite similar, but the magnitude of change is lower from $+2.6^0$C to $+3.2^0$C over the country with the maximum warming seen again in North and Centre AEZs.

2020s



2050s



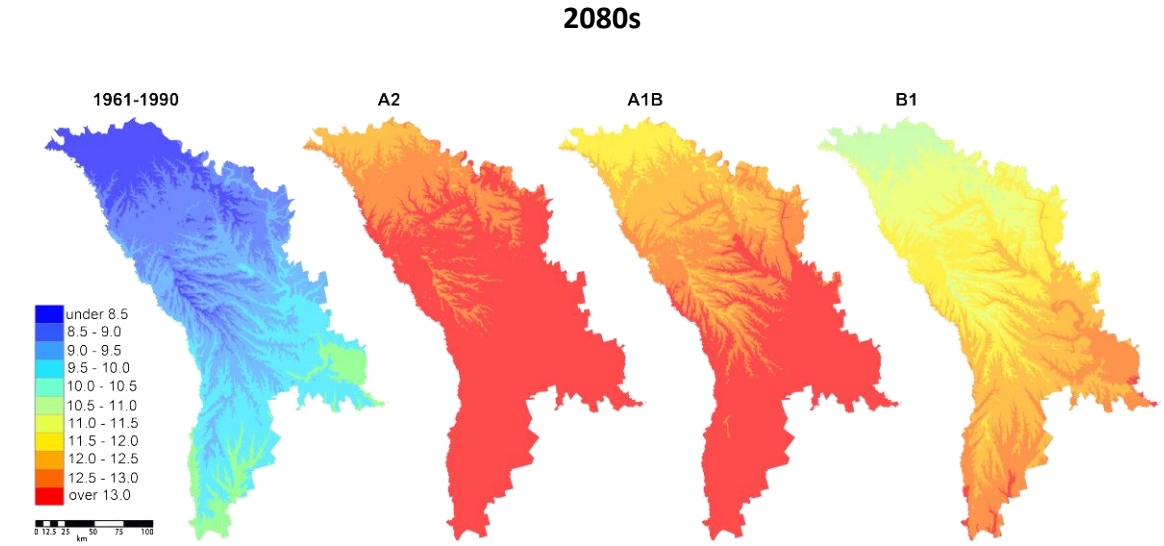
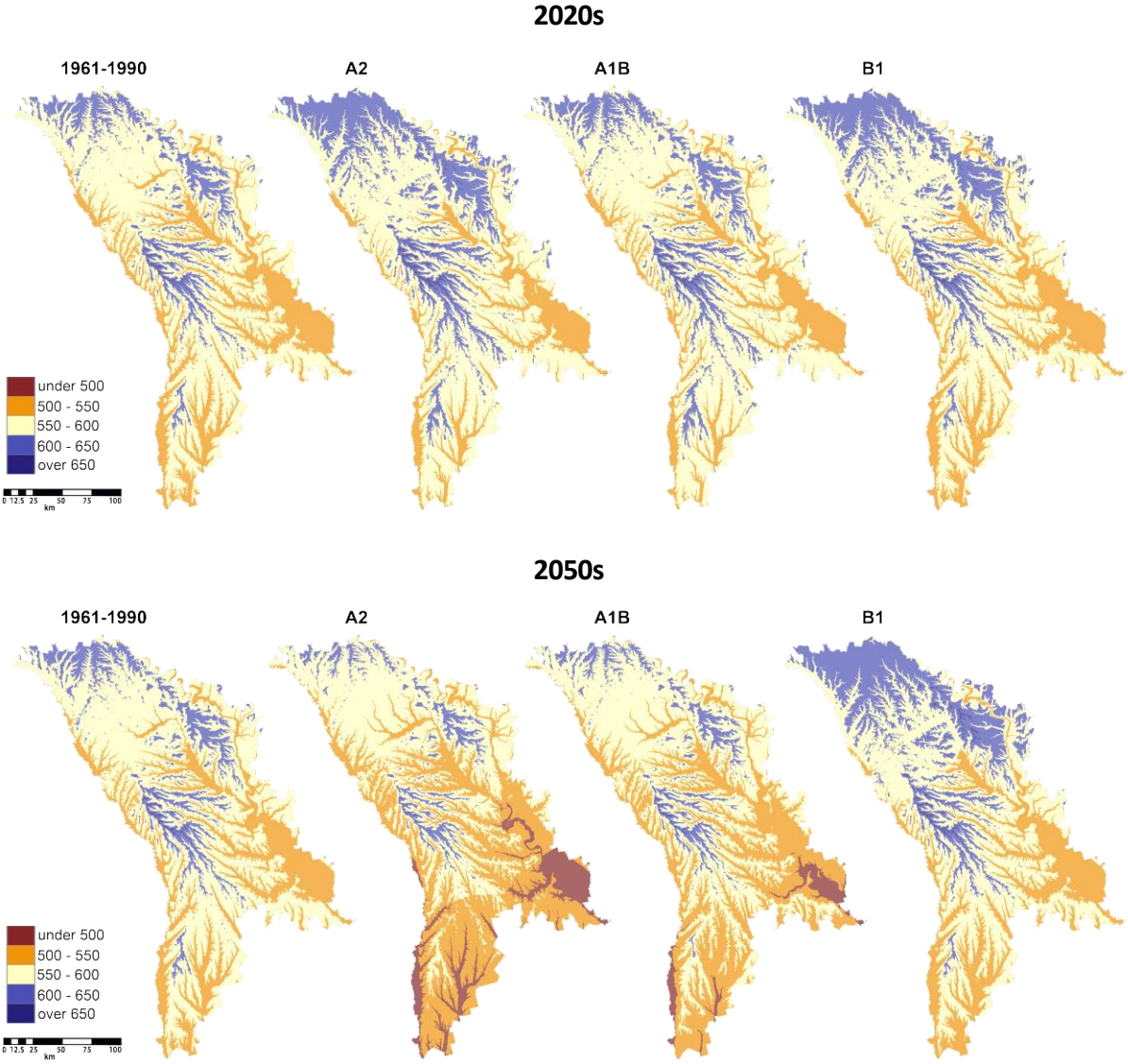


Figure 3: Projected Multi-Model Ensemble Annual Mean Air Temperature over the Republic of Moldova according to A2, A1B and B1 emission scenarios.



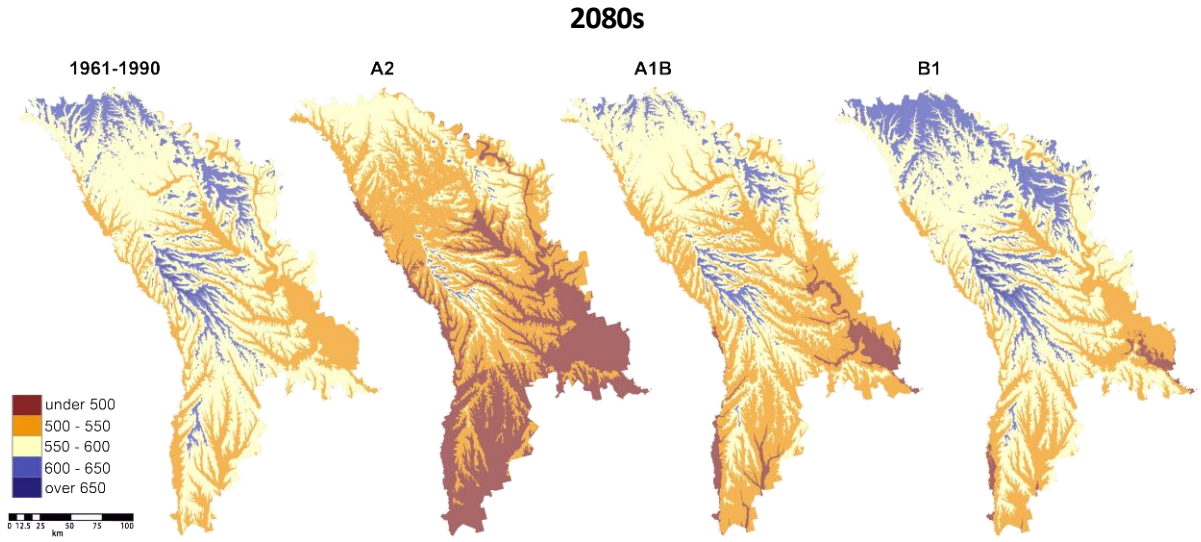


Figure 4: Projected Multi - Model Ensemble Annual Precipitation over the Republic of Moldova according to A2, A1B and B1 emission scenarios.

11. During summer, the climate change indicators simulation models project an increase by +5.1 - 5.2^{0}C over the Centre and South AEZs, but the North AEZ's temperature rise will be lower by up to +4.5^{0}C according to the A2 emission scenario. The models ensemble of the B1 emission scenario show less intense and more uniform warming over all AEZs from +2.9 to +3.1^{0}C (*Table 3*).

Table 3: Projected Multi-Model Ensemble Seasons (winter, summer) Mean Air Temperature Changes (ΔT, °C) over the Republic of Moldova AEZs according to SRES A2, A1B and B1 emission scenarios.

Season	Observed *Average* 1961-1990	SRES	*Projected changes by the 2020s*			*Projected changes by the 2050s*			*Projected changes by the 2080s*		
			Min	*Average*	*Max*	*Min*	*Average*	*Max*	*Min*	*Average*	*Max*
North AEZ											
DJF	-3.5	**A2**	0.5	**1.4**	3.4	2.0	**3.4**	6.4	3.3	**4.9**	8.0
		A1B	0.0	**1.2**	2.2	0.9	**2.8**	4.3	2.2	**4.0**	5.7
		B1	0.8	**1.4**	2.6	1.5	**2.3**	4.3	1.4	**3.0**	4.5
JJA	18.1	**A2**	0.5	**1.2**	2.4	1.4	**2.5**	3.5	2.2	**4.5**	6.1
		A1B	0.7	**1.6**	2.4	1.4	**3.0**	4.7	1.9	**4.1**	6.7
		B1	0.7	**1.5**	2.3	1.2	**2.3**	3.6	1.5	**2.9**	4.5
Centre AEZ											
DJF	-1.8	**A2**	0.2	**1.0**	2.4	1.9	**2.8**	4.2	3.3	**4.3**	5.4
		A1B	-0.2	**1.2**	2.2	0.8	**2.7**	4.1	2.1	**4.2**	6.8
		B1	0.9	**1.4**	2.6	1.5	**2.3**	3.7	1.5	**2.9**	4.3
JJA	20.3	**A2**	0.5	**1.4**	2.4	1.4	**2.9**	4.5	2.3	**5.1**	7.0
		A1B	0.6	**1.7**	2.6	1.4	**3.1**	5.0	1.8	**4.1**	6.9
		B1	0.7	**1.6**	2.5	1.2	**2.4**	3.8	1.5	**3.0**	4.8
South AEZ											
DJF	-1.5	**A2**	0.1	**0.9**	2.3	1.4	**2.5**	3.9	3.2	**3.9**	5.0
		A1B	-0.3	**1.1**	2.1	0.4	**2.4**	3.8	1.7	**3.5**	5.0
		B1	0.8	**1.2**	2.4	1.2	**2.0**	3.4	1.4	**2.6**	4.0
JJA	20.4	**A2**	0.5	**1.4**	2.3	1.4	**3.0**	4.3	2.3	**5.2**	6.9
		A1B	0.6	**1.7**	2.6	1.4	**3.2**	4.8	2.0	**4.3**	6.9
		B1	0.7	**1.5**	2.4	1.2	**2.5**	4.0	1.5	**3.1**	4.8

Note: Presented for Three 30 Year Time Slices in the Future for SRES A2, A1B and B1 emissions scenarios Experiments Relative to the 1961-1990 Baseline Period, winter season: DJF – December, January, February; summer season – JJA – June, July, and August.

12. The climate change phenomenon caused by the increase in the average temperature and the decrease in rainfall could have serious effects on the natural ecosystems and human activities. Climate conditions such as those recorded during 2007 and 2012 could become a climatic norm by 2050'-2080', leading to disastrous consequences for agriculture, human health and the national economy.

For 2080', the ensemble models simulate the largest increase especially in winter precipitation from 5.3 % (B1 scenario) to 7.5% (A2 scenario) over the Northern AEZ and the lowest one from 1.5% (A2 scenario) to 0.2% (B1 scenario) over the Southern AEZ.

During summer the ensemble projections forced by A2 emission scenario project the greatest rainfall reduction by 26.4% in the Southern AEZ and the lowest one by 16.1% in the Northern AEZ.

The Model Ensemble projection for B1 emission scenario is quite similar but the magnitude of changes is lower: from 8.4% to 4.6% in comparison to the reference time period 1961-1990 (*Table 4*).

Table 4: Projected Multi-Model Ensemble Seasons (winter, summer) Total Precipitation Changes (ΔP, %) over the Republic of Moldova AEZs, according to SRES A2, A1B and B1 emission scenarios.

Season	Observed *Average* 1961-1990	SRES	*Projected changes by the 2020s*			*Projected changes by the 2050s*			*Projected changes by the 2080s*		
			Min	*Average*	*Max*	*Min*	*Average*	*Max*	*Min*	*Average*	*Max*
North AEZ											
DJF	110.3	**A2**	-0.5	**4.5**	9.0	-29.0	**-0.5**	18.7	0.7	**7.5**	20.0
		A1B	-18.8	**3.6**	32.8	-22.8	**6.2**	44.7	-14.9	**6.5**	40.8
		B1	-18.3	**2.2**	10.3	-17.2	**2.2**	10.0	-22.5	**5.3**	17.6
JJA	238.3	**A2**	-15.6	**0.6**	10.9	-30.8	**-2.7**	7.5	-46.4	**-16.1**	2.1
		A1B	-40.6	**-4.9**	31.8	-45.5	**-7.3**	37.8	-46.7	**-10.1**	35.2
		B1	-13.0	**3.2**	25.4	-28.0	**1.5**	28.8	-36.6	**-4.6**	34.7
Centre AEZ											
DJF	114.1	**A2**	2.8	**7.0**	11.3	-11.9	**2.4**	11.6	-4.7	**4.4**	21.3
		A1B	-12.1	**4.2**	29.6	-18.7	**4.6**	35.6	-8.3	**4.3**	33.6
		B1	-7.8	**3.3**	9.1	-12.5	**1.3**	10.7	-18.0	**3.6**	15.7
JJA	189.6	**A2**	-17.3	**-1.1**	11.0	-35.1	**-11.0**	1.6	-60.2	**-21.9**	0.7
		A1B	-31.9	**-4.8**	37.7	-36.6	**-7.9**	48.6	-57.6	**-11.3**	46.2
		B1	-17.5	**0.1**	28.8	-33.0	**-2.3**	19.9	-38.5	**-5.8**	34.4
		B1	-22.2	**-4.6**	15.6	-26.0	**-2.8**	22.6	-12.8	**-1.7**	17.9
South AEZ											
DJF	113.2	**A2**	4.7	**7.0**	9.6	-7.3	**-0.3**	11.4	-6.6	**1.5**	18.7
		A1B	-19.6	**4.5**	27.9	-28.5	**1.2**	30.1	-19.4	**0.3**	27.4
		B1	-14.8	**1.0**	8.2	-15.9	**-1.3**	11.8	-25.0	**0.2**	13.4
JJA	195.8	**A2**	-17.9	**-0.6**	14.6	-37.6	**-15.9**	3.0	-57.9	**-26.4**	-2.7
		A1B	-25.8	**-1.4**	33.3	-38.5	**-8.4**	40.5	-54.9	**-9.1**	37.7
		B1	-21.3	**-1.0**	22.1	-35.2	**-3.3**	13.3	-40.6	**-8.4**	23.2

Note:
Presented for Three 30 Year Time Slices in the Future for SRES A2, A1B and B1 emissions scenarios Experiments Relative to the 1961-1990 Baseline Period, winter season: DJF December, January, February; summer season – JJA – June, July, and August.

13. Extreme weather events in the future. Projections of climate scenarios for the Republic of Moldova suggest that what is considered as extreme rare events for *absolute maximum* temperatures of 34-35°C for the baseline period of 1961-1990 will possibly become *mean maximum* summer temperatures. Projections for Europe more generally indicate that the risk of floods increases in Northern, Central and Eastern Europe and that today's 100-year

droughts will return every 50 years especially in Southern and South-Eastern Europe, including in the Republic of Moldova (Lehner, B., P. Döll, J. Alcamo, H. Henrichs and F. Kaspar, 2006: Estimating the impact of global change on flood and drought risks in Europe: a continental, integrated analysis. Climatic Change, 75, 273-299).

14. The climate aridisation process. Currently, most of the Republic of Moldova's territory is characterised by a dry or sub-humid climate. According to the Third National Communication of the Republic of Moldova under the UNFCCC (2013), aridisation, which leads to increased incidence of drought, is predicted to intensify noticeably as early as by the 2040sas compared with the period of 1961-1990. Aridity will be more pronounced during June to October during the plant vegetation period.

Section II. Climate Change Impacts by Sector

15. The projected impacts of climate change by sector for the Republic of Moldova are determined based on the risk analysis and opportunities posed by climate change to specific regions of the country.

This analysis has been performed to identify climate risk "hot spots", where more immediate action to adapt to these impacts is required.

16. Risk levels are defined as follows:

1. HIGH – high probability of risk due to possible climate change demands the urgent attention of decision makers to develop immediate measures for adaptation;
2. MEDIUM – medium probability of risk due to possible climate change should be maintained under review; and
3. LOW – low probability of risk due to possible climate change should be maintained under review. It is expected that existing adaptation measures will be sufficient and no further action will be required unless circumstances change.

17. The ranking for opportunities arising from climate change followed a similar approach and definitions:

1. HIGH – high probability of opportunity as a result of climate change to develop new directions in a region;
2. MEDIUM – medium probability of opportunity arising from climate change, should be maintained under review; and
3. LOW – low probability of opportunity due to possible climate change.

2.1. Climate Change Impacts on Agriculture Sector

18. Agriculture is the dominant sector of employment in the Republic of Moldova. 27.5 percent of the active population is currently employed in agriculture (According the National Bureau of Statistics, 2012).

Following the privatization reforms, about 85% of rural families currently hold farmland. The majority of the farms (about 400,000) are small with an average landholding size of only 1.6 to 1.8 hectares.

The Republic of Moldova has seen a dramatic decline in agricultural output, in large part due to the change in subsidies and access to markets, as well as changes in the farming structure, land reform and productivity declines related to soil degradation and a lack of irrigation infrastructure.

19. Unfavourable climate conditions, most notably the severe droughts of 2003, 2007and 2012, have also negatively affected production. These conditions will persist and intensify even without climate changes.

In 2011, agricultural production totalled MDL 21.7 billion in current prices, or only 59.0 percent of the 1990 level. The contribution of the agricultural sector to GDP decreased from 31.2 per cent to 12.2 percent in 2011.

20. Possible climate change impact on the Agriculture Sector. The combination of long-term changes and the greater frequency of extreme weather events are likely to have adverse impacts on the agricultural sector, and these changes often have many knock-on effects at the macro-economic level.

For example direct impacts on agricultural production and declining yields as a result of increased pest and disease problems could further lead to fluctuations in market prices and changes in crops.

21. The combined effect of changes to the water regime could result in insufficient water for irrigation, and increased water competition, which could ultimately result in higher prices and regulatory pressure.

22. Drought will lead to soil degradation, which is a major threat to the sustainability of land resources and may impair the ability of the Republic of Moldova's agriculture to successfully adapt to climate change.

23. Increased salinity may result in land abandonment as it becomes unsuitable for cropping.

The direct climate change impacts and their potential socio-economic consequences that are relevant to agriculture are outlined in *Table 5.*

Table 5. Summary of Socio-Economic Impact of Climate Change on the Agriculture Sector in the Republic of Moldova

Climate Impact Category	Impact on Agriculture	Social/Economic Impact
Increased temperatures, heat stress	Changes in water requirements	Increased demand for irrigation; Decreased yield of crops; and Changes (positive and negative) in distribution, introduction of new varieties of crops.
	Changes in agricultural pests and diseases	Reduced water quality from increased use of pesticides; Decreased yield and quality of crops; Increased economic risk; and Loss of rural income.
	Changes in crop growth conditions	Pollution by nutrient leaching; Loss of indigenous crop varieties; and Changes (positive and negative) in seed production and seedling requirement.
	Changes in optimal conditions for livestock production	Changes in optimal farming systems; and Loss of rural income.
	Changes in crop distribution	Changes in crop and livestock production activities; Relocation of farm processing industry; Loss of rural income; and Increased economic risk.
Change in precipitation patterns	Changes in hydrological regime; Increased water shortages.	Risks of water quality loss; Increased risk of soil salinisation; Conflicts among water users; Increased groundwater abstraction, depletion; and decrease in water quality.
Extreme events – droughts, floods, hailstorms	Changes in soil fertility, salinity and erosion; Crop failure;	Decrease in water quality from nutrient leaching; Decreased income from crops; Land abandonment;

Climate Impact Category	Impact on Agriculture	Social/Economic Impact
	Yield decrease; Competition for water; and Increased risk of desertification.	Increased expenditure in emergency and remediation actions; Decreased food security in areas with low economic development; and Increased food prices.

24. Climate change is expected to bring both advantages and disadvantages for agricultural crops in the Republic of Moldova. Although warmer temperatures would increase the length of the growing season, they could also increase crop damage due to heat stress, changes in precipitation patterns, and pest problems.

25. The analysis of the potential climate change impacts on the key crops in the Republic of Moldova conducted under the Third National Communication of the Republic of Moldova under the Framework United Nations Convention on Climate Change (2013) reveals that the negative effect of global warming in the 21st century, according to projections for the ensembles in ten global climate models imposed by the high emission scenario - SRES A2, medium - A1B and low - B1 will not be balanced by the tendency of slight precipitation increase in the 21st century in the Republic of Moldova. Under these circumstances, unless any adaptation measures are taken, we may have a significant decrease in productivity by 2080' (2070-2099) compared with the recent period (1981-2010): maize grain varying between 49% and 74%, winter wheat between 38% and 71%; a moderate decrease in productivity respectively: sunflower, from 11% to 33%; sugar beet, from 10% to 20%; and tobacco, from 9% to 19%.

26. There are some potential benefits. The longer growing season will potentially increase grass yields, while increased temperatures will increase the potential for growing forage legumes. The longer growing season should also reduce the costs of housing livestock. There may also be benefits for horticulture, both with respect to reducing costs of indoor production and increasing the range of horticultural crops that can be grown outdoors.

27. However, in the Republic of Moldova, most of the impacts on agriculture are predicted to be adverse. Cropping patterns have shifted with declines in the industry, with a move away from high value-added products such as fruit and meat, to an expansion of areas sown with wheat and sunflower, and sugar beet. Increased summer temperatures and drought risk could make it difficult to achieve the potential yield increases from increased concentrations of CO_2 and perhaps threaten current productivity levels. Some crops will be more vulnerable to hotter and drier summers. Yields of vegetables and potatoes, both of which are frequently irrigated under current conditions, are likely to be reduced more than the yield of cereals. The summer growth of forage crops also appears likely to be reduced. An increased frequency of extreme weather events may also lead to crop damage or failure. There may also be problems arising from the introduction of new pests and diseases.

28. A large proportion of soils in the Republic of Moldova's agro-climatic zones are chernozems. These soils have large organic matter content and breakdown of Soil Organic Matter (SOM) is likely to increase with warmer temperatures. While this breakdown will increase soil fertility in the short term (via release of nutrients) in the longer-term soil fertility is likely to be reduced. The result of long-term research undertaken at the national level indicates that during the last 100 years, the content of SOM in arable soils in the Republic of Moldova has decreased, while the average annual air temperature has increased in the same period of time.

29. Changes in the frequency and intensity of extreme events (e.g., droughts, floods and heavy rains) have been identified as the greatest challenge that would face the agricultural

industry as a result of climate change. Extreme events, difficult to both predict and prepare for, can devastate agricultural operations, as has been demonstrated several times in the past.

Drought and extreme heat have also been shown to affect livestock operations. Model projections and observed trends suggest that warming would be greatest during the winter months. Although warmer winters would reduce cold stress, they would also increase the risk of damaging winter thaws and potentially reduce the amount of protective snow cover.

30. Climate warming is also expected to increase the frequency of extremely hot days, which have been shown to directly damage agricultural crops. Future changes in moisture availability represent a key concern in the agricultural sector. Climate change is generally expected to decrease the supply of water during the growing season, while concurrently increasing the demand.In addition to the direct problems caused by water shortages, the benefits of potentially positive changes, including warmer temperatures and a longer growing season, would be limited if adequate water were not available. Water shortages are expected to be a main problem in several regions of the Republic of Moldova in the future.

31. ***Climate change risks and opportunities for the Agriculture Sector.*** An agro-climatic characterization of the Republic of Moldova was used to differentiate potential risks and opportunities from climate change on agriculture by characterizing the country by agro-climatic zones (*Table 6*).

According to the vulnerability assessment of the magnitude of the risks/opportunities of the climate change on agricultural production, the most vulnerable regions in the Republic of Moldova due to possible climate change will be South (the Plain of Southern Moldova, terraces of the inferior Prut and Nistru Rivers) and partly Centre (Sub-zone II-a, the Plain of Central Moldova and Codrii region, and Sub-zone II, Terraces of the Nistru, Prut, Raut, Prut, Bic, Botna, etc. Rivers) for which it was established that the greatest amount of risks is very likely related to climate change.

32. For agriculture in the Republic of Moldova, five of the identified risks in *Table 6* below are considered to be of high priority: increased risk of drought and water scarcity; increased irrigation requirements; soil erosion, salinisation, desertification; increased risk of agricultural pests, diseases, weeds; and basic cereals (wheat and maize) yield decrease. Three of these risks concern the consequences of potential changes in the precipitation pattern, with increased rainfall in winter and decreased water availability in summer.

2.2. Climate Change Impact on Water Resources

33. The water resources of the Republic of Moldova are represented by surface waters and sub-surface waters. With regard to surface waters, there are two major river basins in the Republic of Moldova: the Nistru and the Prut. The natural water regime of the rivers in these basins has been changed by the construction of dams and reservoirs, designed to prevent floods, trap sediment, and provide water for agricultural, industrial and household consumption as well as for fish farming. Ground waters for centralised household and industrial use are withdrawn from ten aquifer complexes.

The sub-surface water grid includes circa 112,000 springs and wells (public and private) and more than 3,000 functional artesian wells. Sub-surface waters are the main source of potable water supply in the Republic of Moldova, for 100 percent of the rural population and 30 percent of the urban population, or 65 percent of the total population of the country. The remaining 35 percent of the population use surface waters as a source of potable water. Approximately 44 percent of the population in the country does not have access to safe drinking water.

Table 6. Priority Risks and Opportunities for the Republic Moldova's Agro-climatic Zones

Detail of magnitude risk/ opportunity		North (moderately hot, semi-humid)		Centre (hot semi-humid)		South (hot-arid)
		Sub-zone I-a, the Plain of Northern Moldova*	Sub-zone I, the Plain of Northern Moldova, front Nistru hills**	Sub-zone II-a, the Plain of Central Moldova and Codrii region***	Sub-zone II, Terraces of the Nistru, Prut, Raut, Prut, Bic, Botna etc. rivers****	The Plain of Southern Moldova, terraces of the inferior Prut and Nistru Rivers *****
Risk	Crop area changes due to decrease in optimal farming conditions	LOW	LOW	MEDIUM	MEDIUM	HIGH
	Wheat and maize yield decrease	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH
	Grapevine general decrease in yields.		LOW[1]	MEDIUM	MEDIUM	MEDIUM
	Fruit general decrease in yields	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH
	Increased risk of agricultural pests, diseases, weeds	HIGH	HIGH	HIGH	HIGH	HIGH
	Crop quality decrease	LOW	MEDIUM	MEDIUM	MEDIUM	MEDIUM
	Increased risk of drought and water scarcity	LOW	LOW	MEDIUM	MEDIUM	HIGH
	Increased irrigation requirements	MEDIUM	HIGH	HIGH	HIGH	HIGH
	Soil erosion, salinisation, desertification	LOW	MEDIUM	HIGH	HIGH	HIGH
	Deterioration of conditions for livestock production	LOW	MEDIUM	MEDIUM	MEDIUM	HIGH
	Flood increase in frequency and intensity	LOW	MEDIUM[2]	HIGH	HIGH[3]	MEDIUM[4]
Opportunity	Crop distribution changes leading to increase in optimal farming conditions	HIGH	HIGH	MEDIUM	MEDIUM	LOW
	Increasing the range of horticultural crops that can be grown outdoors	HIGH	HIGH	MEDIUM	MEDIUM	LOW
	Crop productivity increase	MEDIUM	MEDIUM			
	Grapevine increase in quality		MEDIUM	HIGH	HIGH	HIGH
	Lower energy costs for glasshouses	MEDIUM	MEDIUM	HIGH	HIGH	MEDIUM

Note:

Sub-zone I-a, the Plain of Northern Moldova include districts: Ocnita, Briceni, Edinet, Donduseni.

****Sub-zone I, the Plain of Northern Moldova, front Nistru hills*** include districts: Rascani, partially Glodeni, Balti Mun., Drochia, Sangerei, Soroca, Floresti, Soldanesti, Rezina.

[1]Now grapevine is grown in Rascani, Glodeni, Sangerei and Soroca districts.

[2]Flood increase in frequency and intensity: low - Rascani and Drochia districts; high - Sângerei district.

***** Sub-zone II-a, the Plain of Central Moldova and Codrii region*** include districts: Ungheni, Nisporeni, Straseni, Hincesti.

****** Sub-zone II, Terraces of the Nistru, Prut, Raut, Prut, Bic, Botna etc. rivers*** include districts: the South-West of Glodeni, Falesti, Ungheni, Nisporeni, Straseni, Telenesti, Orhei, Ialoveni, Dubasari, Criuleni, Hinceşti, Anenii-Noi, the Nourthern Cimislia.

[3]Flood increase in frequency and intensity: medium - Glodeni, Falesti, Orhei, Criuleni, Anenii-Noi, Cimislia and low - Dubăsari.

******* The Plain of Southern Moldova, terraces of the inferior Prut and Nistru Rivers*** include districts: Causeni, Stefan-Voda, Ceadir-Lunga, Taraclia, Leova, Cantemir, Cahul, ATU Gagauzia and the Southern Cimislia.

[4]Flood increase in frequency and intensity: high – Leova, low – Stefan-Voda.

At present all towns and municipalities and over 65 percent of rural settlements have centralised drinking water supply systems, but only 50 percent of this type of systems in satisfactory technical condition. The rest needs capital repairs or reconstruction.

34. According to the National Human Development Report (2009/2010), since 1990, because of economic decline, the decline of heavy industry and falling water use in industry and agriculture, the quality of surface water resources has improved in the major river basins – the waters of the Nistru and the Prut Rivers are considered to be clean and moderately polluted. However, the waters of small rivers are highly polluted.

35. Ground water does not comply with the national standard for drinking water; often, water hardness in wells exceeds the standards by 2 to 5 times and more. Furthermore, almost 90% of the samples taken from unconfined aquifers exceed the maximum permitted concentration for nitrate, attributed in large part to increased livestock production in households.

36. ***Possible climate change impact on water resources.*** Climate change is only one of many factors that will determine future patterns of water availability and use. Non-climatic factors could aggravate or attenuate the adverse effects of climate change on water availability and quality, as well as have a significant influence on water demand. Population growth and economic development (and, by extension, changes in lifestyles and diets) will play a dominant role (as highlighted above, economic decline is a significant factor in the stability of water resources to date, and hence water withdrawals will be expected to increase with economic recovery).

37. According to the water-intensive target of national economic development, secure supply for all water users will be threatened by climate-related change in water resources already in the 2020s, when the intensity of surface water use will be close to 100 percent. However, taking into consideration ground water supply as well, the point when water scarcity will become a brake to development is likely to set in after 2030.

38. Non-climatic impacts could be generated through many realms—from policies and legislation to technologies and infrastructure to land-use patterns and agricultural activities/irrigation. The main direct climate change impacts and their potential socio-economic consequences in the Republic of Moldova that are relevant to water resources are presented in *Table 7*:

Table 7. Summary of Potential Socio-Economic Impacts of Climate Change on Water Resources Sector

Climate Category	Impact on Water Resources	Social/Economic Impact
Increased temperatures, heat waves	Annual runoff decrease; Lowering of the groundwater table; and Changes to water quality*.	Reduced water availability for human use; Increase in demand for irrigation; Increased water pollution; Adverse health impacts in low income areas; and Requirement for additional treatment of water for drinking purposes.
Change in precipitation patterns	Changes in hydrological regime; Reduction in stream flow; and Increased water shortages.	Risk of water quality loss; Increased risk of soil salinisation; and Conflicts among water users.
Extreme events: floods, droughts***	Increased dilution and sediment loads; and Increased nutrients, pathogens,	Increased erosion; Damage on infrastructure, land abandonment; and Increased expenditure in emergency and

Climate Category	Impact on Water Resources	Social/Economic Impact
	and toxins transport.	remediation actions.
	Low flows reduce the dilution capacity; Reduced dissolved oxygen; and Increased water shortages	Increased algal blooms, bacterial and fungi content affect human health, agriculture, ecosystems, and water supplies; and Increased risk of desertification.

Note:

*Winter, and especially, transitional months, will be the most affected by water temperature increases. Already by the 2020s, water temperature increases in the Nistru River could exceed 65 percent in March (under SRES B2 scenario). Summer months (especially August) are the most vulnerable to dissolved oxygen (DO). Decreases in DO levels, in combination with the increase in water temperature, affect the ecosystem composition by allowing the invasion of new thermophilic species and dangerous bacteria.

**The coefficient of variation of the stream flow will rise; leading to an increase in the instability of annual flow and an increase in spring and flash floods (the most severe flash flood in August 2008 seems to confirm these assessments). These results are confirmed by European assessments as well: flash floods on the big rivers will increase as an extension of the Central European trend; water stress will grow as a trend common to South-Eastern Europe.

*** The outcomes of climatic modelling show that droughts will become longer and more severe (the drought in 2007 is characteristic in this regard).

39. C*limate change risks and opportunities for water resources.* Although big rivers constitute the main source of water in the Republic of Moldova, access is unequal. The greatest distance between a settlement and the closest water body in the Republic of Moldova is about 6 km. Approximately one quarter of the population (1.03 mil people) live in the 6 km buffer zone of the Nistru and the Prut Rivers; this zone constitutes one fifth of the national territory and contains 23 per cent of the settlements. The rest of the country and population (about 3 million people) have to rely on various supply systems designed to transfer water from these rivers, or rely on local resources of poorer quality. The northern part of the country and the central part to some extent are currently more or less water secure, while the southern part suffers from a natural water deficit. At the same time, medium and long distance water transfer systems are almost non-existent in the south. This region is among the most exposed to water shortages.

Moreover, local surface water resources in the south (and, less frequently, in the central part of the country) are at high risk of depletion in drought years (such as 2007, when several reservoirs on the Isnovat River dried up). In such a way, the geographical location of water users will play the most decisive role in the future in ensuring access to a secure water supply. The area of water scarcity, as it extends northwards, has already reached the most populated areas, which place the biggest load on water resources and are most intensive in water use.

40. The Third National Communication of the Republic of Moldova under the UNFCCC (2013) shows the results of calculations and mapping of climate induced average annual runoff for the three time periods (2020s, 2050s and 2080s), according to multi-model ensemble for three SRES emissions scenarios A2, A1B and B1 in comparison to the baseline 1961-1990 over the Republic of Moldova's Agro-ecological zones (*Table 8*; *Figure 5*).

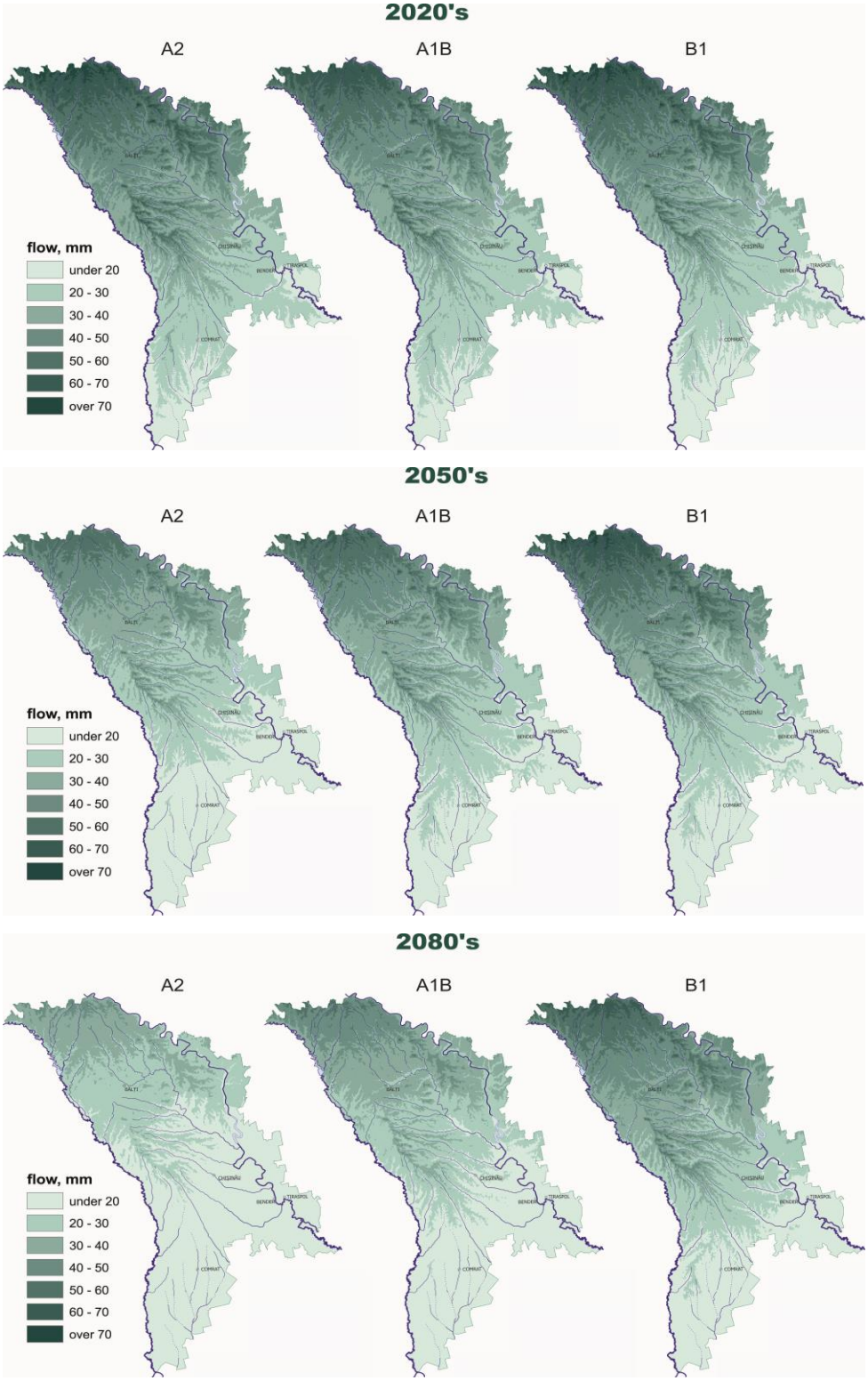


Figure 5: Projected Multi-Model Ensemble Average Climate Induced Annual Runoff (%) over the Republic of Moldova's Agro-ecological zones, based on SRES A2, A1B and B1 emission scenarios

41. The multi-model ensemble average changes in climate induced annual runoff consistently will have the same decrease sign across all scenarios and their magnitude increase from the low GHG emission scenario B1 to the high GHG scenario A2 by the 2080s.

The South AEZ will experience the most significant decrease in climate induced annual runoff from -30.2 (emission model ensemble B1) up to - 64% by the 2080s (emission model ensemble A2).

Table 8: Baseline (mm) and Projected Multi-Model Ensemble Relative Changes of the Average Annual Runoff (%) over the Republic of Moldova's Agro-ecological zones, according to A2, A1B and B1 emission scenarios

Time period	SRES	North	Center	South
2020s	A2	-5.2	-5.0	-5.3
	A1B	-11.3	-9.7	-5.8
	B1	-5.5	-11.1	-14,2
2050s	A2	-26.8	-31.4	-42.2
	A1B	-20.1	-21.9	-23.1
	B1	-9.1	-18.3	-24.4
2080s	A2	-46.6	-55.3	-64.0
	A1B	-33.6	-39.4	-44.0
	B1	-18.3	-22.2	-30.2

42. According to the vulnerability assessment of the magnitude of the impact with the probability of risks due to possible climate change on water resources, the most vulnerable regions in the Republic of Moldova will be South, Centre, and Mun. Chisinau, for which the greatest amount of risks with high probability related to climate change, was revealed (*Table 9*).

Table 9. Priority Risks and Opportunities for Water Resources Sector

Detail of magnitude risk/ opportunity		North	Centre	South	Mun. Chisinau
Risk	Water quality indices (e.g. mineralisation, hardness, dissolved oxygen) affected by higher water temperatures and variation in runoff	LOW	MEDIUM	HIGH	HIGH
	Changes in water demand (increase as a result of population growth, economic development and irrigation requirements)	MEDIUM	HIGH	HIGH	HIGH
	Changes in river flows both increase and decrease	MEDIUM	HIGH	HIGH	HIGH
	Increased risk of drought and water scarcity	MEDIUM	HIGH	HIGH	HIGH
	Increased irrigation requirements	MEDIUM	HIGH	HIGH	HIGH
	Decrease water availability from surface sources or ground water	MEDIUM	HIGH	HIGH	HIGH
	Higher pollution with pesticides and fertilizers to water due to higher runoff	MEDIUM	HIGH	HIGH	HIGH
	Flood increase in frequency and intensity	MEDIUM	HIGH	HIGH	LOW

43. For Water Resources Sector in the Republic of Moldova, eight of the identified risks are considered to be of high priority: (1) increased risk of drought and water scarcity; (2) increased irrigation requirements; (3) flood increase in frequency and intensity; (4) decrease water availability from surface sources or ground water; (5) changes in water demand; (6) water quality indices (e.g. mineralisation, hardness, dissolved oxygen) affected by higher water temperatures and variation in runoff; (7) higher pollution with pesticides and fertilizers to water due to higher runoff; (8) changes in river flows both increase and decrease.

44. The Republic of Moldova's climate has been steadily moving toward drier conditions since the 1990's of the 20th century. Nine significant dry periods or droughts have been recorded since 1990, including catastrophic droughts in 2007 and in 2012 that resulted in losses of up to 70% for major crops such as wheat, maize and sunflower. Drought is becoming endemic in many parts of the country and is increasingly affecting rural livelihoods and development.

2.3. Climate Change Impacts on Health Sector

45. Life expectancy is generally accepted as a key indicator of the overall state of a nation's health. In terms of life expectancy at birth, the Republic of Moldova is presently in a slightly better position than in the pre-transition period of time (in 2012 it was 71.12 years for both sexes compared to 1990 when it was 67.97 years for both sexes).

While the overall health conditions of the Moldovan population have tended to improve in the last decade, the comparative statistics show that the situation in most transition countries improved to a greater extent than in the Republic of Moldova.

46. ***Possible climate change impact on health.*** It is clear that climate change and extreme weather events have a direct impact on health. However, they can also affect forestry, agriculture and the economy resulting in problems related to food security and poor sanitary conditions that can, in turn, lead to serious mid- to long-term health effects. The health effects of drought could, for example, cause a decrease in food production and result in nutritional problems in the population, making them more vulnerable to disease.

In a UNICEF survey conducted in the Republic of Moldova (UNICEF Moldova, "Drought after-effects upon population of the Republic of Moldova", Chisinau, 2007), local leaders anticipated that the most severe impact of the 2007 drought would be its effect on the health of the population. In fact, eight out of ten respondents (and 91% of the medical personnel interviewed) considered that it had already done so. However, the long-term effects of drought may be even more devastating.

47. According to a study conducted by the World Health Organisation (WHO, "Assessment of health security and crisis management capacity", The Republic of Moldova, 2008), the increasing competition for arable land may eventually result in migration to cities and abroad, and conflict as resources dwindle.

The main direct climate change impacts and their potential socio-economic consequences that are relevant to health are outlined in *Table 10*.

Table 10. Summary of Socio-economic Impact of Climate Change on Health in the Republic of Moldova

Climate Impact Category	Impact on Health	Social/Economic Impact
Extreme air temperatures and heat waves	Excess mortality*; Worsened health conditions of people suffering from chronic diseases; Change in food borne disease patterns; Change the distribution of infectious diseases; an Increase in the frequency of respiratory diseases.	Reduced economic growth; Increased burden of diseases and health conditions, including water borne diseases; Population displacement; Increased mental and behavioural disorders due to stress; and Loss of education.

Climate Impact Category	Impact on Health	Social/Economic Impact
Floods	Increased number of deaths and injuries; and Increased water borne diseases.	See above
Drought	Increased hunger and malnutrition.	See above

Note:

*Information on the heat waves of 2007 in Chisinau was used to study the relations between elevated temperatures and excess mortality caused by these events. The authors (N. Opopol, R. Corobov (2010), Excess mortality in Chisinau during the hot summer of 2007. The Proceedings of the National Conference: Health in relation to the environment. Chisinau, 15 October 2010, p.22-33 2010) have revealed that the excess mortality in April-September totalled 190 deaths, or 6.5% of their number in the analogous period of reference years (2000-2008).

The average daily excess deaths above the threshold hot temperatures (about 25°C, 31°C and 19°C for mean, maximum, and minimum daily temperatures, respectively) were in the range of 2.0-4.4% per 1°C temperature increase. Temperature–excess mortality relationships become stronger with an increasing time lag; maximal effects were mainly revealed after one-three days of a heat impact.

48. ***Risks and opportunities of climate change impact on the Health Sector.*** Sub-populations that are most vulnerable to the health impacts of climate change depend on the region, the health outcome, and population characteristics, including human, institutional, social, and economic capacity. Individual vulnerability depends on genetic, developmental, acquired, and socio-economic factors.

In general, the most vulnerable include children, older adults, individuals with chronic medical conditions, disadvantaged groups, and populations highly dependent on natural resources. *Table 11* summarises vulnerable populations by health outcome.

Table 11: Climate-Sensitive Health Outcomes and Particularly Vulnerable Groups

Climate-Sensitive Health Outcom	*Particularly Vulnerable Groups*
Heat-related illnesses and deaths	Elderly, chronic medical conditions, infants and children, pregnant women, urban and rural poor, outdoor workers
Diseases and deaths related to air quality	Children, pre-existing heart or lung disease, diabetes, athletes, outdoor workers
Illnesses and deaths due to extreme weather events	Poor, pregnant women, chronic medical conditions, mobility and cognitive constraints
Water- andfoodborne illness	Immunocompromised, elderly, infants
Vectorborne illnesses	
Lyme disease	Children, outdoor workers
Hantavirus	Rural poor, occupational groups
Malaria	Children, immunocompromised, pregnant women, genetic

49. According to the vulnerability assessment of the magnitude of the risk/opportunities of the climate change on health the most vulnerable regions in the Republic of Moldova due to possible climate change will be in Mun. Chisinau, South, and partially Centre for which as a result of expert judgment revealed the greatest amount of risks with high probability related to climate change (*Table 12*).

50. Six of the identified risks are considered to be of high priority:

1. increase in heat wave-related deaths;
2. increase in air pollution-related diseases;
3. increased risk of allergic disorders;
4. increased risk of drought and water scarcity; and

5. increase the burden of waterborne and foodborne diseases.

One opportunity associated with climate impacts on health exists: reduction in winter mortality from cold.

Table 12. Priority Risks and Opportunities for Health

Detail of magnitude risk/ opportunity		North	Centre	South	Mun. Chisinau
Risk	Increase in heat wave-related deaths	LOW	MEDIUM	HIGH	HIGH
	Increase in air pollution-related diseases	MEDIUM	MEDIUM	MEDIUM	HIGH
	Changes in phenological phases and increased risk of allergic disorders	MEDIUM	MEDIUM	MEDIUM	HIGH
	Increased risk of drought and water scarcity*	LOW	MEDIUM	HIGH	LOW
	Flood increase in frequency and intensity**	MEDIUM	HIGH	HIGH	LOW
	Increase the burden of waterborne and foodborne diseases	MEDIUM	HIGH	HIGH	MEDIUM
Oppor -tunity	Reduction in winter mortality from cold	HIGH	MEDIUM	LOW	MEDIUM

Note:

*Drought reduces water availability for hygiene; drought increases the risk of forest fires; drought reduces food availability in populations that are highly dependent on household agriculture productivity and/or economically weak.

**Flooding disrupts water supply and sanitation systems and may damage transport systems and health care infrastructure; floods may provide breeding sites for mosquito vectors and lead to outbreaks of disease; floods may increase post-traumatic stress disorders.

51. Climate changes do not hit different population groups in the same manner: some groups are obviously more vulnerable than others.

For example, the health care services infrastructure is much less accessible in rural areas, and the rural population has a much higher share of persons who are not registered with family physicians (62% of the total non-registered) as well as a much higher share of those not holding obligatory medical insurance (27.3% of the rural population vs. 19.9% of the urban population). Moreover, every third person who does not hold medical insurance is from the fifth poorest quintile. Secondly, the rural population (around 59% of the total) is much more dependent on the decentralised supply of water than the urban population, and the decline in the quality of water will affect the rural population (one of the most vulnerable group to intestinal diseases is children).

Another important vulnerability is the risk of malnutrition which appears when severe climate events, such as droughts, floods and hails may ruin crops, leaving small farmers with no food and no income meaning that rural populations will face serious nutrition risks (National Human Development Report, 2009/2010).

2.4. Climate Change Impacts on the Forest Sector

52. Forestry ecosystems (represented by forestland and other forestry vegetation) cover only 450.9 thousand ha, or about 13.3% of the Republic of Moldova's territory (National Bureau of Statistics, 2012), and play an extremely important role in watershed protection, while at the same time providing a number of direct and indirect economic and environmental benefits to rural communities: fuel-wood, non-wood products, ravine

stabilisation, landscape beautification and other benefits. Fuel-wood is particularly salient for poorer households, which are unable to afford high household energy costs for gas and electricity.

According to the Third National Communication of the Republic of Moldova under the UNFCCC (2013), the country's forests are primarily concentrated in the central region (60% of the forest estate), with lower coverage in the northern and southern regions (26 and 14 %) (*Table 13*).

The following principle types of forests are represented in the country: oak woods, durmast woods, beech woods, water meadows and mixed varieties woods. The forestry ecosystems are populated by circa 860 species of plants, which account for 43 percent of the total spontaneous floral biodiversity of the country. Of all species of vertebrate and invertebrate animals, about 60 percent can be frequently found in forestry biotic communities. It is also significant that more than 50 percent of all vegetal and animal species included in the Red Book of the Republic of Moldova are part of forestry biomes.

Table 13. Forests distribution in the Republic of Moldova

Geographic zone	Total surface of the zone, thousand ha	Surface coved with forest, Thousand ha	Degree of the forestation, %
North	1,149.4	92.9	8.1
Centre	1,448.8	209.4	14.5
South	786.9	60.4	7.7
Total	3,385.1	362.7	10.7

53. As stated in the Strategy for Sustainable Development of Forestry Sector in the Republic of Moldova, the main function of forest resources is to maintain ecological balance, but the amount of forested area is insufficient to guarantee effective environmental protection. Low forestation has been a major cause of high level of soil erosion, landslides and degradation of water resources; it also intensifies droughts.

54. The main causes of forest degradation are: (a) the increase in illicit cutting due to higher prices for wood and fuel; (b) lack of efficient controls on the part of local administrations; (c) low levels of ecological knowledge and culture; and (d) excessive grazing and lack of adequate forest management.

A long–term, one-hundred-year trend of deforestation has been reversed in the past 50 years and the Republic of Moldova's current forest policy calls for a further increase in forest cover through afforestation and improved community management of forests for direct uses and watershed protection.

55. ***Possible climate change impact on the Forest Sector.*** Researchers expect that even small changes in temperature and precipitation could greatly affect future forest growth and survival, especially at ecosystem margins and threshold areas such as the Republic of Moldova's forests.

Climate change would impact future moisture conditions in forests through changes in both temperature and precipitation patterns. As the temperature increases, water loss through evapotranspiration increases, resulting in drier conditions. Higher temperatures also

tend to decrease the efficiency of water use by plants. In some areas of Republic of Moldova, future decreases in precipitation will accentuate the moisture stress caused by warming. Changes in the seasonality of precipitation and the occurrence of extreme events, such as droughts and heavy rainfalls, will also be important.

For example, treering analysis of oak and ash trees stems in the centre of Republic of Moldova revealed reduced ring growth to as little as 50% of the previous year and compared to the multiannual average of the past 10 years was associated with the 2007 drought (Second National Communication, 2009.).

56. Further are outlined the main direct climate changes impacts and their potential socio-economic consequences that are relevant to forests (*Table 14*).

Table 2-14. Summary of Socio-Economic Impacts of Climate Change on the Forest Sector

Climate Category	Impact on Forest Sector	Social/Economic Impact
Increased temperatures, heat waves	Longer growing season; Negative consequences for species sensitive to temperature changes; and Increases in vulnerability to forest fires.	Decrease in the volume of wood production; Transition to the other forms of energy; and Additional costs to the public.
Change in precipitation patterns	Change in the phytosanitary condition* Changes in species composition; and Changes in the types and incidence of pests and diseases.	Modification of forest habitat's capacity for biologic diversity maintenance, environmental protection and provision of specific socio-economic functions.
Extreme events: droughts, fires, wind storms and floods	Reduced growth and biomass production; Increases in forests fires; and Increased seed mortality rate.	Economic losses in the Forest Sector.

Note:

*During 2010-2039, it is expected that the phytosanitary condition (e.g. plant health) will change significantly in the Northern part of the country where areas with trees drying out will expand by circa 15-25%. In 2040-2069, the change of the phytosanitary condition determined by the trees' drying level in the Northern part of the country will strongly aggravate expanding towards South and South-East. Significant changes under this aspect will take place during 2070 and 2099. In the Northern part the forests will dry out intensely.

57. ***Climate change risks and opportunities for the Forestry Sector.*** The potential lack of summer precipitation with consequent droughts is the main constraint factor on forest growth and productivity. Temperature increase and changes in precipitation are the main factors predisposing forests to various insect pests and fungal diseases. The demand of water during the growing season is normally larger than the amount of rainfall. This indicates that if temperature increase is not coinciding with increased rainfall, water could limit growth to an even larger extent than today. The effect of climate change on individual species can be either positive or negative, depending on the site conditions and regional climate changes.

According to the vulnerability assessment of the magnitude of the impact with the probability of risk due to possible climate change on the Forestry Sector, the most vulnerable regions in the Republic of Moldova will be: South (where there is already the lowest degree of forestation 7.7%), and partially Centre (where there is now the biggest surface coved with forest 209.4 thousands ha, or about 14.5% of the total

geographic zone territory) for which as a result of expert judgment revealed the greatest amount of risks with high probability related to climate change (*Table 15*).

Table 15. Priority Risks and Opportunities for the Forestry Sector

Detail of magnitude risk/opportunity		North	Centre	South
Risk	Changes in species composition *	LOW	MEDIUM	HIGH
	Possible increase in tree mortality	LOW	MEDIUM	HIGH
	Alterations in species competitiveness	MEDIUM	MEDIUM	HIGH
	Negative consequences for species sensitive to temperature changes	LOW	MEDIUM	HIGH
	Changes in the regeneration rate	MEDIUM	HIGH	HIGH
	Changes in species sensitivity to water shortages	MEDIUM	HIGH	HIGH
	Changes in individual tree density	MEDIUM	HIGH	HIGH
	Increase abiotic disturbances caused by fires, wind storms, flooding and drought	LOW	MEDIUM	MEDIUM
	Changes in the phytosanitary conditions	MEDIUM	HIGH	HIGH
Oppor-tunity	Change in biomass production **	HIGH	MEDIUM	LOW

Note:

* Decrease of mesophilic forests areas (beech trees stands, durmast trees stands and oak trees stands) in favour of thermophilic forests of durmast with wig trees and of xerofile pastures.

**Among the mix species the *Hornbeam* and the *Ash* tree may be the most vulnerable species in the new climate conditions determined by climate change. Starting in the first half of the production cycle (2060' for Hornbeam, and 2070' for Ash, respectively) until the end of the century, both species tree may feature a 20-40% decrease in biomass growth.

58. For the Forestry Sector in the Republic of Moldova, seven of the identified risks are considered to be of high priority:

1. negative consequences for species sensitive to temperature changes;
2. changes in the regeneration rate;
3. changes in species sensitivity to water shortages;
4. changes in individual tree density;
5. changes in the phytosanitary conditions;
6. changes in species composition;
7. possible increase in tree mortality.

59. There is one opportunity associated with climate impacts on the Forest Sector: increase in biomass production. *Foul lime* may accumulate over 30% more than normal until 2030', followed by a further decrease in total biomass under environmental change, due to reduced population as a result of species decline; also *Durmast* may in the last quarter of the cycle accumulate 20-40% more biomass than normal, the new climate conditions are favourable for this species, although for the long-term the total production will tend to decrease, due to the decline of this species (Third National Communication, 2013).

2.5. Climate Change Impacts on the Energy Sector

60. Most of the Republic of Moldova's installed capacity for energy is obsolete, and energy inefficiency is high. The losses of energy (electricity and heat) in the transmission and distribution networks have been excessive in the past and are still considerable, affecting adversely the Energy Sector's energy efficiency.

61. Due to organisational and technical measures, the losses in the electricity distribution networks dropped from over 39.9% in 2001 to 9.9-12.4% in 2012 (National Agency on Energy Regulations, 2012). Losses of heat in Chisinau and Balti municipalities are as high as 19.8%. Reducing losses of energy networks remains a priority for the Energy Sector and complies with EU policies. Given the limited capacity to generate energy domestically, the Republic of Moldova is heavily reliant on imports for its energy needs. Energy imports made up almost 95.2% of total energy consumption in 2011 (NBS, 2012). This leaves the country very vulnerable to disruptions and price hikes in foreign energy supply, and can have significant impacts on human development (National Human Development Report 2009/2010).

The breakdown of final energy consumption per sector in 2011 is dominated by the Residential Sector (46.5 per cent), Transport Sector (25.2 per cent), Industry and Construction Sectors (7.9 per cent), Commercial and Institutional Sectors (10.4 per cent), Agriculture Sector (2.9 per cent) and others (7.0 percent). The breakdown of final fuel consumption per type in 2011 was dominated by natural gases (38.6 per cent), diesel oil (20.4 per cent), electricity (11.3 per cent), gasoline (10.3 per cent), coal (7.2 per cent), liquefied natural gases (3.6 per cent), oil fuel (1.4 per cent) firewood (2.7 per cent) ad other types of fuel (4.6 per cent) (NBS, 2012).

The Republic of Moldova has the potential to employ a greater share of renewable sources, including biomass, solar, wind, hydro and geothermal, and these are governed by the 2011-2020 National Programme on Energy Efficiency.

62. ***Possible climate change impact on the Energy Sector.*** As the climate of the world warms, the consumption of energy in climate-sensitive sectors is likely to change. Possible effects of warming, that could be relevant in the Republic of Moldova, include***:***

(1) decreases in the amount of energy consumed in residential, commercial, and industrial buildings for space heating and increases for space cooling;

(2) decreases in energy used directly in certain processes such as residential, commercial, and industrial water heating, and increases in energy used for residential and commercial refrigeration and industrial process cooling;

(3) increases in demand for energy used to supply other resources for climate-sensitive processes, such as pumping water for irrigated agriculture and municipal uses;

(4) changes in the balance of energy use among delivery forms and fuel types, as between electricity used for air conditioning and natural gas used for heating; and

(5) changes in energy consumption in key climate-sensitive sectors of the economy, such as transportation, construction, agriculture, and others.

Changes in supply could also occur. Extreme events extreme temperatures can cause damage to energy supply infrastructure, and development of renewable energy sources is

very dependent on water, wind and biomass potential, all of which are expected to change under climate change. The main direct climate change impacts and their potential social economic consequences in Republic of Moldova are relevant to the Energy Sector (*Table 16*).

Table 16: Summary of Socio-Economic Impact of Climate Change on the Energy Sector

Climate Impact Category	Impact on Energy	Social/Economic Impact
High Temperatures and Heat Waves	Greater demand for electricity for air conditioning. High temperatures reduce thermal generation efficiency Solar cell efficiency reduced by high temperatures Increased water needs for thermal power plants	Access to air conditioning only available to higher income households. Increased demand and peak demand, taxing transmission and distribution systems Reduced energy generated
Extreme events	Increased damage to supply grids. Alteration in wind speed frequency distribution	Threat to electricity transmission and distribution*. Increased uncertainty on energy output
Droughts	Reduced hydro-power production	Hydropower generation can be seriously affected by drought, 10-30% less electricity generati is expected.
	Decrease of biomass yield	Threat to energy production from biomass reductior Potential competition between energy and non-energy crops for land and water resources
Low Temperatures and Freezing	Damage to electricity transportation lines	Loss of power; and Cost of repairing lines.
Decreased cloud cover	Increased potential for photovoltaic (PV) production of electricity	Diversification of energy supply; and Reduced pollution.
Rise in wind speed	Increased wind power generation	Diversification of energy supply; and Reduced pollution.

Note:
*Almost 300 localities suffered power supply disruptions in January 2009 because of strong winds and related events.

63. ***Climate change risks and opportunities for the Energy Sector.*** Although the Republic of Moldova mostly covers its energy needs through imports, the Republic of Moldova's Energy Strategy 2030 envisages strengthening local production capacities by modernising and enhancing the existing combined heat and power plants. Another focus of the effort will be boosting production from renewable sources, such as biomass, solar and wind energy.

However, climate and water availability projections show that some of these plans may be put at risk under climate scenarios. Currently 65 to 70 percent of total water is used in industrial heating and cooling and hydro-energy production. However, as has been shown, water quantity in the Republic of Moldova is quite sensitive to climate change effects. Thus, water scarcity will start adversely affecting national development goals by 2020 if only surface water is taken into account. If ground water is added then water scarcity will become a development obstacle by 2030. Furthermore, one of the climate change effects on water supply will be growing instability in annual water flows: growing short-term oversupply due to spring and flash floods and scarcity due to longer and more severe droughts. Hence, growing water scarcity may become the main obstacle to enhancing local hydro- and cogeneration power production. Furthermore, the climate projections show that the

anticipated worsening of humidity conditions and growing aridisation may result in a deterioration of the ecological-climate conditions for plant growing towards the end of the century. In the longer run it represents a serious threat to energy production from biomass.

According to the National Human Development Report 2009/2010, the anticipated rise in the number of days with temperature over 10°C will mean that building heating will be required for a smaller number of days (in Chisinau centralised heating season starts when daily temperature is below 8°C). At the same time, summers and autumns are expected to become hotter and drier. Therefore, demand for the electricity required to assure air cooling in the buildings is likely to surge. Even without taking climate change effects into consideration, electricity consumption is expected to grow by over 15 per cent by 2020 compared to 2006. Taking into the equation climate change effects on demand could push demand for electricity still higher.

According to the vulnerability assessment of the magnitude of the impact with the probability of risk due to possible climate change on the Energy Sector, the most vulnerable regions in the Republic of Moldova will be: Mun. Chisinau, North and partially South for which as a result of expert judgment revealed the greatest amount of risks with high probability related to climate change (*Table 17*).

Table 17. Priority Risks and Opportunities for the Energy Sector

	Detail of magnitude risk/opportunity	North	Centre	South	Mun. Chisinau
Risk	Increase in damage to supply grids which present a threat to electricity transmission and distribution	HIGH	HIGH	HIGH	HIGH
	Increase in energy used for residential and commercial refrigeration and industrial process cooling	HIGH	MEDIUM	MEDIUM	HIGH
	Changes in the balance of energy use among fuel types	HIGH	MEDIUM	MEDIUM	HIGH
	Growing water scarcity may become the main obstacle to enhancing hydro- and cogeneration power production	HIGH	HIGH	HIGH	HIGH
	Decrease of biomass yield	MEDIUM	MEDIUM	HIGH	
Opportunity	Decrease in energy used in residential, commercial, and industrial water heating	MEDIUM	HIGH	HIGH	HIGH
	Wind speed and direction (wind generate potential and efficiency)	MEDIUM	MEDIUM	HIGH	MEDIUM
	Cloudiness (Solar generation potential)	MEDIUM	MEDIUM	HIGH	HIGH

64. For the Energy Sector, five of the identified risks are considered to be of high priority:

1. increase in energy used for residential and commercial refrigeration and industrial process cooling;
2. increase in damage to supply grids which present a threat to electricity transmission and distribution;
3. changes in the balance of energy use among fuel types;
4. growing water scarcity may become the main obstacle to enhancing hydro- and cogeneration power production; and
5. decrease of biomass yield.

65. Three opportunities associated with climate impacts on the Energy Sector exist: decrease in energy used in residential, commercial, and industrial water heating in Chisinau municipality, Centre and South regions; wind speed and direction may increase wind generation potential and efficiency with high probability in South and to a lesser degree in Centre and North regions; and cloudiness which may increase solar generation potential in South part of the country and in Chisinau municipality.

2.6. Climate Change Impacts on the Transport and Road Infrastructure Sector

66. Transport infrastructure is critical for human development, as it provides a lifeline for delivering key services, and access to markets.

The Transport and Road Infrastructure Sector plays a significant role in the national economy of the Republic of Moldova, its current contribution to the Gross Domestic Product being circa 10.7 percent (NBS, 2012), and it has an increasing trend (from 4.8 percent in 1990, to 10.7 percent in 2011). The sector provides jobs to 67 thousand persons or to 5.7 percent of the employed population of the country (NBS, 2012) and is comprised of the following segments: road transportation, railway transport, air transportation and naval transportation.

Because the Republic of Moldova is geographically small, and landlocked, roads are a key form of infrastructure. Presently, 97.7 per cent of passengers and 84.7 per cent of freight is transported by road (NBS, 2012).

According to statistics (NBS, 2012) only 8,827 km of a total of 9,352 km of roads have any capital pavement, the rest have a so-called “light pavement” and represent mainly the local roads. A number of indicators reveal a very low development standard and poor quality of the roads. According to a World Bank study (World Bank (2002), “Moldova: Transport Strategy Update with Emphasis on the Road Sector”, December 2002.), due to the inadequate condition of the road network, about 40 settlements have no year-round access to the national road network and, during the rainy and winter seasons, are virtually isolated from the rest of the country.

67. ***Possible climate change impact on the Transport and Road Infrastructure Sector.*** Transport Sector is vulnerable to the predicted increase in frequency and intensity of storms (wind, rain, snow), which could result in raised costs related to the construction, maintenance, and operations of transportation infrastructure and vehicles.

Increased humidity and the problems caused by it lead to deterioration of asphalt flatness, shorter roads’ operation time, the need for premature repairs of the asphalt and reduced speed and comfort level of traffic respectively, producing an increase in the vehicle maintenance cost and ultimately a decrease in the roads safety. Heavy summer rains almost stopped vehicular circulation in downtown Chisinau in 2005, 2008, and 2009 causing additional damage to the pavement of city streets, pavement that is already in a poor condition.

Bridges and viaducts also have very serious problems as water penetrates the concrete resistance structure, accelerating the rusting of metal reinforcements. The only solution in this case is to replace the whole asphalt concrete, cover them with a waterproof protective layer and lay new asphalt concrete clothing. This solution is very expensive and would

disrupt the traffic on bridges or viaducts for a long time.

Long-lasting heat waves can also worsen or even destroy the asphalt pavement of the national roads. This phenomenon has already been witnessed both in 2003 and 2007, and 2012, when longer periods of high temperatures were registered. The most serious damage was to the Chisinau-Balti highway. Even on the newly rebuilt Chisinau - Leuseni national highway, long portions of the road were deformed. The roads in Rabnita and Rezina were almost completely destroyed by trucks carrying cement from the local factories.

The increase in temperatures might also affect the daily operation of aircrafts and the length of runway, as runways need to be longer when temperatures are high.

68. The condition of roads after winter is a serious issue for the Republic of Moldova. In regions where the winter temperature varies significantly (for example, from +5-10 °C to -25-30°C), the number of days with such variations is a damaging factor for pavement integrity. The water collected in the cracks and micro-cracks in the surface of asphalt pavement freezes (dilates) and unfreezes (shrinks) repeatedly. If this cycle occurs 20-30 times during winter season, it rapidly reduces the elastic properties and deformability of asphalt concrete, causing the loss of integrity and occurrence of multiple holes.

Below are outlined the main direct climate change impacts and their potential socio-economic consequences in the Republic of Moldova that are relevant to the Transport and Road Infrastructure Sector.

Table 18: Summary of Socio-Economic Impact of Climate Change on the Transport and Road Infrastructure Sector

Climate Impact Category	Impact on Transport	Social/Economic Impact
High temperatures and heat waves	Changes to asphalt concrete integrity, e.g. softening and migration of liquid asphalt; deepening, traffic-related rutting; Deformation of railroad lines; and Vehicle overheating.	Accelerated deterioration of transport infrastructure; Restricted transportation of heavy loads, speed limits; Raised fuel consumption; Limitations on periods of construction activity; and Increased costs of both capital investment and operation and maintenance costs in land transportation systems.
Increase in intense precipitation events	Increase in weather-related delays; Increase in traffic disruptions; Disruption of construction activities; and Disruption of safety and maintenance operations.	Damage transport infrastructure and restrict movement Decreased revenue from transport activities; Disruption to supply of goods; and Increased expenditures on transport maintenance and operation.
Decrease in precipitation	Reduced humidity of the roadbed, especially in spring and autumn; and Restricted development of river transportation.	Reduced risk of landslides and soil erosion; Circulation of vessels impaired; Increased operational costs; and Need for additional engineering works for adaptation.
Less precipitation and higher temperatures in the winter	Effect on local roads that are not covered with an asphalt surface and have shallow roadbeds.	Lower costs for snow and ice control measures on some roads; and Rural communities become separated from the rest of the country during the winter season or in rainy periods.

69. ***Climate change risks and opportunities for the Transport and Road Infrastructure Sector.***

Projected climate changes are likely to have a particularly significant impact on transportation infrastructure because the Republic of Moldova's transportation system was specified to typical weather conditions, and expected changes in climate extremes could push environmental conditions outside the range for which the system was designed.

All modes of transportation are vulnerable to climate change. The impacts will vary depending on the location, mode, and condition of the transportation infrastructure.

For example, Southern areas will be subject to a high magnitude of risks such as highway asphalt rutting, health and safety risks from heat stress to highway maintenance personnel and passengers, as well as overheating of diesel engines, whereas the Northern area may experience lower magnitude of risks (*Table 19*).

Table 19. Priority Risks and Opportunities for Transport and Road Infrastructure Sector

Detail of magnitude risk/opportunity		North	Centre	South	Mun. Chisinau
Risk	Highway asphalt rutting	High	High	HIGH	High
	Health and safety risks from heat stress to highway, maintenance personnel and passengers	LOW	MEDIUM	HIGH	MEDIUM
	Low water levels on inland waterways	LOW	MEDIUM	MEDIUM	
	More airport runway length and fuel needed because of less dense air	MEDIUM			MEDIUM
	Rail buckling due to derailment and malfunction of track sensors and signal sensors, increased travel time due to speed restrictions	LOW	MEDIUM	MEDIUM	MEDIUM
	Thermal expansion of bridges, traffic disruptions	LOW	LOW	LOW	LOW
	Overheating of diesel engines	MEDIUM	HIGH	HIGH	HIGH
	Infrastructure deterioration, travel and schedule delays, loss of life and property, increased safety risks	MEDIUM	MEDIUM	MEDIUM	MEDIUM
	Flooding of roads, rails, airport runways, pipeline systems, bikeways and walkways (frequency and magnitude will increase)	MEDIUM	MEDIUM	MEDIUM	MEDIUM
	Loss of visibility from drifting snow, lane obstruction, treatment chemical dispersion	MEDIUM	MEDIUM	MEDIUM	MEDIUM
Oppor-tunity	Due to higher temperatures the costs of de-icing planes and removing of snow and ice from the runways may fall substantially	MEDIUM	HIGH	HIGH	HIGH

70. Given the weather forecasts, their impacts and risks mentioned above, adaptation to climate change should become an important element in the Republic of Moldova's national policy and in the general development of the country to reduce potential damages, to take advantage of opportunities and react appropriately to climate change consequences.

To assure this, the Republic of Moldova needs to create an appropriate policy and institutional framework, the stakeholders and the public need to be informed and understand the risks, impacts and consequences of climate change to assure an active role in reducing climate change effects and adapting to them. Moreover, adaptation to climate change needs to be integrated in different sectors and at different levels (national, regional, local) with customised approaches for each sector/location so as to develop their resilience to this phenomenon.

71. This was found based on the following **problems** identified in the analysis of climate change policy implementation, requiring the intervention of the Government, namely:

1) ***Institutional capacities***, technical and financial resources are inadequate and do not assure the promotion and implementation of adaptation policies in the Republic of Moldova, and the number of climate change experts is quite limited. No institutional structure exists that would address climate risks and incorporate policy targets and incentives.

2) The ***legal, regulatory and political framework*** practically is not implemented and is not applied consistently. Although climate change is recognised as being of global importance, the Republic of Moldova's national strategic framework does not include integrated measures to mitigate climate change or adapt to its effects. Most strategies, action plans and sectoral programs already approved by the Government, rarely include activities associated with adaptation to climate change. Only some agriculture, energy and forestry strategies have included measures for adaptation to climate change, some of the impacts of climate change are mentioned sporadically in different contexts, but the connection between them and the climate change, and their complex consequences are largely omitted. Multi-disciplinary nature of climate change and incoherent interventions based on sectoral approaches make difficult the development of adaptation strategies and action plans at sector level. Ministries implement various activities at sector level, which are considered a higher priority than climate change adaptation.

3) ***Coordination mechanisms*** related to climate change are not functioning among stakeholders and the Government to assure a high level of representation of all stakeholders, coordination and communication between different ministries in solving sectoral adaptation problems. The lack of an open dialogue is highlighted in the promotion of cross-sectoral coordination of adaptation activities, indifference and inadequate involvement of all stakeholders, particularly of private sector, in addressing the adaptation problems.

4) Mechanisms for ***collecting and disseminating climate information*** are weak, there are no mechanisms for using information to raise awareness and influence the decision-making process, the lack of specific knowledge and the low level of awareness of policy-makers and civil society on issues related to climate change and adaptation at the sector level.

5) Most often, academic institutions lack the needed tools and qualified personnel to carry out comprehensive ***research and studies*** on vulnerability and adaptation to climate change. A number of research studies and research visits to international performance centres on the assessment of climate impacts and adaptation to climate change are needed.

6) The ***financial resources*** for climate change adaptation measures are limited. There are no mechanisms to identify and mobilise the national and international funding for climate change adaptation and to assure that funding flows to local level facilitate adaptation actions. Technological innovations are too expensive or too complicated to be properly implemented in the Republic of Moldova without external assistance of donors and key partners. The presence of more pressing problems, political and/or socio-economic ones

shifts the focus in the allocation of financial resources from the budget ignoring the climate change adaptation problems.

7) A high ***vulnerability*** of key sectors to current and future risks/opportunities of climate change, are outlined, while these risks are not identified for all sectors of the national economy and fields of activity. The country's development path is not climate change resilient, especially in areas with high climatic risk (heat stress caused by high temperatures, changes in precipitation patterns and frequency of extreme events such as droughts, floods, hail, etc.). There are a number of highly vulnerable population groups that are unable to adapt independently enough. Periodic losses of economic benefits and jobs occur as a result of natural disasters, including the ones caused by climate change.

III. VISION, GOAL AND OBJECTIVES

72. Climate Change Adaptation Strategy of the Republic of Moldova provides for an integrated vision on the development opportunities of the Republic of Moldova in a resilient manner to the impact of these changes, and is underpinned by an in-depth study of future climate risks and impacts of climate change on vulnerable sectors. In this regard, it will strengthen and guide the sectoral approach that is characteristic to climate risks, climate change impacts on vulnerable sectors such as Agriculture, Water Resources, Forestry, Health, Energy, Transport and Road Infrastructure, and the adaptation of these sectors to potential climate changes.

73. The **vision** of the Climate Change Adaptation Strategy has as a prerequisite a mechanism for adaptation to actual and potential climate change impacts, integrated and implemented across all sectors of the national economy so as to reduce vulnerability and increase resilience to the effects of these changes.

74. The **goal** of the Strategy is to assure that *the Republic of Moldova's social and economic development is less vulnerable to climate change impacts by becoming more resilient.*

75. The **general objective** of the Strategy is oriented towards "***Increasing the capacity of the Republic of Moldova to adapt and respond to actual or potential climate change effects***".

76. The **specific objectives** of the Strategy are:

1) Create by 2018 the institutional framework in the field of climate change that would assure the efficient implementation of adaptation measures at the national, sector and local levels. The adaptation capacity of a country is defined by the total number of tools, resources and institutional structures needed for the effective implementation of climate change adaptation measures. A strong institutional basis will create a platform for developing the capacities and strengthening the cross-sector coordination, and for removing the barriers to innovation and effective climate change adaptation actions at the national, sector and local levels. A strong policy, legislative and institutional framework for climate risk management is needed to sustain the capacity to implement specific measures at sector level, based on a reasonable understanding of the risks;

2) Create by 2020 a mechanism to monitor the climate change impacts, the related

social and economic vulnerability and for the management/dissemination of the information on risks and climate disasters. Research on climate change is evolving continuously. Periodically, based on them, new projected scenarios of climate evolution will be proposed. They will be based on improved models that will more accurately forecast climate change and provide a more detailed picture of the regional and local effects. At the starting point of climate resilience promotion, the climate hazards and impacts, and the physical, social, economic and environmental vulnerabilities to this impact should be known to undertake effective and timely actions. Decisions should be taken in light of the best available information, to assure that any action is climate resilient. There are a number of ongoing initiatives in the Republic of Moldova in this regard, which can serve as a basis.

3) Assure the development of climate resilience by reducing at least by 50% the climate change risks and facilitate climate change adaptation in six priority sectors by 2020. Adaptation requires actions at all levels – local, regional, national and international levels, and across all sectors. The challenge for adaptation is to increase the economic and ecological systems' resilience and reduce their vulnerability to climate change effects. Climate resilience can be achieved not only by introducing specific adaptation activities, but also through a detailed review of the current and planned activities that can mainstream climate risks to avoid adaptation failures and assure that the planned investments are as profitable as possible.

IV. COURSES OF ACTION

77. The long-term forecast carried out based on the applied climate models show that climate change will continue to vary according to geographical parameters, emphasising the need to have a well-founded local adaptation approach to these changes. The estimated evolution of climatic factors determined based on the studies developed according to climate scenarios fully justifies the need for urgent climate change adaptation actions, further research to assess the opportunities and support emergency actions, institutional cooperation and raising the awareness of authorities and population.

This Strategy is intended to serve as an umbrella strategy that creates the enabling environment for specific sectors and ministries to "mainstream" climate change adaptation and risk management in their existing and future strategies and action plans, to prevent the adverse effects of climate change and maximise the opportunities provided by them.

While the tasks are complex and solutions are often drastic, and while there is no certainty on the magnitude and speed of climate change, public authorities, businesses, NGOs and citizens should take effective actions and cooperate to achieve concrete results to achieve the objectives.

78. Specific objective 1: Create by 2018 the institutional framework in the field of climate change adaptation that would assure the effective implementation of adaptation measures at the national, sector and local levels. The objective will be achieved through the following courses of action:

1) Develop the institutional framework in the field of climate change adaptation. The Climate Change Adaptation Strategy of the Republic of Moldova focuses on developing and strengthening the national institutional framework needed to initiate the process of developing sectoral action plans and stimulate effective adaptation actions at sector and

community levels.

At the national level, the Government should create a strong institutional structure and the environment that would enable advocating for climate change adaptation across all sectors and at all levels of implementation. For this, an assessment of capacity building needs will be conducted at the national and local levels to identify those fields where capacities are strong and areas where climate risk management capacities are missing (e.g., the level of knowledge about climate, management capacities to respond to the climate change, financial capacities to undertake adaptation measures and mechanisms to coordinate their implementation).

Given the fact that the Ministry of Environment does not have a special structure that would develop and promote an effective climate change policy, the capacity building becomes indispensable to this ministry by creating a division specialising in climate policies. Considering the need to integrate climate change aspects in sectoral development policies, climate change units will also have to be created in the line ministries and provide these institutions with adequate financial resources.

The Governmental Decision no. 1574 of 26 December 2003 on the "*National Commission for implementing the United Nations Framework Convention on Climate Change*, as well as the mechanisms and provisions of the Kyoto Protocol" (hereinafter - the National Commission), originally created only to approve the mitigation and adaptation projects under the Clean Development Mechanism of the Kyoto Protocol, will be reviewed to develop powers and functions of this Commission in climate change adaptation.

It is also necessary to strengthen and assure the functioning of Inter-ministerial Working Group on Climate Change, as a forum for discussion at technical level of the future adaptation and mitigation plans at the sector level, adaptation and mitigation projects and other initiatives related to full implementation of national commitments under the United Nations Framework Convention on Climate Change.

The long-term forecast performed applying climate models show that climate change will continue to vary. All information about the projected scenarios of climate developments need to be regularly updated, and new scenarios based on improved climate models are needed, obtained through research projects. This will create a *Working group for climate modelling*, where will be delegated representatives of ministries, Climate Change Office, State Hydro-meteorological Service, academic institutions, university centres, National Centre for Natural Disasters and other institutions involved in climate science and climate change impacts assessment to identify the needs and assure continuous improvement of climate models, and coordinate the research activities in the field.

To assure a regular exchange of information needed to assess climate risks and their impacts at cross-border level, and operation of a regional system of early warning on climate and natural hazards, a *Regional coordination body with neighbouring countries will be established* (Ukraine and Romania) and a mechanism for its operation will be developed.

Building the capacities of governmental institutions to manage and integrate climate change adaptation in sectoral development policies and sustainable practices to be implemented at national and local levels will be initiated at the beginning of the implementation of this Strategy. A training program will be developed and implemented on

building the capacity to integrate climate risks and disasters in sectoral policies and sustainable practices related to climate change adaptation methods, adapted to the needs of local and national levels, and sector-specific issues, accordingly.

2) Mainstream climate change adaptation in the sectoral policies of national economy. Responding to the risk posed by climate change will require coordinated and focused efforts of the Moldovan Government in view of promoting policies and measures at national and sector levels to prevent adverse climate change effects. In particular, the national policy framework should not only support, but also stimulate and increase the effectiveness of responses to climate change at all levels.

Climate change adaptation is an ongoing process; for this reason, each ministry needs to develop strategies and/or action plans on climate change adaptation to address climate risks as part of the policies and activities planned at sector level.

Mainstreaming climate change risks and adaptation into the national framework requires several steps to assure that information about climate-related risks, vulnerability, and options for adaptation is incorporated into planning and decision-making in key sectors as well as into existing national assessments and action plans. Broadly speaking, these steps include:

a) Understand climate risks and existing knowledge on climate change adaptation. Government policies, programmes and priorities are unlikely to result in actions that prevent or reduce climate impacts unless they are built upon a strong understanding of the main risks posed by climate change, and incorporate the lessons learned from adaptation action that has already been taking place. Relevant stakeholders, such as sectoral research and development institutions, need to be involved to understand the latest thinking on climate risks and key hotspots (based on relevant analysis and scientific research as it comes out). Key sectoral policy documents will need to be analysed to identify risk areas with regard to climate change and the main points for modification/intervention.

b) Assess institutional and policy implications of key threats posed *by climate change.*The overall approach to managing climate risk, both in national development plans as well as in more specific sectoral policies, creates a platform and framework for action at the meso and micro levels, and is critical for creating a strong enabling environment for adaptation in communities. The national level policy framework can be strengthened by identifying existing objectives and priorities that may be at risk from climate change, and modifying these priorities to be more climate-resilient. In this regard, key government development and sectoral policies, as well as planned projects and activities will be reviewed, assessing their goals and objectives through a climate lens to determine those areas of current policy/projects that are most at risk to climate change. Capacities will be assessed and options will be identified for climate risk management at national and local levels, and where they do not exist, risk management decision-support options and adaptation priorities will be developed. These options may be at the policy level, may relate to activities such as capacity building or establishing institutional structures, and/or may include adaptation activities at a local level.

c) Amend the existing and develop new sectoral strategies and action plans that are climate-resilient. Sectoral policies and action plans that account for climate change impacts

will result in actions that are sustainable and viable under climate change, assuring that government budgets are spent to maximum benefit on activities that are viable in the longer term. This enabling environment at the national level is critical to facilitating autonomous and planned adaptation at the local level. Building on the previous two steps, activities and amendments to policies will need to be prioritised according to priorities, and appropriate bodies/processes need to be involved to amend the existing strategies and action plans. Sectors that have high risk activities need to be identified in terms of climate impact and a comprehensive sectoral policy development needs to be initiated through climate change adaptation perspective. For sectors where these risks have been identified, and where it will not be possible to mainstream climate change adaptation measures into current policies, ministries will develop strategies and/or action plans for risk mitigation and climate change adaptation.

To assurer the implementation of these policies, actions on identifying funds for adaptation, creating mechanisms for performance coordination and monitoring will be needed. This process is not linear, that is why it requires that new information on climate risks and adaptation approaches be continuously integration to minimise the impacts.

The implementation of climate change adaptation measures while assuring the sustainable development and economic growth also requires the improvement of the existing legal framework, the development of efficient financial instruments to implement these measures and a change in the behaviour and attitude to consumption mode and generation method. Thus, all relevant legislative acts will be reviewed to identify fields that do not enable the existing or potential adaptation activities, the legislation will be amended or new legislative and regulatory acts will be developed to assure that legislative and regulatory frameworks facilitate climate change adaptation at all levels, including autonomous adaptation of individuals, communities and private sector.

3) Develop the communication and the institutional cooperation in view of implementing adaptation policies.

In the spirit of joint action stemming from the Strategy's general objective, public authorities will establish clear objectives and jointly achieve them, to protect the Republic of Moldova against the negative effects of climate change. They will propose measures and solutions and will implement actions under the leadership, guidance and coordination of the Ministry of Environment, in accordance with the national priorities and the European Climate Change Adaptation Policy and the obligations of the Republic of Moldova under the Moldova-EU Association Agreement to implement these policies. Following the courses of action set out in this Strategy, decision makers and those who assure its implementation in all priority sectors should cooperate effectively to assure a secure future.

Since governmental institutions cannot assume themselves the responsibility to implement of climate change adaptation measures, the whole society should be ready to respond to requests by going through a transition process of changing attitudes and actions, from a reactive to a proactive approach to a climate change mitigation policy, fully accepted, adopted, implemented, and continuously updated by the Government. Public authorities need to focus on the cooperation with the business community, NGOs and academic/scientific community and combine the expertise and resources to raise the

awareness and willingness to act. Public authorities need to assure the creation, sharing and dissemination of knowledge, as well as the exchange of best practices in all priority sectors. The development of public-private partnership will encourage for increasing the effectiveness of the approach specific to a field. Regional and international cooperation will be also developed, and as long as the provision of financial resources is limited, collaborative relationships with donor financial institutions will be developed.

The main instrument for strengthening the cross-sector coordination will be Communication Strategy on climate change adaptation, which will establish an effective mechanism to disseminate, among relevant ministries, the information on implementation of climate change adaptation strategies, and as a feedback link inclusive, to have a two-way information flow.

79. Specific Objective 2: Create by 2020 a mechanism for monitoring the climate change impact, related social and economic vulnerability, and managing/disseminating the information on climate risks and disasters.

Mid- and long-term weather forecasts for the Republic of Moldova justify the call of this Strategy to immediate actions. Climate models show that annual average temperatures will continue to rise steadily, especially in summer and winter. Thus, all information on projected scenarios of climate developments needs to be constantly updated so that the database on climate change adaptation permanently provides cutting-edge information.

Adaptation involves innovation in technology, physical interventions, administrative relations, new regulations and intelligent solutions in accordance with the characteristics specific to dynamics and to development processes.

Optimal development and implementation of climate change policy adaptation requires effective research to base the decision-making process on adaptation policies and measures, actions and solutions, and provide the stakeholders with an optimal way of achieving the objectives. Given the fact that climate change research constantly evolves, new scenarios based on improved climate models will be regularly developed that will more accurately forecast climate change and will provide a more detailed picture of the regional and local effects. The results and conclusions of updated climate scenarios will be a common basis for research, studies and measures, actions and planned adaptation solutions for various sectoral and natural systems.

More information is needed to properly overcome uncertainties with regard to climate change and its impacts. Assuring thorough research activities related to the creation of a national database containing climate change information is essential to substantiate the climate change adaptation measures. Creating a national database is a key element for developing policies, strategies and sectoral action plans; it will contain full information on the future evolution of climatic factors such as temperature, rainfall regimen, etc., including their variability and the occurrence of extreme weather events.

Additional efforts are needed to increase the level of awareness of governmental institutions and private sector representatives to provide an adequate general level of information and to create public support for climate change adaptation policy. Climate change consequences will be felt by every citizen and at all administrative levels. Public authorities, companies, NGOs and citizens must have as full as possible knowledge on the

socio-economic and environmental impacts of climate change in the next period. With a high level of awareness, all these parties will play an active role in mitigating climate change. The success requires initiative and energy, as well as adequate capacity to act.

This objective will be implemented in 3 courses of action:

1) On-going monitoring and research of climate change impacts, related social and economic vulnerability, and regular updating of climate scenarios.

Continuous monitoring of climate change impacts at the national level allows for identifying the most likely evolution in this field, and providing opportunities for immediate action and decisions at the administrative level.

As accurate as possible knowledge on potential climate change effects on economic and social sectors in our country is needed to adopt effective climate change adaptation measures. Research activities need to be implemented on the following priorities:

a) determine the vulnerability of sectors, regions and natural/anthropogenic systems when extreme weather events take place;

b) identify the climate change evolution, as close as possible to the regional and local levels, and develop climate maps to identify at-risk areas in the Republic of Moldova to undertake priority actions inclusive.

c) develop climate scenarios (average conditions and various extreme weather events) that are based on regional climate models, and assess the uncertainties related to such scenarios;

d) carry out research on climate change impact on sectors, regions and natural/anthropogenic systems.

National research on climate change will be linked to international research efforts and will apply the knowledge gained at this level. Experienced research institutes will be encouraged to participate in supporting the development of the national climate change policy. Since most research institutes conduct studies only on a contractual basis, adequate financial resources are crucial for conducting climate change research, and collaborative relationships will be developed with international financial institutions as long as financial resources remain limited for a long time.

A major emphasis will be placed on building the capacities of Working Group members for climate modelling to develop climate models and perform impact assessment studies, for example, by facilitating the exchange of experience and research visits to international climate modelling centres.

It is equally important to monitor the climate change impact and conduct research in *priority sectors* such as: Agriculture, Health, Forestry, Energy, Transport and Road Infrastructure, Water Resources etc.

In the ***Field of Agriculture,*** research needs to address not only change in temperature and precipitation and its impacts on agriculture, but also the interaction with hazards, directly or indirectly arising from atmospheric conditions, such as rainfall, flood, frost, drought, hail, heat waves, seasonal shifts (length of growing season, budbreak, quality aspects), and changes in pest and disease patterns. Crop specific evaluations should be conducted to determine changes in seasonal development, characteristics of production, cultivation methods, etc., under climate change. Crop models are required to assess the

impacts of climate change and increased atmospheric concentration of CO_2 on various crops, pastureland and livestock. Further, crop simulation models need to be interfaced with Geographic Information Systems (GIS) in order that these models can be applied for regional planning and policy analysis. In addition, a variety of approaches, such as economic regression models, microeconomic and macroeconomic models, and farm models should be used.

Research needs in ***Health Sector*** should assess risks, vulnerabilities, and climate change impacts on public health. Quantitative research is required to identify the regions of the Republic of Moldova most vulnerable to the adverse health effects of climate change. These areas will require focused adaptation measures, including better health clinics and tools, education of the public in these areas about how they can cope with new health concerns. Improved disease burden estimates need to be established, based on latest climate models to estimate (i) heat-related mortality statistics based on existing mortality and population data at the national level and in key cities of the Republic of Moldova; (ii) the impacts of projected changes in climate, taking into account various forms of acclimatisation/adaptation; and (iii) climate - water and foodborne diseases relationships using panel data on income and health to project cause-specific deaths and disability-adjusted life year (DALY) rates by demographic group. Further in depth studies on the socio-economic assessment of climate change in the health sector would be beneficial, including: (i) the health 'damage' costs of climate change under different mitigation scenarios; and (ii) the costs of preventing death, illness and injury under different mitigation scenarios (i.e. adaptation measures).

The research of climate impacts on ***water resources*** should focus on: (i) defining critical thresholds in water resource; (ii) improving the capacity to calibrate state-of-the art rainfall runoff models; (iii) understanding of the economic and social impacts of climate change on water quantity, supply, and demand including irrigation, drinking-water supplies, recreation/tourism, hydropower and industry, and system losses. The capacities of developing and implementing systems of hydro-economic assessment of river basin will be enhanced to assess the further development of water resources and the related sustainable development, such as hydro-electric development, waste treatment and irrigated agriculture. On-going or planned pre-feasibility or feasibility studies for irrigation and land use projects are needed (including from groundwater sources), and should be required to include an assessment of the physical and economic impacts of climate change.

Assessments and analyses on social, economic and environmental costs and benefits of future adaptations will be performed.

Research needs in the **Field of Forestry** include: establishing the climatic thresholds that correspond to the distribution limits of a forest type or species and develop a bioclimatic model to predict future steady-state forest distributions under a range of plausible climate change scenarios; collecting historical analogues and life-history information to estimate how long it might take for the forest boundary to migrate a given distance; calibrating a biogeochemistry model to predict changes in productivity and carbon stocks in each forest type, with and without the effects of elevated CO_2 concentrations, evaluation of adaptive capacity including the inherent adaptive capacity of trees and forest

ecosystems and the socioeconomic factors determining the ability to implement planned adaptation measures.

Research needs in the ***Energy Sector*** include: assessing the possible effects (both positive and negative) of climate change on energy consumption: (i) effects of climate warming on energy use for space heating; (ii) effects of climate warming on energy use for space cooling; (iii) market penetration of air conditioning and heat pumps (all-electric heating and cooling), and changes in humidity; conducting studies possible effects on energy generation and supply: (i) assessment of impact of increase temperatures and droughts on hydro energy potential; (ii) impacts of climate change on energy generation from biomass; (iii) wind resources changes (intensity and duration); and (iv) electricity transmission and distribution; research on efficiency of energy use in the context of global warming, with an emphasis on technologies and practices that save cooling energy and reduce electrical peak load.

Research needs in ***Transport and Road Infrastructure Sector*** include: *examining the long-term impacts of climate change on the Transport Sector in light of climate change projections to determine whether, when, and where the impacts could be consequential, particularly in light of the long planning horizons for transport infrastructure; analysing options for adapting to these impacts, including the possible need to alter assumptions about infrastructure design and operations, the ability to incorporate uncertainty into long-range decision making, and the capability of institutions to plan and act on mitigation and adaptation strategies at the state and regional levels.*

The promoted studies on climate change and on the vulnerability to its effects enable better knowledge about sectors, ecosystems and regions that are particularly exposed to climate change, facilitating the identification and promotion of vigorous and effective actions for mitigating the adverse effects of climate change in our country. The findings of these studies will substantiate the adoption of planned adaptation measures and will help to increase the domestic adaptation capacity in line with the achievement of objectives and national sustainable development and environmental protection priorities.

2) Create a climate change database.

Research and studies promoted in the field of climate change and vulnerability to its effects continuously produce new information enabling better knowledge of sectors, ecosystems and regions that are particularly exposed to climate change, facilitating the identification and promotion of vigorous and effective actions of mitigating the negative effects of climate change in our country. Given the amount of information found in the continuous evolution process, the Ministry of Environment will coordinate the creation of a national climate change database, acting in this regard jointly with the research institutions, academia, universities and NGOs.

This database will contain full information on the future evolution of climatic factors such as temperature, rainfall regimen, etc., including their variability, and the occurrence of extreme hydro-meteorological events. From this point of view, the climate change scenarios currently available in the country will be regularly updated according to technical evolution of mathematical models at the global and regional levels, and will be made available to the interested public.

To create at the first stage a climate change database, all available information in the field will be collected (research, measures and policies, including regional and international ones for climate change adaptation) and will identify areas where this knowledge is missing. At a later stage, this database will be completed and organised in a systematic manner so as to be easily accessible to stakeholders. Then, the database will be expanded at the local level, as authorities at this level are the ones who often implement measures which are not part of the central governmental structures' duties.

A model of creating this database is the Clearinghouse mechanism, developed at European level that will be a tool for collecting and disseminating climate change information, data and case studies, and will also help to increase the coordination between the relevant sectoral policies.

Capacity building and strengthening of the national system of statistics collection/monitoring, reporting, to assure adequate management of electronic databases for periodic hydro-meteorological and climate information and other data needed to assess climate risks and impacts, will be considered some of the important elements for assuring the implementation of the national climate change adaptation policy.

3) Raise the awareness of all stakeholders, especially of population with problems, on climate change risks and adaptation measures.

Mitigation of climate change effects is a general responsibility of the whole society, while adaptation objectives require a phased approach, based on experience and innovative spirit related to transparent communication on the undertaken actions. Adequate understanding of the effects posed by climate change (speed, magnitude, impact, etc.) is an essential condition for the development of effective climate change adaptation policies and measures, and helps to develop more effective financial and economic tools that support their optimal implementation. Therefore, the exchange of knowledge and experience with other countries, raising public awareness on the need to adapt to climate change effects will be a priority throughout the implementation of the Strategy.

To implement climate change adaptation policies, the whole society together with public authorities, companies and NGOs, will assure an appropriate level of knowledge about climate change and its expected effects. The awareness on the need to promote climate change adaptation measures will facilitate the needed shift in attitudes and behaviour, and will improve the overall capacity to mitigate climate change effects. Awareness raising actions will be developed based on the need to change the attitudes and behaviour towards the use of natural resources, environmental protection and especially to climate change and the urgency of climate change adaptation actions.

At the same time, inclusion of climate change adaptation issues in the curricula at all levels and in the professional training process plays a very important role in the development of appropriate attitudes, so that young people and children have access to information on disaster and climate risk, appropriate emergency response and long-term adaptation options.

To achieve this goal, an effective awareness campaign will be conducted on climate change adaptation issue, on the potential and the current risks and threats associated with climate change and on the needed preventive actions. Raising the awareness level,

disseminating information and proper training are essential elements in the decentralisation of the efforts of identifying and implementing specific adaptation measures. The promotion and implementation of the Strategy on communicating climate change impacts and possible responses to them will be of particular importance in this regard, including a public information and awareness campaign through appropriate mass-media. An early warning system on natural disasters of climatic origin will be created, by providing access for public to data and information needed to assess the climate risks and impacts, as well as the publication of regular monitoring reports as part of the strategy for communication of climate change impacts. By assuring the appropriate level of awareness and sensitivity, obvious behavioural changes are expected in society and at the community level.

80. Specific Objective 3: Assure the development of climate resilience by reducing at least by 50% the climate change risks and facilitate climate change adaptation in six priority sectors by 2020.

Climate change adaptation process will take place in different sectors and at different levels (national, regional, local) with a customised approach for each sector/location. As climate change has a different impact across the sectors and at different levels, measures on adaptation to climate change effects will also be different but will respect the same parameters.

Coordination between measures is particularly important to prevent the implementation of inadequate adaptation measures (for example, cross-sector coordination) thereby giving assurance that the proposed/implemented measures do not interfere with each other. Moreover, coordination can be achieved through synergy between measures that enhance, on the one hand, the relevance and impact of measures and reduce costs, on the other hand. An integrated approach leads to balanced assessment of the various interests and to an appropriate response. Also, measures of adaptation to climate change effects must be synchronised and combined, as efficiently as possible, with measures for reducing greenhouse gas emissions.

To provide viable sectoral solutions, adaptation will be mainstreamed in planning the development of the given sector and will be achieved by close cooperation between stakeholders. In this regard, adaptation measures will be mainstreamed in the current sectoral policies, or new Strategies and/or Action Plans for risk mitigation and climate change adaptation will be developed.

Thus each relevant sector will identify and implement specific measures taking into account:

1) assessment of the current stage (actions undertaken, their results, etc.) and experience gained;

2) general objectives, intermediate objectives and measures to be taken to achieve them;

3) indicators to monitor the progress of their implementation;

4) present and future research needs;

5) available and needed resources;

6) the institutional framework for implementation, and allocation of responsibilities;

7) risk management tools;

8) the best practices for the integration of climate change adaptation measures in the development of national policies.

If necessary, the legal framework, regulations and financial instruments will be amended to implement climate change adaptation.

Development and implementation of all climate change adaptation measures will be coordinated by the Ministry of Environment and achieved by line ministries.

Priority sectors to be framed primarily in the climate change adaptation policy are: Agriculture, Water Resources, Health, Forestry, Energy, and Transport.

81. Course of action no. 1. ***Risk reduction and climate change adaptation in the Agriculture Sector.***

To reduce risks and provide conditions for climate change adaptation in the Agricultural Sector, actions will target the most efficient conservation of soil water in winter, and maintaining water supply in summer. A big part of the adaptation research in the Agricultural Sector will be focused on actions to combat the projected water scarcity in the future. Adaptation options, such as water conservation measures and adjustment of planting and harvesting periods could have an essential role in reducing losses associated with future moisture limitations. Other studied adaptation options include the introduction of new varieties and hybrids, for example, with greater resilience to drought and heat, and developing policies and practices to increase the flexibility of agricultural systems. Some more precise definitions of critical climate thresholds will also be beneficial for adaptation planning.

1) At the national level it is necessary to:

a) identify vulnerable areas and sectors and assess the needs and opportunities of alternative crops, and change varieties as a response to climate change;

b) support agricultural research and experimental production for the selection of crops and development of the best varieties that are better suited to the new climate conditions;

c) improve the capacities for the adaptation to climate change effects through raising the awareness of stakeholders with agricultural advice and essential information on farm management;

d) assure increased investments in efficiency of irrigation infrastructure, aqua-technologies and improvement of water resources management;

e) develop irrigation plans based on a careful assessment of their impact, future water availability and water needs, taking into account the supply-demand balance;

f) create some tools for risk and crisis management to cope with the economic consequences of climate related events.

2) At the farm level, several elements of adaptation to climate change effects are extremely important, such as:

a) adaptation of periods during which agricultural activities are carried out;

b) develop technical solutions to cope with extreme weather events, to protect the crops and livestock (gardens/orchards against frost);

c) improve ventilation and air conditioning systems of livestock rooms, etc. and of

rural and urban communities;

d) choose crops and varieties better adapted to changes in the growing season and to water availability, as well as greater resilience to new climate conditions;

e) crops adaptation by using the existing genetic diversity and new opportunities provided by biotechnology;

f) increase the efficiency of pest and disease control;

g) efficient use of water by reducing water losses, improving irrigation techniques, water recycling and storage;

h) improved soil management by increasing water retention to maintain soil moisture;

i) landscape management by maintaining landscape elements that provide shelter to livestock;

j) introduce livestock species resilient to extreme temperatures and adapt the nutritional regime of livestock to demands caused by climate change;

k) popularisation of new technologies addressing soil structure stability and soil treatment for enlarging the active layer of the root zone for enlarging water uptake

l) runoff reduction by agronomic practices (no-tillage and cropping systems can reduce water runoff);

m) develop new complex agricultural water management programmes (combining irrigation, fishery and excess inland water management);

3) Climate change adaptation measures recommended by specialists in the Agricultural Sector result in:

a) developing good practice guides for agriculture, especially for non-irrigated agriculture;

b) developing and implementing local action plans (at commune level) for climate change adaptation;

c) developing and implementing plans for land improvement that would increase the precipitation likelihood (including afforestation, water surfaces, etc.);

d) use research to combat current vulnerabilities and change cropping/farms structure for an agriculture less exposed to climate change;

e) encourage crop/farm insurance;

f) improve the availability and applicability of modelling and adaptation options to be used by farmers (provide data and results on the reaction of water resource to possible climate change scenarios, promote the use of GIS technology, etc.);

g) develop the infrastructure and technology needed for local active interventions to combat extreme weather events to protect crops and local communities.

82. Course of action no. 2. ***Risk reduction and climate change adaptation in the Water Resources Sector.***

1) To protect water resources of the Republic of Moldova against climate change, there is a need to conduct studies that will serve as a basis for climate change adaptation:

a) re-evaluate available water resources for each river basin;

b) determine the projected climate change influence on the maximum, medium and minimum flow of water courses;

c) determine the vulnerability of water resources to climate change;

d) assess water requirements of the major crops in the context of climate change (cross-sectoral studies with agriculture);

e) assess water needs for the main categories of consumption (drinking water, industrial water, domestic water, etc.) in the context of climate change;

f) assess the danger of floods, droughts and water scarcity in the river basins under different climate scenarios;

g) assess potential climate-change-related damages in case of flooding/drought.

2) To assure the availability of water at source in the Republic of Moldova taking into account the current and future climate change, the following measures need to be undertaken:

a) build new infrastructure for transforming water resources into socio-economic ones (new accumulation lakes, new inter-basin derivatives, etc.);

b) modify the existing infrastructure to regulate the water flows whose distribution changes over time as a result of climate change (over-increased dam height);

c) design and implement solutions for rain water collection and usage;

d) extend solutions for recharging the ground layers with water;

e) build reservoirs without dams (with the water level below the ground level);

f) protect wetlands (one of the main positive functions of wetlands is to allow groundwater recharge and reduce peak discharges downstream);

3) Measures to adapt to water uses (users) should be directed to:

a) more efficient water use and conservation through the rehabilitation of water transport and supply/distribution facilities and through technological changes (promote technologies with reduced water consumption);

b) changes in the people's lifestyle (reduce water demand, use recycled water for certain activities, etc.);

c) increase the level of water recycling for industrial needs;

d) change the types of agricultural crops using those adapted to low water demand;

e) develop and implement a system of water prices and tariffs based on the season and available resource;

f) use lower quality water for certain purposes/uses.

4) Measures to be taken at river basin level to assure climate change adaptation:

a) update the directory landscaping and management schemes, so as to take into account climate change effects (decrease in the available water at the source, increase in water demand);

b) apply integrated water management principles (for water quantity and quality);

c) introduce, at the stage of designing the accumulation lakes to be built, backup volumes to be used only in exceptional circumstances or creation of accumulation lakes with special operation regimen to supplement the available water resources in critical situations;

d) inter-basin transfers of water to compensate for water shortages in certain

reservoirs;

e) set water quality targets and apply water quality criteria to prevent, control and reduce the transboundary impact, coordinate the regulations and issue clearances;

f) improve treatment of wastewater and domestic water;

g) harmonise the regulations on limiting the emissions of hazardous substances in water;

h) identify potentially risky areas.

5) Measures to be taken for flood risk management:

a) select certain local protection works (for some communities and socio-economic structures) instead of large-size protection works;

b) choose regularisation of flood path (slowing and reducing floods as they occur) instead of increasing the height of existing dams or building new dams;

c) use the latest methods and technologies for the rehabilitation/construction of dams and carry out protective works in line with local spatial plans;

d) increase the awareness on flood risk among the exposed population (the appropriate response before and after the event, insurance contracts, etc.);

e) measures to protect irrigation infrastructure against flooding;

f) improved flood forecasting and installation of systems to provide dam break alerts;

g) effective collaboration between the Republic of Moldova, Ukraine, and Romania to monitor water discharges, improve weather/flood forecasting and early warning for all downstream countries.

6) Measures to be taken to combat drought/water scarcity:

a) services on monitoring and warning on the decreasing flow/drought at the national level;

b) reduce leakage in water distribution networks;

c) saving measures and efficient water use (irrigation, industry);

d) cooperation with other countries aimed at sharing experiences in combating drought;

e) plans for priority water supply/setting the hierarchy of water supply restrictions;

f) establish methodologies for drought thresholds and drought mapping;

g) increase water storage capacity;

h) re-assure water quality during drought;

83. Course of action no. 3. ***Risk reduction and climate change adaptation in the Health Sector.***

To identify the climate change impact on public health indicators, health surveillance should be established. For example, health indicators related to air, drinking water and bathing water quality can be used to assess the positive and negative health determinant environmental factors to identify areas of intervention and prevention and to evaluate the results of policies and specific programmes aimed at improving public health.

Health incidents during periods of extreme temperatures seem to be the most

common manifestations of climate change on public health. The incidence of cardiovascular diseases and respiratory infections has increased in the context of warmer, more humid climate.

The WHO Regional Office for Europe states in one of its releases (Menne betal., Eds. (2008), "Protecting Health in Europe from Climate Change." Copenhagen, WHO Regional Office for Europe, 2008) that the prevention of and response to the health effects of climate change will require a portfolio of action at different levels: from health system preparedness coordinated with meteorological early warning systems to timely public and medical advice and improvements to housing and urban planning.

Actions for improving climate change adaptation in the Health Sector could include:

1) develop integrated assessments of environmental, economic and health impacts of climate change;

2) discuss and design adaptation strategies to be used by the Health Sector in identifying climate-related health risks in the country;

3) agree on a lead body to coordinate the public health preparedness for and response to climate change; define roles and responsibilities;

4) review and strengthen the existing disease surveillance systems with a view of including further climate-related health outcomes, such as heat-related morbidity and mortality;

5) the awareness of medical professionals, public and the most vulnerable groups;

6) improved medical access for remote communities and vulnerable groups (e.g., elderly, obese, and disabled);

7) identify, monitor and target risk groups and vulnerable populations;

8) develop treatment protocols for climate-related health problems;

9) provide training and guidance for medical professionals and advice for the public on measures to be taken during extreme weather events, such as heat-waves, flooding and drought;

10) upgrade current education and communication programmes;

11) a monitoring system and evaluation mechanism to assess the effectiveness of preparedness and response measures;

12) apply new technology for scientific measurement (e.g. vector borne disease, water quality, climate change, etc.);

13) the risk for the emergence of new, unfamiliar diseases and health impacts;

14) consider the cost (and amount) of the energy and CO_2 emissions used by air-conditioning and advocate alternative cooling methods to the public;

15) maintain the international and regional cooperation

84. Course of action no. 4. ***Risk reduction and climate change adaptation in the Forestry Sector.***

Adaptation measures in the Temperate Continental bioclimatic zone, which also includes the Republic of Moldova's forests, are very versatile. On-going and planned research includes adapted seedlings, biotic and abiotic damages, biodiversity, especially genetic diversity, silviculture treatments, and protection functions of forests. Measures at stand level (forest regeneration, tending and thinning of stands, harvesting) are aimed at

decreasing risks of abiotic disturbances, i.e. fire, wind, drought, as well as biotic disturbances, i.e. pests and pathogens. Building stable diversified forests is an on-going measure and it is planned to improve stand stability by selection of suitable species, provenances and genotypes.

The most appropriate measure of climate change adaptation would be the intensification of reforestation. It would not only help to balance forest ecosystems, but would also decrease soil erosion; it would prevent landslides and flooding, while favouring tourism. Forests must be populated with less vulnerable tree species. Climate change resilient tree species should be also resilient to new types of pests.

Climate change adaptation measures in the Forestry Sector should be based on scientific research and technological progress that support sustainable development of forests, taking into account the environmental and socio-economic context. These measures should also be accompanied by appropriate monitoring of forests' health and their development. Last but not least, the importance of forests, particularly in the climate change context should be better explained to all interested parties and public, to encourage forest protection and defence.

The following climate change adaptation measures could be implemented in the Forestry Sector:

1) revision and development of new important components of the forestry regulatory basis, as integral parts of the forestry regime, focusing on the following areas: maintenance and conservation of forestry stations; conservation of forestry genetic resources; ecological reconstruction of forests; certification of forests, forest products and forest management systems;

2) revision of the regulatory framework pertaining to development of an appropriate financial mechanism in conservation and development of forestry resources, needed for expansion of lands covered with forestry vegetation , etc;

3) development and approval of the regulation on implementation and assuring functionality of the principles of participatory management of public forest resources;

4) increasing the forest cover, including in the climate change context mitigation and biodiversity conservation;

5) development and implementation of projects aimed at planting protection forestry strips (buffer zones) for agricultural lands protection, antierosional purpose, and for waters protection;

6) establishment of plantation forests to meet the needs of population in fuel wood for heating, cooking, etc;

7) develop methodologies/technologies to assure forest ecosystems adaptability to climate change.

85. Course of action no. 5. ***Risk reduction and climate change adaptation in the Energy Sector.***

Climate change will alter the seasonal demand for electricity, which will be lower in winter and higher in summer. The decreased demand for electricity for heating in winter, due to the increase in global average temperature will not offset the increased consumption of electricity required to operate air conditioners and cooling devices in hot days.

Climate change may also reduce hydropower due to low water resources.

Examples of climate change adaptation measures to reduce losses/risks in the Energy Sector we can mention the following:

1) Energy supply:

a) ***Mined resources*** (including fuel oil and gas, thermal power) could include replace water cooling systems with air cooling, dry cooling, or recirculating systems; improve design of gas turbines (inlet guide vanes, inlet air fogging, inlet air filters, compressor blade washing techniques, etc.); (re)locate in areas with lower risk of flooding/drought; build dikes to contain flooding, reinforce walls and roofs; adapt regulations so that a higher discharge temperature is allowed; consider water re-use ad integration technologies at refineries.

b) ***Hydropower*** could include: build de-silting gates; increase dam height; construct small dams in the upper basins; adapt capacity to flow regime (if increased); adapt plant operations to changes in river flow patterns; operational complementarities with other sources;

c) ***Wind***: (re)locate based on expected changes in wind-speeds.

d) ***Solar:*** (re)locate based on expected changes in cloud cover; and

e) ***Biomass***: introduce new crops with higher heat and water stress tolerance; substitute fuel sources; early warning systems (temperature and rainfall); support for emergency harvesting of biomass; adjust crop management and rotation schemes; adjust planting and harvesting dates; introduce soil moisture conservation practices.

2) **Energy demand**: invest in high-efficiency infrastructures and equipment; invest in decentralised power generation such as rooftop photovoltaic generators; efficient use of energy through good operating practice.

3) Energy transmission and distribution: improve robustness of pipelines and other transmission and distribution infrastructure; burying or cable re-rating of the power grid; emergency planning; and regular inspection of vulnerable infrastructure such as wooden utility poles.

86. Course of action no. 6. ***Risk reduction and climate change adaptation in the Transport Sector.***

A means of transportation resilient to climate change implies, above all, a sustainable transport infrastructure. This implies, for example, roads covered with materials resilient to temperature fluctuations and flooding, as well as bridges that take into account water flow record.

Alternative means of transportation such as walking or cycling and meshed transport systems can also help to significantly decrease the air pollution in urban areas in general and rationally use the energy resources in particular.

In addition to protecting the existing infrastructure (possibly as part of the required rehabilitation), it is essential that all future infrastructure be designed taking into account the adaptation to climate change effects. Moreover, the means of transportation must also be adapted and/or created so as to be resilient to climate change effects. Mobility planning policies need to be improved and cycling needs to be supported as an alternative and environmentally friendly means of transportation particularly in urban areas by providing adequate infrastructure, integrated transport systems and meshed transport networks.

Promoting bicycle as a multipurpose and environmentally friendly urban vehicle adaptable to the existing infrastructure can be achieved by reorganising the existing urban space. Spatial planning of urban transport systems needs to be known by as many local actors as possible.

Studies on climatic factors' influence on various means of transportation and those related to new climate change resilient technologies are essential to assure that the transport system of the country is not be affected by foreseen and unforeseen climate change. Floods, landslides and mud torrents were defined by experts as the main threats to transportation and transport infrastructure in particular. For this reason, climate change adaptation projects must begin with the construction/rehabilitation of dams and protection systems of riverbanks. Real-time warning systems are needed for all water levels and landslides, as well as for potentially destructive extreme weather events. Constant monitoring is recommended at national and local levels to record the temporal effects of weather events and risks for transport activities.

Examples of adaptation measures to reduce losses/risks in Transport Sector to climate change are outlined below:

1) In case of *significant variations of temperatures, including heat waves*:

a) develop new, heat-resilient paving materials;

b) greater use of heat-tolerant streets and highways landscape protection;

c) proper design/construction, milling out ruts;

d) shifting construction schedules to cooler parts of day;

e) designing for higher maximum temperatures in replacement or new construction;

f) adaptation of cooling systems.

2) In case of *increases in intense precipitation events*:

a) develop new, adverse climate conditions-resilient paving materials;

b) overlay with more rut-resilient asphalt;

c) using the most efficient technologies to assure sealing and renewal of asphalt concrete (for example, those that combine impregnation and surface treatment of asphalt concrete and which, respectively, assures the revitalisation and renewal of bituminous binder quality, reducing the fragility of the upper asphalt layer, increasing its elasticity and flexibility, and its resilience to water and chemicals);

d) wider use of efficient road maintenance methods (*preventive maintenance*: include coatings, repairs, sealing by spraying cationic emulsions, crushed stone seals, sealing cracks with suspensions, etc.; *corrective maintenance*: include patching, repair of surface and surface treatments with sealants);

e) conduct risk assessments for all new roads;

f) improve flood protection;

g) greater use of sensors for monitoring water flows;

h) upgrading of road drainage systems;

i) pavement grooving and sloping;

j) increases in the standard for drainage capacity for new transportation infrastructure and major rehabilitation projects; and

k) engineering solutions, increase warnings and updates to dispatch centres, crews

and stations.

V. ESTIMATING THE RELATED COSTS

87. The implementation of climate change adaptation objectives needs to be supported by appropriate financial mechanisms. The implementation cost of the Strategy is estimated at about MDL 2.7 billion. The cost of inaction, however, could be devastating, given the fact that natural disasters alone cause the country an average loss of about US$ 61 million each year. The estimates of future costs and benefits suggest that every euro spent on flood protection would avoid six euros of cost generated by damage.

The provision and allocation of adequate financial resources are prerequisites for achieving a successful outcome of the climate change adaptation process.

To support climate change adaptation initiatives, both the state's domestic financial resources as well as the external ones should be used.

Domestic financing can be secured both from the state budget and from other financial mechanisms. Special Funds (National Ecological Fund, National Fund for Regional Development, Energy Efficiency Fund, etc.) will be important tools for directing the domestic monetary flows in environmental investments, and a means of strengthening the external and domestic financing.

Foreign assistance and investments will play an important role in promoting climate change actions in all economic sectors and in catalysing the specific investments that will be needed to assure climate change adaptation. These investments are linked to a wide range of technologies intended to improve the energy efficiency, use renewable energy, develop the related infrastructure, and adapt to climate change. In this context, this financial support is very useful to implement appropriate policies or strategies, or to resolve specific issues in the fields where the climate change impact is significant.

88. Implementation of small-scale pilot and demonstration projects will involve sustainability of external assistance to be received, including through financial mechanisms available under the United Nations Framework Convention on Climate Change, to which the Republic of Moldova is a party.

It is anticipated, for example, that the Strategy's objectives will be achieved to a greater extent under the conditions in which the Republic of Moldova gains access to the financial mechanisms of the UNFCCC Adaptation Fund, Special Climate Change Fund and the Green Climate Fund, in view of implementing adaptation projects in the most vulnerable sectors of the national economy.

VI. THE RESULTS AND THE EXPECTED IMPACT

89. Overall, the highest result of Strategy implementation is that the Government will be able to undertake priority climate change adaptation actions, either through funding or through direct implementation or through relevant policies and legislation to assure the reduction of the impact of these changes on national economy sectors, and increase the climate change resilience in these sectors.

90. A strong national level framework for adaptation, accompanied by climate-resilient sectoral policies and plans, will help to stimulate and support adaptation at a local level, assuring that innovation from other actors to respond to climate change does not

encounter regulatory or institutional barriers.

91. Communication tools, information databases and appropriate support systems will exist to assure continued strengthening of knowledge on climate risks and provide the decision-makers with the whole amount of information needed to develop effective policies and action plans.

92. Cooperation mechanisms will exist that would enable the public authorities at all levels to understand and effectively address climate risks and to use this information to mainstream adaptation in the existing institutional policies and practices.

The Strategy can then provide decision-makers with the appropriate incentives and structures required to incorporate adaptation into sectoral strategies and processes.

93. Decisions will be substantiated by cross-sectoral research and analyses. Research will be directed primarily towards supporting the national and sectoral policy development and optimisation of the science-policy interface.

Climate Change Adaptation Strategy of the Republic of Moldova is anticipated to strengthen and guide the sectoral approach characteristic of the governance program. Taking into account the objectives set out in the Strategy, ministries will receive directions and guidelines for their sectors during the development of specific climate change adaptation strategies and action plans. The approach of mainstreaming adaptation in all relevant sectors will give the freedom to each sector to find the best solutions for the adaptation at the sectoral level.

94. Climate change is expected to have a wide range of impacts on all development sectors of the Republic of Moldova, with particularly profound effects on Agriculture and Water Eesources, both of which are essential for human and economic development.

It should be noted that with respect to the implementation of climate change adaptation measures, there will be a long timeframe between making expenditures and obtaining benefits. Nevertheless, a benefit of this difficult adaptation process is that some measures will have positive effects regardless of what happens with climate change. Restoring forest cover, wetlands and grasslands to prevent soil erosion, and reducing the damage that can be caused by storms and floods will help people, if ordinary storms occur, and the measures will create sanctuaries for wildlife and will bring aesthetic and recreational benefits. The development of evacuation plans and of medical response systems in case of storms and floods can help save lives and in other emergencies.

95. Forest protection can bring “triple gains” through increasing food production and productivity; help to get people out of poverty, and support the global environment through carbon storage and biodiversity conservation.

The gains of applying improved agricultural practices are more significant than the forecasted changes caused by climate change.

The Strategy will promote the sustainable economic growth, will stimulate climate change resilient investments and will create new jobs, especially in such sectors as Construction, Water Management, Insurance, Agricultural Technologies and Management of Ecosystems

VII. THE IMPLEMENTATION, MONITORING, REPORTING AND EVALUATION FRAMEWORK

96. Implementation. The Strategy should be implemented through an Action Plan. The proposed activities are distributed to be carried out in two stages:

1) Short-term activities (during 2014-2016) are needed to create the framework for implementing this Strategy and should be a priority for immediate implementation.

2) Mid-term activities (during 2017-2020) may be revised over time.

To assure the financial support for the activities planned in the Action Plan, such activities should be included in the sectoral strategies for mid-term expenditures and in the annual work plans of institutions involved in Strategy implementation.

The responsibility for implementing this Strategy rests with all competent institutions identified in the Plan. The National Commission for implementation of mechanisms and provisions of the United Nations Framework Convention on Climate Change and of the Kyoto Protocol will coordinate the implementation and will conduct regular assessment of the level of indicators and progress achievement.

97. The **monitoring** of this Strategy implementation will be carried out by the Ministry of Environment, where a subdivision will be designated for that purpose. Based on the collected and systematised information, it will prepare the annual report on implementation of this Strategy and will submit it to the Government and to the Secretariat of the United Nations Framework Convention on Climate Change and the Kyoto Protocol.

98. Reporting and Evaluation. During the monitoring process, annual monitoring reports will be developed that will include information on the implementation of the indicators set in the Action Plan for each action, and every 3 years or as needed progress evaluation reports will be developed which will assess the impact of activities carried out during the given time and the level of objectives implementation. Monitoring and evaluation reports will be submitted for consideration to the Government.

Climate Change Adaptation Strategy was not designed as a linear, but as an iterative process, and therefore it will be updated and reviewed periodically, based on the monitoring and evaluation findings, as well as on the updated climate models, and in accordance with the scientific research.

Towards the end of the Strategy implementation, a final assessment report, containing information on the level of achievement of objectives and of the expected impact, will be prepared. Based on this report, the next stage of strategic planning of climate change adaptation will be decided.

Annex 2
the Government Decision
no .1009 of 10.12.2014

ACTION PLAN FOR THE IMPLEMENTATION OF THE REPUBLIC OF MOLDOVA'S CLIMATE CHANGE ADAPTATION STRATEGY BY 2020

No.	Activities	Institution in charge	Partners	Achievement	Costs	Sources of funding	Monitoring Indicator
Specific Objective 1: Create by 2018 the institutional framework in the field of climate change that would assure the efficient implementation of adaptation measures at the national, sector and local levels.							
Course of action no. 1. ***Develop the institutional framework in the field of climate change adaptation***							
1.1.1	Assess the risk management capacities and climate change adaptation policy implementation capacities at national and local levels, and identify their capacity-building needs.	Ministry of Environment; central public authorities		2015	500,000	State Budget, external financial assistance	Capacity building concept developed
1.1.2.	Enhance the capacity of the Ministry of Environment and central authorities to develop and advocate for climate change adaptation policy.	Ministry of Environment; central public authorities		2016	1,536,000	State Budget, external financial assistance	Specific units created in the Ministry of Environment and other public authorities
1.1.3.	Develop the draft Government Decision on amending the Government Decision no. 1574 of 26 December 2003 on setting up the National Commission for the Implementation of the United Nations Framework Convention on Climate Change, and of mechanisms and provisions of the Kyoto Protocol, to assure higher representation of key ministries that will implement the climate change adaptation policy.	Ministry of Environment		2016	-	State Budget	Project approved
1.1.4.	Assure the functioning of the Inter-ministerial Working Group on Climate	Ministry of Environment		2016	96,000	State budget external	Working Group and approved

No.	Activities	Institution in charge	Partners	Achievement	Costs	Sources of funding	Monitoring Indicator
	Change, as a forum for public consultations on sectoral adaptation plans.					financial assistance	consolidated, Meetings held
1.1.5	Create the Climate Modelling Working Group to conduct research and economic, social and environmental impact assessment.	Ministry of Environment; Academy of Sciences of Moldova	University Centres	2016	-	State budget	Working group created
1.1.6	Create a Regional coordination body with neighbouring countries (Ukraine and Romania) to establish the link between the activities of managing the risks of natural disasters, including of climate risks.	Ministry of Environment		2016		State Budget	Coordination body created
1.1.7	Develop and implement a training program for building the capacity on mainstreaming climate and disaster risks in sectoral policies and sustainable practices related to climate change adaptation methods.	Ministry of Environment; State Chancellery	Academy of Public Administration	2016	120,000	State Budget, external financial assistance	Training program developed and implemented
Course of action 2. *Mainstream climate change adaptation in the sectoral policies of national economy.*							
1.2.1	Assess the key sectoral policies and strategies and identify the fields at risk of climate change and the main points for modification/intervention and documents that may be proposed to be amended.	Ministry of Environment; central public authorities		2015	1400000	State Budget, external financial assistance	Assessment Report developed, Sectors and regions with high climate change risks identified
1.2.2.	Develop climate change adaptation Strategies and/or Action Plans for sectors with a high level of vulnerability.	Ministry of Environment; Ministry of Health; Ministry of Agriculture and Food Industry; Ministry of Economy; "Moldsilva" Agency		2018	4,200,000	State Budget, external financial assistance	Strategies and/or action plans for 4-6 sectors with a high risk to climate change impacts
1.2.3.	Amend/modify/develop/review sectoral	Central public authorities		2017	2,000,000	State	Policy documents

No.	Activities	Institution in charge	Partners	Achievement	Costs	Sources of funding	Monitoring Indicator
	policies to mainstream climate risks in all existing and future sectoral policies.					Budget, external financial assistance	where climate change adaptation measures have been mainstreamed
1.2.4.	Assess the current adaptation activities to identify the most successful ones that could be taken over and replicated.	Ministry of Environment		2016	1,400,000	State Budget, external financial assistance	Assessment Report
1.2.5.	Assess relevant legislative/regulatory acts, review and amend them to assure the climate resilience by reducing the risks and advocating for climate change adaptation at national and sectoral levels.	Ministry of Environment; central public authorities		2017	4,200,000	State Budget, external financial assistance	The number of legislative/ regulatory change
1.2.6.	Develop a plan for financing climate risk management and implement climate change adaptation measures.	Ministry of Environment; central public authorities		2015	1,000,000	State Budget, external financial assistance	Financing plan developed and approved, 4-5 alternative funding sources identified
Course of action 3. ***Develop the communication and the institutional cooperation in view of implementing adaptation policies.***							
1.3.1.	Develop a climate change communication strategy.	Ministry of Environment		2015	100,000	State Budget, external financial assistance	Communication Strategy approved
1.3.2.	Develop a resources platform and a network of experts in "climate change" (independent experts, NGOs, scientific institutions, financial institutions), which could provide climate change adaptation services to local public authorities	Ministry of Environment	Environmental NGOs, UNDP, academia	2016	7,000,000	State Budget, external financial assistance	Specialised climate change resources platform on established and functional. Network of independent

No.	Activities	Institution in charge	Partners	Achievement	Costs	Sources of funding	Monitoring Indicator
							experts, scientific institutions, NGOs, financial institutions specialised in climate change developed and functional
1.3.3.	Establish a mechanism for cooperation and coordination with neighbouring countries to correlate the activities in disaster and climate risk management.	Ministry of Environment; Ministry of Interior		2018	14,000,000	State Budget, external financial assistance	International cooperation mechanism established
1.3.4.	Switch the national system of early warning on natural disasters, including climate ones, to the regional system of early warning on climate-related natural disasters	Ministry of Environment; Ministry of Interior		2017	500 000	State Budget, external financial assistance	System switched
1.3.5	Develop international cooperation with donor agencies to provide the support needed to implement adaptation measures.	Ministry of Environment; Central public authorities	Environmental NGOs	2020	84,000,000	State budget, external financial assistance	Cooperation, financing agreements (memoranda), signed, adaptation activities implemented
1.3.6.	Develop public-private partnerships to implement adaptation measures.	Ministry of Environment; central public authorities	Economic operators	2020	84,000,000	State budget, external financial assistance	The number of public-private partnerships created, adaptation measures implemented
Specific Objective 2: Create by 2020 a mechanism for monitoring the climate change impact, related social and economic vulnerability, and managing /disseminating the information on climate risks and disasters.							
Course of action 1. ***On-going monitoring and research of climate change impacts, related social and economic vulnerability, and regular updating of climate scenarios.***							
2.1.1.	Build capacities to collect, monitor,	Ministry of Environment,		2019	5,500,000	State	3-4 working visits

No.	Activities	Institution in charge	Partners	Achievement	Costs	Sources of funding	Monitoring Indicator
	report statistics, analyse and disseminate information needed for climate modelling, climate risk and impact assessment.	National Bureau of Statistics				Budget, external financial assistance, National Ecological Fund	and visits to international research centres in climate modelling and climate impact assessment organised for climate modelling working group; capacities build
2.1.2.	Climate risk mapping at regional (for the North, Centre and South of the country) and sectoral (Agriculture, Forestry, Energy, Transport, Human Health, etc.) levels.	Academy of Sciences of Moldova, Ministry of Environment	"Moldsilva" Agency	2016	1,500,000	State Budget, external financial assistance, National Ecological Fund	Major risk areas identified and prioritised
2.1.3.	Develop mid- and long term regional climate scenarios for the Republic of Moldova, based on global circulation patterns and general regional climate models.	Ministry of Environment		2017	500,000	State Budget, external financial assistance	Climate scenarios developed and applied
2.1.4.	Develop and disseminate high-resolution maps for future climate conditions in the Republic of Moldova, taking into account various emission scenarios: A2 (high emissions), A1B (average emissions), B1 (low emissions).	Academy of Sciences of Moldova; Ministry of Environment		2017	280,000	External financial assistance, National Ecological Fund	Maps developed
2.1.5.	Evaluate the spatial and temporal trends in the frequency and intensity of extreme weather events in the Republic of Moldova as a result of climate	Academy of Sciences of Moldova Ministry of Environment		2016	280,000	Projects and grants from external financial	Evaluation Report

No.	Activities	Institution in charge	Partners	Achievement	Costs	Sources of funding	Monitoring Indicator
	change.					assistance	
2.1.6.	Vulnerability and risk assessment for the Agriculture Sector at the regional or district levels.	Academy of Sciences of Moldova; Ministry of Agriculture and Food Industry; Ministry of Environment	"Nicolae Dimo" Institute of Soil Science, Agrochemistry and Soil Protection	2016	420,000	State Budget, external financial assistance	Assessment Studies developed and published
2.1.7	Conduct studies on climate change impact on basic crops and main categories of livestock reared in the country.	Academy of Sciences of Moldova; Ministry of Agriculture and Food Industry; Ministry of Environment	"Nicolae Dimo" Institute of Soil Science, Agrochemistry and Soil Protection; Practical Scientific Institute of Biotechnology in Animal Husbandry and Veterinary Medicine	2016	550,000	State Budget, external financial assistance	Studies based on 10 climate models conducted
2.1.8	Temporal and spatial assessment of the climate change impact on surface water, groundwater and underground water.	Academy of Sciences of Moldova; Ministry of Environment		2016	420,000	State Budget, external financial assistance, National Ecological Fund	Temporal and spatial assessments developed, impact maps produced and disseminated
2.1.9.	Assessment of risk/opportunities for human health and sustainable development of sectors vulnerable to climate change (e.g., Agriculture, Forestry, Water Resources, Construction	Academy of Sciences of Moldova; Ministry of Environment; Ministry of Health; Ministry of Agriculture	"Nicolae Testemiteanu" State University of Medicine and Pharmacy of	2016	1,200,000	State Budget, external financial assistance	Study conducted

No.	Activities	Institution in charge	Partners	Achievement	Costs	Sources of funding	Monitoring Indicator
	Sectors, etc.) caused by the increased number and higher intensity of extreme events	and Food Industry; Ministry of regional development and Construction	Moldova; "Moldsilva" Agency				
2.1.10	Assessment of risks and vulnerability to climate change in the Energy and Transport Sectors	Academy of Sciences of Moldova; Ministry of Environment; Ministry of Economy Ministry; Transport and Road Infrastructure	Institute of Power Engineering of Academy of Sciences of Moldova; Technical University of Moldova	2016	550,000	State Budget, external financial assistance	Study conducted
Course of action 2. Create a climate change database.							
2.2. 1.	Assess the current system of collecting, monitoring and reporting regular hydro-meteorological and climate information to identify the gaps and ways to overcome barriers	Ministry of Environment; National Bureau of Statistics		2016	1,000,000	State Budget, external financial assistance,	Assessment Report developed, gaps identified
2.2.2	Collect all available information on climate change and strengthen the national statistical data collection, monitoring, and reporting system.	Ministry of Environment; National Bureau of Statistics		2017	1,500,000	State Budget, external financial assistance	Missing data collected
2.2,3	Create national databases on climate change containing periodic hydro-meteorological and climatic information, information on current climate change adaptation projects and activities.	Ministry of Environment; National Bureau of Statistics; E-Governance Centre		2018	1,000,000	State Budget, external financial assistance, National Ecological Fund	National database created
2.2.4	Extend the databases at the local level.	Ministry of Environment;		2020	2,000,000	State	The number of

No.	Activities	Institution in charge	Partners	Achievement	Costs	Sources of funding	Monitoring Indicator
		National Bureau of Statistics; E-Governance Centre				Budget, external financial assistance, National Ecological Fund	databases at the local level
Course of action 3. ***Raise the awareness of all stakeholders, especially of population with problems, on climate change risks and adaptation measures.***							
2.3.1.	Create mechanisms to raise the public awareness on climate change risks and adaptation measures.	Ministry of Environment; Ministry of Economy; Ministry of Education; Ministry of Health; Ministry of Agriculture and Food Industry; Ministry of Transport and Road Infrastructure; Ministry of Construction and Regional Development		2020	1,000,000	State Budget, external financial assistance, National Ecological Fund	Information and awareness programme approved
2.3.2.	Organise awareness, information and education campaigns on climate change through mass-media, comprehensive approaches and other methods of disseminating the information.	Ministry of Environment; Ministry of Education;		2018	4,500,000	State Budget, external financial assistance, National Ecological Fund	Campaigns organised
2.3.3.	Review and complete the school curricula for primary and secondary education to mainstream the topic "Climate Change" in reference subjects.	Ministry of Education; Ministry of Environment;		2016	700,000	State Budget, external financial assistance,	School curricula completed
2.3.4.	Develop and implement programs and materials accessible e-learning (books,	Ministry of Environment Ministry of Economy;		2018	1,000,000	State Budget,	Programs and e-learning materials

No.	Activities	Institution in charge	Partners	Achievement	Costs	Sources of funding	Monitoring Indicator
	brochures, etc.) on adaptation to climate change in order to improve the skills of farmers, medical professionals, civil protection and exceptional service engineers in the energy, transport and construction, other specialists	Ministry of Health; Ministry of Agriculture and Food Industry; Ministry of Transport and Road Infrastructure; Ministry of Regional Development and Construction				external financial assistance	(books, brochures, etc.) on adaptation to climate change conducted and published
2.3.5	Create an early warning system on natural hazards climatic origin, providing public access to data and information needed to assess climate risks and impacts.	Ministry of Environment; Ministry of Internal Affairs		2019	2,000,000	State Budget, external financial assistance	Early-warning system on climate, natural hazards Monitoring reports on climate, natural hazards regularly published
Specific Objective 3: Assure the development of climate resilience by reducing at least by 50% the climate change risks and facilitate climate change adaptation in six priority sectors by 2020.							
Course of action no. 1. ***Risk reduction and climate change adaptation in the Agriculture Sector.***							
3.1.1.	Identification of vulnerable areas and sectors and assessment of needs and opportunities of alternative crops and varieties more resistant to change in response to climate change	Ministry of Agriculture and Food Industry; Academy of Sciences of Moldova		2017	2,000,000	State Budget, external financial assistance	Study developed areas identified needs and opportunities
3.1.2	Develop a program of measures to conserve water in the soil and adjustment periods for conducting agricultural activities on climate change	Ministry of Agriculture and Food Industry		2018	2,000,000	State budget, external financial assistance	Programme of measures to be developed, activities performed
3.1.3	Support for agricultural research and experimental production in the selection of crops and development of the best varieties that are better suited to the new climate conditions	Ministry of Agriculture and Food Industry		2020	10,000,000	State budget, external financial assistance	Funds identified, studies and research conducted
3.1.4.	Capacity building for adaptation to	Ministry of Agriculture		2020	6,000,000	State	Information

No.	Activities	Institution in charge	Partners	Achievement	Costs	Sources of funding	Monitoring Indicator
	climate change through awareness of stakeholders using the FAS and supply essential information on farm management	and Food Industry				Budget, external financial assistance	campaigns organized, Advice, information published
3.1.5	Developing irrigation plans based on an assessment of their impact, the future water availability and water needs, taking into account the balance between supply and demand	Ministry of Agriculture and Food Industry; Ministry of Environment		2018	500,000	State Budget, external financial assistance	Plans developed and approved
3.1.6.	Creating tools for risk management and crisis to cope with the economic consequences of events due to climate	Ministry of Agriculture and Food Industry; Ministry of Environment		2019	5,000,000	State Budget, external financial assistance	Risk management tool created
Course of action no. 2. ***Risk reduction and climate change adaptation in the Water Resources Sector.***							
3.2.1.	Conduct studies to assess the available water resources, determine their vulnerability to climate change, water requirements and needs for the main categories of consumers.	Ministry of Environment; Academy of Sciences of Moldova		2017	1, 000,000	State Budget, the National Ecological Fund, external financial assistance	Studies and research conducted
3.2.2.	Assure availability of water at source through the development of the infrastructure for transforming water resources into socio-economic ones.	Ministry of Environment, Ministry of Agriculture and Food Industry		2020	2,000,000	State Budget, the National Ecological Fund, external financial assistance	New accumulation lakes created, infrastructure for collecting rain water created, wetlands developed
3.2.3.	Assure the integrated water management based on river basin principle.	Ministry of Environment	"Moldsilva" Agency	2020	5,000,000	State Budget, the National	Water quality criteria established, wastewater

No.	Activities	Institution in charge	Partners	Achievement	Costs	Sources of funding	Monitoring Indicator
						Ecological Fund, external financial assistance	treatment process improved, regulations on the limitation of emissions of hazardous substances into water established
3.2.4.	Ensure proper management of flood risks.	Ministry of Environment		2020	2,000,000	State Budget, the National Ecological Fund, external financial assistance	km of protective dams re-constructed/ constructed, flood forecasting, information and alert systems created
3.2.5.	Undertake measures to combat drought/water scarcity.	Ministry of Environment; Ministry of Agriculture and Food Industry		2020	60,000,000	State Budget, the National Ecological Fund, external financial assistance	Monitoring and warning services provided, leakages in water networks reduced, mapping and drought thresholds established, water storage capacity created
Course of action no. 3. ***Risk reduction and climate change adaptation in the Health Sector.***							
3.3.1.	Evaluate and identify health risks related to climate change.	Ministry of Health		2016	4,000,000	State budget, external financial assistance	Study developed, risks identified
3.3.2	Identify and monitor the at-risk groups and populations vulnerable to climate	Ministry of Health		2017	2,000,000	State budget,	Risk groups and categories of

No.	Activities	Institution in charge	Partners	Achievement	Costs	Sources of funding	Monitoring Indicator
	change.					external financial assistance	populations identified
3.3.3.	Provide increased access for isolated communities and vulnerable populations to health care.	Ministry of Health		2018	40,000,000	State budget, external financial assistance	Mechanisms to provide access to vulnerable populations created, established
3.3.4.	Evaluate the existing disease surveillance systems and strengthen them by including certain climate-caused consequences.	Ministry of Health		2018	2,000,000	State budget, external financial assistance	Disease surveillance systems improved and consolidated
Course of action no. 4. ***Risk reduction and climate change adaptation in the Forestry Sector.***							
3.4.1.	Enhance the process of scaling-up territories covered with forest vegetation and ecological restoration of forests, create interconnection corridors between forested massives.	"Moldsilva" Agency; Ministry of Environment		2020	10,000,000	State Budget, the National Ecological Fund, external financial assistance	130,000 ha of woodland, green islands created
3.4.2.	Create forest bands for agricultural land, roads and water protection	"Moldsilva" Agency; Ministry of Environment; Ministry of Transport and Road Infrastructure; Ministry of Agriculture and Food Industry		2020	10,000,000	State Budget, the National Ecological Fund, external financial assistance	30,000 ha of forest bands restored/created
3.4.3.	Create forest plantations for industrial and energy needs (planting energy forest to meet the population's needs)	Ministry of Economy; Ministry of Environment; "Moldsilva" Agency		2020	380,000,000	State Budget, the National Ecological	Forest plantations created (ha)

No.	Activities	Institution in charge	Partners	Achievement	Costs	Sources of funding	Monitoring Indicator
						Fund, external financial assistance	
3.4.4.	Identify and increase certain types of trees resilient to various weather conditions.	"Moldsilva" Agency; Ministry of Environment	Forest Research and Management Institute	2020	190,000,000	State Budget, the National Ecological Fund, external financial assistance	Species identified, areas cultivated
Course of action no. 5. ***Risk reduction and climate change adaptation in the Energy Sector.***							
3.5.1.	Promote renewable energy sources that operated based on environment-friendly technologies	Ministry of Economy; Ministry of Environment; Energy Efficiency Agency		2020	1,140,000,000 Wind	State Budget, National Ecological Fund, Energy Efficiency Fund, external financial assistance	Photovoltaic generators, wind facilities, biomass heated facilities used
3.5.2.	Promote the gradual transition from the use of traditional fuel sources to biofuel use	Ministry of Environment; Ministry of Economy; Ministry of Transport and Road Infrastructure		2020	2,000,000	State Budget, National Ecological Fund, Energy Efficiency Fund, external financial assistance	15% of the used fuel will be biofuel, Standards and technical regulations implemented.
3.5.3	Promote the efficient energy use and	Ministry of Economy;		2020	480,000,000	State	Energy intensity

No.	Activities	Institution in charge	Partners	Achievement	Costs	Sources of funding	Monitoring Indicator
	promote high energy efficient products	Energy Efficiency Agency				Budget, National Ecological Fund, Energy Efficiency Fund, external financial assistance	reduced by 10% 2% of energy efficiency assured every year
3.5.4.	Improve the sustainability of energy transmission and distribution infrastructure	Ministry of Economy		2020	100,000,000	State budget, external financial assistance	Inspection of vulnerable infrastructure, of electrical cables buried, re-rated
Course of action no. 6. ***Risk reduction and climate change adaptation in the Transport Sector.***							
3.6.1.	Assure the design of road infrastructure taking into account the need to adapt to climate change.	Ministry of Transport and Road Infrastructure	Local Public Authorities	2020	500,000	State budget, local budgets, external financial assistance	Regulations, standards approved
3.6.2.	Assure the planning of urban transportation system in view of creating the needed infrastructure to promote the alternative transportation such as cycling.	Ministry of Transport and Road Infrastructure	Local Public Authorities	2019	5,000,000	State budget, local budgets, external financial assistance	Infrastructure created for cyclists in urban area
3.6.3.	Assure the sustainability of transport infrastructure through the use of materials resistant to temperature fluctuations, floods	Ministry of Transport and Road Infrastructure		2017	500,000	State Budget	Regulations, standards approved

INFORMATIVE NOTE
to the draft Government Decision on approving the Republic of Moldova's Climate Change Adaptation Strategy by 2020 and of the Action Plan for its implementation

The Republic of Moldova is highly vulnerable to climate variability and change. According to the Republic of Moldova's Second National Communication under the United Nations Framework Convention on Climate Change (2009) and the National Human Development Report 2009/2010, the future impacts of climate change on various economic, social and environmental aspects are expected to intensify.

At present, our country is one of the least advanced countries in Europe and Central Asia, with a high level of vulnerability to such changes. It is confirmed by the Human Development Index for 2012, the value of which was the fourth out of 30 countries in the region. The climate change impact on agriculture is of particular concern – agriculture is a major source of income for a big part of the Republic of Moldova's population. More than half the population of the country lives in rural areas and about one third of the labour force are employed in agriculture.

The socio-economic costs of climate change related natural disasters such as droughts, floods and hail, and other are significant. Both their intensity and frequency are expected to further increase as a result of climate change. During 1984-2006, the Republic of Moldova's average annual economic losses due to natural disasters were about US$61 million. The most recent floods had an adverse impact. The 2007 and 2012 droughts alone caused losses estimated at about MDL 12 and 5 billion, accordingly.

The 2008 floods cost the country about US$120 million, and the 2010 floods had an adverse economic impact on the Gross Domestic Product of about 0.15 percent, with total damage and losses estimated at approximately US$42 million.

Climate change is increasingly recognised as a key factor in the development of extreme weather events at the global, regional and national levels, but so far the Republic of Moldova has no strategic framework encompassing integrated and comprehensive measures to adapt to new climate conditions determined by climate change.

In response to this issue, the Ministry of Environment has developed the draft of the Republic of Moldova's Climate Change Adaptation Strategy by 2020 and an Action Plan for its implementation aiming at assuring that the social and economic development of the Republic of Moldova becomes resilient to climate change impacts in the future. The Strategy also supports the achievement of the global objectives in this regard established by the United Nations Framework Convention on Climate Change (UNFCCC) to which the Republic of Moldova is a Party (Parliament Decision no. 404-XIII of 16 March 1995). Similarly, it will create the needed strategic national framework to put in place the mechanism through which the Republic of Moldova will receive international support for developing countries that are not included in Annex. 1 of the United Nations Framework Convention on Climate Change, offered by the industrialised countries.

The Republic of Moldova's Climate Change Adaptation Strategy by 2020 has been developed in accordance with the provisions of the Chapter on "Climate Change" of the EU Association Agreement and the provisions of the Programme of the Government of the Republic of Moldova "European Integration: Freedom, Democracy, Welfare" (2013-2014), Chapter on "Environment".

Climate change affects all facets of development – it is not specific to any one sector; therefore the risks that climate change may pose to the success of all economic development activities need to be taken into account.

Thus the Strategy sets out a general objective that tends to ***develop and consolidate the Republic of Moldova's capacity to adapt and respond to actual or potential climate change effects***.

To achieve this objective, it is necessary to:

- *enhance the institutional capacities to efficiently implement climate change adaptation measures at the national, sector and local levels;*
- *regularly monitor and evaluate the climate change impact, related social and economic vulnerability, and establish the mechanism for managing/disseminating the information on climate risks and disasters;*
- *implement climate resilience development measures by reducing risks and advocating for climate change adaptation in priority sectors (Agriculture, Energy, Transport, Health, Forestry and Water Resources).*

At the same time, the Climate Change Adaptation Strategy is intended to serve as an umbrella strategy that creates the enabling environment for specific sectors and ministries to "mainstream" climate change adaptation activities and risk management in their existing and future sectoral strategies and action plans, or to develop their own climate change adaptation strategies and/or action plans.

The development of the Strategy involved extensive stakeholder consultation with line ministries, scientific research institutions, donor organisations, NGOs and civil society.

The implementation cost of the Strategy would be approximately MDL 35 million. The Republic of Moldova recognised and accepted this cost during the signing of the Association Agreement and the Deep and Comprehensive Free Trade Area. It will be covered from the State Budget, National Ecological Fund, and Energy Efficiency Fund and from external investment sources to be negotiated with the development partners after the document is approved.

Based on the aforementioned and on the fact that at present, in the Republic of Moldova, there is no strong enabling environment and clear courses of action for an effective and coherent climate change adaptation process in the key sectors of the national economy, the Ministry of Environment believes that it is imperative to approve the Republic of Moldova's Climate Change Adaptation Strategy by 2020 and the Action Plan for its implementation.

Minister Valentina TAPIS