

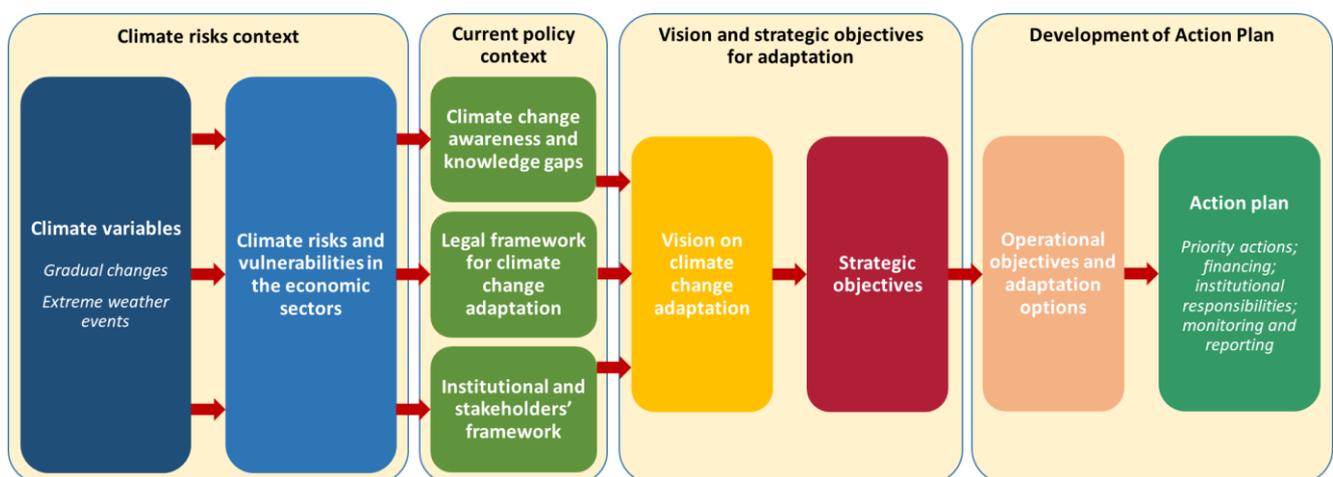


## BULGARIA – CLIMATE CHANGE ADAPTATION

# Strategy and Action Plan: Bulgaria

October 2018

Following strong EU commitment to act upon climate change, the Bulgarian government started developing its National Climate Change Adaptation Strategy and Action Plan (NASAP) counting on the knowledge and expertise of the World Bank (WB). In 2016, Bulgaria signed a contract with the WB for the provision of analytical and advisory services in support of the NASAP. The WB's team of experts prepared an assessment of climate change related risks in nine economic sectors: agriculture, biodiversity and ecosystems, energy, forestry, human health, tourism, transport, urban development, and water. Areas that were also studied include disaster risk management, and macroeconomic consequences of climate change. The following figure illustrates the logic of the NASAP development.



### WHY BULGARIA NEEDS A STRATEGY

Climate threats for Bulgaria are imminent with an expected average temperature rise of up to 4°C by 2100. Also, precipitation patterns will change.

Climate change consequences are multiple, including reduced water reserves, health effects, disturbance of agricultural production, stress on biodiversity and forests, damage to infrastructure and private property, change of tourism patterns, and many others.

Macroeconomic calculations show that climate change will, if no action is taken, in monetary terms, negatively affect the country, potentially wiping out Bulgaria's entire economic growth by 2050. Macroeconomic effects can be considerably mitigated, if adaptation action is taken. Sector specific cost-benefit analyses show that investing in adaptation measures pays off. Calculations generally show high cost-effectiveness of investments, varying per sector and per adaptation measure. Each invested euro is expected to be earned back, from several times to peaks of more than 700 times the invested amount.

### TIMEFRAME FOR THE STRATEGY

The NASAP, while setting the framework for Bulgaria's conformity with the 2013 EU Adaptation Strategy and the 2015 Paris Climate Agreement, will cover the period until 2030.

### WHAT SHOULD THE STRATEGY ACHIEVE?

The NASAP will aim to 'develop the country's highest possible level of resilience against climate change, by taking any measures needed and feasible, thus securing the undisturbed functioning of the country's economic sectors, safeguarding its population's health and well-being, and preserving its rich natural assets'.

Its long-term objective is to 'pro-actively pursue long-term high-impact economic, social, and ecological resilience and sustainability, to allow Bulgaria's citizens, private sector, and public institutions to adequately prepare and protect themselves against vulnerabilities deriving from climate change'. In other words, secure the framework the country needs to sustain and further develop its economy and social fabric.

## WHAT ARE THE STRATEGIC OBJECTIVES?

Adaptation to climate change is a matter of all sectors in society, involving all authorities at local, regional, and national level. But also involving private sector, civil society organizations, and citizens.

Everybody has a stake in the realization of the NASAP's strategic objectives, namely:

- \* **Mainstream and integrate climate change adaptation in all sectors:** strengthen the policy and legal framework;
- \* **Build institutional capacity:** by building expertise, knowledge base, monitoring and reporting;
- \* **Raise awareness:** enhance education, build public acceptance and participation in adaptation actions;
- \* **Build resilience:** by strengthening infrastructure, protection of natural capital, water system and energy supply infrastructure, protecting ecosystem services, and others.

## ACTION PLAN

The Strategy comes with an Action Plan, describing, per economic sector, which adaptation actions should be taken, showing potential budget consequences and sources, foreseen duration and expected results, performance indicators and responsible institutions. Separate sector fact sheets address the action planning per sector.

A logical sequence of actions will maximize adaptation benefits. Across sectors specific adaptation measures must be taken first. These mostly concern short-term measures with generally low/no budget needs and with a strong focus on strengthening the policy and legal framework, raising awareness, building capacities, and strengthening the knowledge base (for better decision making). In general, medium and long-term measures are characterized by their need for higher investment and for being preceded by the short-term measures.

## MONITORING AND REPORTING

Implementation progress of the Action Plan is planned to be assessed in 2025 and 2031. Short-term high priority measures will be assessed in 2021.

## FUNDING

Both public and private funds will be required with public funds focusing on the policy environment, providing climate-resilient public goods (e.g. infrastructure), and assisting vulnerable groups. For the 2014–2020 period 20 percent of the EU Structural Funds budget is to be used for action on climate change, including adaptation. For the 2021–2027 period the percentage is currently foreseen to be increased to 25. Also, LIFE funding, the EU program for the environment and climate action, is foreseen to increase.

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## BULGARIA – CLIMATE CHANGE ADAPTATION

# Agriculture Sector

October 2018



Following strong EU commitment to act upon climate change challenge, the Bulgarian government started developing its National Climate Change Adaptation Strategy and Action Plan (NASAP) counting on the knowledge and expertise of the World Bank (WB). In 2016, Bulgaria signed a contract with the WB for the provision of analytical and advisory services in support of the NASAP. The WB team of experts prepared an assessment of climate change related risks in nine economic sectors, including agriculture. The assessment findings for agriculture (see Appendix 1 to the NASAP) include an overview of sector relevant climate risks, a description of the policy context, and a set of adaptation options.

The Action Plan to the NASAP shows a full set of adaptation measures for the agriculture sector.

### CLIMATE CHANGE IMPACTS

The agriculture sector is specifically vulnerable to climate change, showing a variety of potential impacts. At the same time, there will be certain opportunities to benefit from the changes.

Climate change impacts on agriculture include crop yields and crop quality, agricultural productivity, changes in the length of the growing season, livestock yield, soil aridity, erosion, salinization, land losses and loss of income.

### STRATEGIC OBJECTIVES

In its Action Plan, the NASAP mentions the following, strategic objectives for the agriculture sector:

- Sustainable management of agricultural practices for adaptation to climate change;
- Promote adaptive capacity and awareness;
- Promote research and innovation for climate change adaptation;
- Strengthen policy and legal framework.

### OPERATIONAL OBJECTIVES AND ACTIVITIES

In more detail, the actions in the four strategic areas look as follows:

#### 1. Sustainable management

- Adapting productivity (*irrigation system development, timing of farm operations, growing thermophilic crops, developing climate adapted crops, improving pest control*)
- Adapting livestock production (*adapting farms and facilities, diversifying livestock farming, saving existing pastures for grazing*)
- Adapting natural resources management (*increasing perennial crops use, protective cover for soil, soil structure maintenance, improve soil's organic matter reserves, use cultivation machines / technology, improve water management, maintain/improve aquaculture habitats*)

#### 2. Promote adaptive capacity and awareness

- Build adaptive capacity (*climate change training, knowledge dissemination action, knowledge development [aquaculture], develop/improve M&E systems*)
- Improve awareness (*climate change adaptation knowledge for local farmers, establish formal platform for aquaculture, develop ecosystem observation systems*)

#### 3. Promote research and innovation

- Strengthen research, technology development and innovation (*research on new crop varieties, farm level resource management innovations, conduct research development, improve technologies for cultivation of fish and aquaculture, climate information and early warning systems, research to better understand interaction climate change-fisheries/aquaculture, aquaculture observation and monitoring*)

#### 4. Strengthen policy and legal framework

- Strengthen legal framework (*improve legal framework, update and amend legislation affecting inland fisheries and aquaculture, elaborate a National Strategy for Agricultural Development*)
- Strengthen risk management and other policy development (*develop insurance and risk management programs*)

### PRIORITY ACTIONS AND INDICATORS

The Action Plan identifies the following priority actions, to be implemented on the short and medium term:

- \* Developing irrigation systems, inter alia to increase the irrigated area by 50% (45,000 ha) (short term);
- \* Developing climate adapted crops, to decrease variable costs by 5% (medium term);
- \* Adapting farms and facilities, to increase livestock well-being and generate 30% variable cost saving (medium term);
- \* Ensuring protective cover for soil surface, supporting farm income increase by 10% (medium term);

- \* Improving soil structure maintenance, increasing crop production by 15% (medium term);
- \* Maintaining and improving existing aquaculture habitats, leading to 5% increase in aquaculture production (medium term);
- \* Developing a national database (online platform) to disseminate climate change information (short term);
- \* Establishing a formal platform for aquaculture (short term);
- \* Developing research on new crop varieties, increasing crop yields by 1.5% (medium term);
- \* Developing climate information and early warning systems, increasing crop yields by 10% (medium term);
- \* Updating inland fisheries and aquaculture legislation, creating better sector resilience against climate change (short term);
- \* Elaboration of a National Strategy for Agriculture Development, supporting competitiveness, local production, sustainable use of resources, climate change resilience, and generating 0.5% increase of gross value added of the agriculture sector (short term);
- \* Developing insurance and risk management programs, increasing the number of farmers covered against losses by 20% (medium term).

## **INVOLVED STAKEHOLDERS**

Public sector stakeholders include Ministries and their bodies related to the sector. Farmers and fishermen and their branch associations are another group of important actors as their commitment is essential for successful implementation of the Action Plan. Academia and research institutes also play an important role, along with civil society, and local and regional authorities.

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## BULGARIA – CLIMATE CHANGE ADAPTATION

# Biodiversity and Ecosystems Sector

October 2018



Following strong EU commitment to act upon the climate change challenge, the Bulgarian government started developing its National Climate Change Adaptation Strategy and Action Plan (NASAP) counting on the knowledge and expertise of the World Bank (WB). In 2016, Bulgaria signed a contract with the WB for the provision of analytical and advisory services in support of the NASAP. The WB team of experts prepared an assessment of climate change related risks in nine sectors, including biodiversity and ecosystems. The assessment findings for biodiversity and ecosystems (see Appendix 2 to the NASAP) include an overview of sector relevant climate risks, a description of the policy context, and a set of adaptation options. The Action Plan to the NASAP shows a full set of adaptation measures for biodiversity and ecosystems.

The Action Plan to the NASAP shows a full set of adaptation measures for biodiversity and ecosystems.

### CLIMATE CHANGE IMPACTS

Biodiversity and ecosystems are specifically vulnerable to climate change, showing a variety of potential impacts, like loss of genetic diversity, disruption of species lifecycles and phenological phases, deterioration of habitats and impact on the provision of ecosystem services.

### STRATEGIC OBJECTIVES

In the Action Plan, the NASAP specifies the following strategic objectives related to biodiversity and ecosystems:

- Enhancing ecosystems governance;
- Enhancing knowledge management, education and stakeholder communication for adaptation;
- Creating space for biodiversity & ecosystems;
- Increasing climate change resilience by reducing pressures not related to climate change;
- Sustainable use of regulating and cultural ecosystem services for adaptation.

### OPERATIONAL OBJECTIVES AND ACTIVITIES

In more detail, the actions in the five strategic areas look, as follows:

#### 1. Enhance ecosystem governance

- Align strategic planning and implementation legislation (*Develop a new Biodiversity Strategy and Action Plan and new Green Infrastructure Strategy, review legal requirements, operationalize ecosystem-based monitoring and EIA / SEA*)
- Adjust sectoral legislation to climate legislation (*revise Climate Change Mitigation Act and sectoral strategies/legislation, adjust regional / local adaptation strategies to the amended legislation / strategies*)
- Link emissions statistics to new environmental accounts (*create carbon environmental accounts, link carbon and environmental accounts*)

#### 2. Enhance knowledge management and education

- Open and reuse data (*establish ecosystem data interoperability between authorities / actors, open data for public use*)
- Improve communication about and understanding of ecosystem processes (*develop tools for informed prioritization of research and practical action, establish interdisciplinary teams and centers of excellence, encourage topical multidisciplinary research contests*)
- Restore, enhance and use local biodiversity knowledge (*collect folk customs and traditional knowledge, import foreign knowledge*)
- Maximize use of citizen science (*promote ecosystems thinking among volunteers, enable volunteer sharing*)
- Educate for ecosystem thinking (*implement training at all educational levels, create specialized course for public sector, develop skills for ecosystem communication and awareness raising*)

#### 3. Create space for biodiversity and ecosystems

- Reclaim space from grey infrastructure, create refugia and reduce fragmentation (*regional/local 'red lines' preventing ecosystem loss, biodiversity conservation and restoration programs*)

#### 4. Increase resilience by reducing pressures

- Reduce pollution, disturbance and overexploitation (*estimate carrying capacity for vital ecosystems and production capacity for their services, use self-monitoring and environmental impact assessments to track ecosystem (ES) exploitation, disturbances and ES services stocks*)

#### 5. Sustainable use of ecosystem services

- Sustainable use of ecosystem services (*use of genetic resources for resilience, cultural ecosystems for recreation and education, ecosystem restoration, local development and equitable access to ecosystems*)

## PRIORITY ACTIONS

The Action Plan identifies the following priority actions to be implemented on the short and medium term:

- \* Developing new Biodiversity and Green Infrastructure Strategies (short term);
- \* Reviewing legislation related to the mentioned strategies (short term);
- \* Establish ecosystem data interoperability between authorities / actors (short term);
- \* Open data for public use (short to medium term);
- \* Encourage topical multidisciplinary research contests (short term);
- \* Targeted collection of folk customs and traditional knowledge (short term);
- \* Enable volunteer sharing (short term);
- \* Training programs at all educational levels (short term);
- \* Regional / local 'red lines' to prevent loss of ecosystem services (short to medium term);
- \* Regional / local biodiversity conservation and restoration programs (short to medium term);
- \* Estimate carrying capacity for vital ecosystems (short to medium term);
- \* Use self-monitoring and environmental impact assessments for tracking ecosystems exploitation (short to medium term).

## INVOLVED STAKEHOLDERS

The public sector relevant ministries, along with their bodies related to the biodiversity and ecosystems have an important role to play. The academia and related scientific and research institutes, however, will become quite prominent. Civil society, local authorities, and citizens are important as well. The private sector with its national and local business associations and companies also has a role and needs to become more active.

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## BULGARIA – CLIMATE CHANGE ADAPTATION

# Energy Sector

October 2018



Following strong EU commitment to act upon climate change challenge, the Bulgarian government started developing its National Climate Change Adaptation Strategy and Action Plan (NASAP) counting on the knowledge and expertise of the World Bank (WB). In 2016, Bulgaria signed a contract with the WB for the provision of analytical and advisory services in support of the NASAP. The WB team of experts prepared an assessment of climate change related risks in nine economic sectors, including energy. The assessment findings for energy (see Appendix 3 to the NASAP) include an overview of sector relevant climate risks, a description of the policy context, and a set of adaptation

options. The Action Plan to the NASAP shows a full set of adaptation measures for the energy sector.

### CLIMATE CHANGE IMPACTS

Energy sector vulnerabilities to climate change distinguish between **primary energy supply** (coal production) and **electricity generation** (nuclear and thermal power plants, renewable energy, supply/demand balance, transmission and distribution, heating production and distribution).

Climate change may impact the energy sector in many ways – it may cause damage to infrastructure and equipment; reduce coal quality; increase the risk of heat stress for outdoor workers; reduce the efficiency of power plants; reduce availability of cooling water; create uncertainty of power generation; decrease efficiency of solar and wind power generation; cause shifts in energy demand; and reduce the need for heating.

### STRATEGIC OBJECTIVES

In the Action Plan, the Strategy outlines the following, strategic objectives for the energy sector:

- Build institutional capacity, knowledge and use of data for adaptation;
- Mainstream climate change considerations into energy sector policies, plans, and financial mechanisms;
- Incorporate climate resilience into design and engineering;
- Increase resilience of energy supply.

### OPERATIONAL OBJECTIVES AND ACTIVITIES

In more detail, the actions in the four strategic areas are as follows:

#### 1. Build institutional capacity, knowledge, and use of data

- Build institutional capacity and knowledge networks (review climate change awareness levels in the energy sector, provide energy sector training);

- Translate monitoring, forecasting, and weather data for the energy sector (meet with National Institute for Meteorology and Hydrology at the Bulgarian Academy of Sciences [NIMH-BAS] to defined climate services' needs, ensure NIMH-BAS has the resources to provide data)

#### 2. Mainstream climate change into energy sector policies, plans, and financial mechanisms

- Mainstream climate change consideration within energy sector policies and plans (incorporate climate resilience in strategies, plans, standards, policies, design standards, investments, power demand forecasts, infrastructure management)
- Develop financial mechanisms to build resilience (review financial mechanisms for financial protection in other countries and consider potential implementation in Bulgaria)

#### 3. Incorporate climate resilience into design and engineering

- Incorporate climate resilience into design and engineering – power plants (integrate climate resilience into water resources management/operation of large hydroelectric power plants, review costs and benefits of incorporating climate resilience into design of new power plants)
- Incorporate climate resilience into design and engineering – transmission and distribution (T&D) infrastructure (develop climate risk zones maps, continue monitoring causes of interruptions to T&D system, classifying climate/weather related causes, evaluate options for underground distribution system sections)

#### 4. Increase resilience of energy supply

- Diversify supply to increase overall energy system resilience (continue regional interconnections / electricity trading, consider improved district heating systems, diversify supply, financially support gasification of households)
- Improve energy efficiency in building and industry systems (stimulate Energy Service Companies development, support development of energy saving evaluation methods, motivate implementation of energy saving measures, harmonize

*price regulation with energy efficiency improvement, raise energy traders' awareness regarding the Energy Efficiency Act, explore links between water efficiency and energy efficiency)*

## **PRIORITY ACTIONS**

The Action Plan identifies the following priority actions to be implemented on the short term:

- \* Provide energy sector training on climate resilience;
- \* Define with NIMH-BAS needs for climate services and centralized agreement on their provision;
- \* Make an inventory of strategies, policies, plans, standards, site selection, energy infrastructure design norms identifying need to incorporate climate resilience needs;
- \* Ensure that energy elements of the NASAP are built into the climate-energy planning;
- \* Ensure that climate resilience is mainstreamed in the new Energy Strategy;
- \* Ensure that climate resilience is integrated into water resources management and large hydroelectric power plant decisions;
- \* Develop climate risk zones maps relevant to T&D infrastructure;
- \* Continue monitoring causes of interruptions to the T&D system and classify climate/weather-related causes.

## **INVOLVED STAKEHOLDERS**

The public-sector stakeholders include the relevant ministry and its bodies, along with the state regulator. Energy and water companies both public and private are also on top of the list. Special attention should be given to the consumers, with their relevant associations, as well as energy sector related scientific and research institutes. Last, but not least – civil society and local authorities also have a role to play.

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## BULGARIA – CLIMATE CHANGE ADAPTATION

# Forestry Sector

October 2018



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adaptation options. The Action Plan to the NASAP shows a full set of adaptation measures for the forestry sector.

### CLIMATE CHANGE IMPACTS

Bulgaria is rich in forests, but climate change is a potential driver of significant changes. A main vulnerability is formed by species-specific physiological responses. Some species may even lack adaptability to cope with new climate conditions. Other vulnerabilities include uncertainties for the interaction between species, the fact that large areas with coniferous plantations are at too low elevations. Climate change may also trigger increased probability of large fires and other disturbances, along with the improved conditions for invasive species. High prevalence of firewood as a timber product presents a challenge as well.

### STRATEGIC OBJECTIVES

In its Action Plan, the NASAP mentions the following, strategic objectives for the forestry sector:

- Enhance the knowledgebase and awareness for climate change adaptation;
- Enhance and protect the forest resources;
- Improve the potential for sustainable use of the forest resources.

### OPERATIONAL OBJECTIVES AND ACTIVITIES

In more detail, the actions in the three strategic areas look as follows:

#### 1. Enhance knowledge base and awareness

- Build capacity for research, education and extension (establish research and development coordination body for mitigation and adaptation, develop research program to support adaptation of forests, create a National Forestry Extension Service, build capacity in public and private entities and academia in the forestry sector);

- Develop research to support adaptation (model performance of tree species, continue studying genotype variability and suitability for endangered tree species; develop risk models for e.g. windthrow, fire, insect damage; micro- and macro-

level research, analyses and assessment of forest ecosystem monitoring data; assess impact of changing wood resources; research use of wood to promote its value-added use)

#### 2. Enhance and protect forest resources

- Build resilience in regenerating, expanding and strengthening forest resources (enhance nursery capacity and system for seed collection and storage, carry out enrichment planting, rehabilitate highly damaged areas and improve water and soil protection functions, maintain and create new forest shelter belts in agriculture lands, create forest corridors linking forest patches, establish short-rotation biomass plantations, assess the regulatory framework and monitoring arrangements to using agricultural lands for forest production)

- Maintain biodiversity, genetic diversity and forest resilience (maximize species, genetic, and structural diversity; limit spatial extent of homogeneous areas, protect sites of great biodiversity [old forests]; identify rare species with serious risk of extinction, protect their status, plan for their regeneration and potential migration; limit the potential of invasive species; participate in European Information System on Forest Genetic Resources)

- Enhance management of forest resources (build a national system for rapid fire detection and response, build a national system for long-term disturbance monitoring, execute a National Forest Inventory, integrate existing and novel information systems in National Information System for Forest Resources)

#### 3. Improve the potential for sustainable use of the forest resources

- Improve potential for long-term use of higher-valued wood products (review current building standards to improve the position of wood as a construction material, establish a timber marketing board, create a wood specifiers guide to ease the use of wood, promote novel wood-based specifications among municipalities as a pilot, e.g. wooden bridges and small buildings)

- Improve potential for sustainable and more environmentally-friendly use of wood biomass for production of energy (make a program to promote installation of modern energy and heat production systems, develop a strategy for forest biomass)

## PRIORITY ACTIONS

The Action Plan identifies the following priority actions to be implemented on the short term:

- \* Establish a research and development coordination body for climate change mitigation and adaptation;
- \* Initiate and implement a research program to support climate change adaptation of forests;
- \* Model potential performance of tree species under future climate conditions;
- \* Develop spatially explicit risk models for e.g. windthrow, fire, insect damage;
- \* Promote management strategies maximizing species, genetic, and structural diversity and limit spatial extent of homogenous areas;
- \* Build national systems for rapid fire (and other natural calamities) detection and response, and for long-term disturbance monitoring;
- \* Execute a National Forest Inventory.

## INVOLVED STAKEHOLDERS

Public sector stakeholders are ministries and their bodies that have responsibilities toward the forestry sector. Private sector stakeholders come from forest enterprises and woodworking industry. Land owners are important actors as well, while sector-related scientific and research institutes, nongovernmental organizations, and local authorities also have an important role to play.

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## BULGARIA – CLIMATE CHANGE ADAPTATION

# Human Health Sector

October 2018



Following strong EU commitment to act upon the climate change challenge, the Bulgarian government started developing its National Climate Change Adaptation Strategy and Action Plan (NASAP) counting on the knowledge and expertise of the World Bank (WB). In 2016, Bulgaria signed a contract with the WB for the provision of analytical and advisory services in support of the NASAP. The WB team of experts prepared an assessment of climate change related risks in nine sectors, including human health. The assessment findings for human health (see Appendix 5 to the NASAP) include an overview of sector relevant climate risks, a description of the policy context, and a set of adaptation

options. The Action Plan to the NASAP shows a full set of adaptation measures for the human health sector.

### CLIMATE CHANGE IMPACTS

Climate change impacts human health through temperature and humidity (cardiovascular diseases, strokes, vector-borne morbidity, infections, respiratory diseases, allergies), extreme weather events and fires (mortality, waterborne and foodborne morbidity, post-traumatic stress disorder), and change in precipitation (bacterial and diarrheal infections).

### STRATEGIC OBJECTIVES

In the Action Plan, the NASAP outlines the following strategic objectives related to the human health sector:

- Enhance governance for adaptation;
- Build knowledge base and awareness for adaptation;
- Adapt external environment to reduce health impacts of climate change.

### OPERATIONAL OBJECTIVES AND ACTIVITIES

In more detail, the actions in the three strategic areas look as follows:

#### 1. Enhance governance for adaptation

- Strengthen policy, legal and institutional framework (develop National Strategy and Action Plan for climate change and human health, revise existing plans/programs for disease control; review and update legislation, standards, codes, plans, policies)
- Develop administrative, infrastructure, communication, financial, and technical capacity (Establish a climate change and human health working group for communication and coordination; review climate change related infrastructure and equipment needs and recommend priority improvements; partnership and cooperation: develop a handbook on roles and responsibilities; ensure health representation in climate change processes at all levels; develop, update, disseminate catalogue of good health practices; establish national climate change and human health fund)

- Build professional capacity (conduct thematic workshops and training for professionals; series of thematic information materials for health care professionals; include climate change and human health in professional educational programs at all levels; develop, apply, update standards for climate change related medical treatments)

#### 2. Build knowledge base and awareness

- Develop public education and awareness on adaptation (include climate change and human health in education curricula; prepare a multimedia campaign; develop, publish and disseminate code for personal conduct for citizens with dangerous climate change phenomena)
- Develop monitoring, data collecting and early warning (build national climate change and human health monitoring system; maintain process of accurate operational monitoring – develop/update national climate change and human health database; develop and launch national early warning system for health effects of climate change)
- Develop research and knowledge base (enhance research knowledge on climate change and human health – assess health vulnerabilities, vulnerability maps)

#### 3. Adapt external environment to reduce health impacts of climate change

- Adapt built and natural environment to reduce health impact of climate change (develop concept and guidelines for adjustment of public-built environment to climate change; develop/implement system of incentives to use weather-proof constructions, materials, tools; build/ maintain public places with protective architecture and landscape design against extreme weather events; develop/update a handbook of natural environment location vulnerable to climate change)
- Develop socio-economic capacity (develop a Program for prophylactic control of human health status; provision of medical treatment; develop/update register of social groups vulnerable to climate change; develop special program to work with vulnerable groups; prepare harborages/facilities for protection from extreme weather events of people from vulnerable groups)

## PRIORITY ACTIONS AND INDICATORS

The Action Plan identifies the following priority actions to be implemented on the short term:

- \* Develop a National Strategy and Action Plan 'Climate Change and Human Health';
- \* Review and update legislation, regulations, standards, codes, plans, policies, programs and other relevant documents relevant to climate change and human health;
- \* Establish an interdisciplinary climate change and human health working group for vertical and horizontal communication and coordination;
- \* Review climate change related infrastructure and equipment needs of the health sector and develop recommendations for priority improvements;
- \* Establish a national climate change and human health fund to assist in treatment of climate change inducing morbidity, strengthen research, and improve climate change related health sector infrastructure;
- \* Develop thematic information materials on climate change for healthcare professionals and stakeholders;
- \* Develop, apply, and update standards for climate change related medical treatments;
- \* Carry out a multimedia campaign on climate change and human health;
- \* Develop a national early warning system for health effects of climate change;
- \* Enhance research knowledge on climate change and human health.

## INVOLVED STAKEHOLDERS

The public-sector stakeholders include the ministries with their bodies, as well as the National Health Insurance Fund. Professional medical societies, sector related scientific and research institutes are very important as well. The leading nongovernment organization of the Red Cross is becoming an important stakeholder also, along with local authorities.

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## BULGARIA – CLIMATE CHANGE ADAPTATION

# Tourism Sector

October 2018



Following strong EU commitment to act upon the climate change challenge, the Bulgarian government started developing its National Climate Change Adaptation Strategy and Action Plan (NASAP) counting on the knowledge and expertise of the World Bank (WB). In 2016, Bulgaria signed a contract with the WB for the provision of analytical and advisory services in support of the NASAP. The WB team of experts prepared an assessment of climate change related risks in nine economic sectors, including tourism. The assessment findings for tourism (see Appendix 6 to the NASAP) include an overview of sector relevant climate risks, a description of the policy context, and a set of

adaptation options. The Action Plan to the NASAP shows a full set of adaptation measures for the tourism sector.

### CLIMATE CHANGE IMPACTS

Due to its spatially concentrated, weather-dependent, and highly seasonal character, tourism in Bulgaria is vulnerable to climate change. Vulnerability consists of short- and long-term threats, even though higher temperatures earlier and later in the year may make the shoulder seasons more attractive.

Main risks related to climate change include lower numbers of tourists, a shorter winter season, shorter average stay, health problems with tourists, poorer conditions for outdoor recreation, damage of tourist infrastructure and superstructure, poorer access to tourist destinations, and water shortages.

Opportunities from climate change include longer summer and shoulder seasons, development of new tourism products, attracting new markets, and less need for heating energy in the winter and shoulder seasons.

### STRATEGIC OBJECTIVES

In its Action Plan, the NASAP mentions the following, strategic objectives for the sector:

- Mainstream climate change adaptation into policy development and legal framework;
- Enhance awareness and knowledge base for climate change adaptation;
- Build adaptive capacity in the tourism sector;
- Develop specific adaptation actions for the sector.

### OPERATIONAL OBJECTIVES AND ACTIVITIES

In more detail, the actions in the four strategic areas look as follows:

#### 1. Mainstream climate change adaptation into policy development and legal framework

- Develop a sectoral Climate Change policy (develop National Adaptation Strategy & Action Plan for tourism)

- Provide a comprehensive legal framework, risk management and incentives (improve sector's legal framework, develop insurance and risk management programs, create cross-sectoral policy frameworks, create economic incentive mechanism to implement adaptation options)

#### 2. Enhance awareness and knowledge base for climate change adaptation

- Raise awareness on climate change and its impacts on the sector (develop a national database [online portal] with climate change adaptation information, share adaptation knowledge with entrepreneurs, introduce climate change education in schools' and universities' curricula, develop outreach materials, develop video materials, organize awareness raising seminars, develop tourism indicators sensitive to climate change, develop tourism sector relevant climate change indicators)

- Strengthen the sector knowledge base (develop, finance, and implement climate change research projects and programs; collect tourism-related data on climate change; initiate and disseminate publications; develop a monitoring & evaluation system; disseminate developed adaptation measures to relevant stakeholders)

#### 3. Build adaptive capacity in the tourism sector

- Regional and sub-sectoral assessment of adaptive capacity (develop assessment tools for adaptive capacity, conduct adaptive capacity assessments)

- Capacity building (develop training and knowledge dissemination actions; introduce financial incentives for stakeholders' capacity building; introduce special programs/courses in colleges and universities, improve coordination, information, and communication across responsible governmental and public institutions)

#### 4. Develop specific adaptation actions for the tourism sector

- Adapt existing tourism sectors (develop and implement adaptation measures for summer and winter tourism)
- Develop new tourism and management solutions (develop new tourism types / products / destinations, identify new

*tourist sectors, develop and implement new marketing strategies and approaches, develop sub-sector – level resource management solutions)*

## **PRIORITY ACTIONS**

The Action Plan identifies the following priority actions to be implemented on the short term:

- \* Engage in wider dissemination of climate change adaptation knowledge to reach local tourism entrepreneurs;
- \* Develop tourism indicators sensitive to climate change;
- \* Develop climate change indicators relevant for the tourism sector;
- \* Develop assessment tools for adaptive capacity;
- \* Develop climate change training.

## **INVOLVED STAKEHOLDERS**

Involved stakeholders inter alia include the relevant ministries and their bodies responsible for tourism sector policies and regulations. The private sector, along with its associations and entrepreneurs, is also a key stakeholder. Last, but not least, the Organizations for Tourism Regions Management, scientific and research institutes, and civil society have their stake.

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## BULGARIA – CLIMATE CHANGE ADAPTATION

# Transport Sector

October 2018



Following strong EU commitment to act upon climate change challenge, the Bulgarian government started developing its National Climate Change Adaptation Strategy and Action Plan (NASAP) counting on the knowledge and expertise of the World Bank (WB). In 2016, Bulgaria signed a contract with the WB for the provision of analytical and advisory services in support of the NASAP. The WB team of experts prepared an assessment of climate change related risks in nine economic sectors, including transport. The assessment findings for transport (see Appendix 7 to the NASAP) include an overview of sector relevant climate risks, a description of the policy context, and a set of

adaptation options. The Action Plan to the NASAP shows a full set of adaptation measures for the sector.

### CLIMATE CHANGE IMPACTS

The main transportation modes to be impacted in terms of services, are road and railway, followed by water and air transport. Most significant impacts on infrastructure are expected to come from floods and landslides due to a higher frequency of extreme precipitations. Also, blizzards, snowfall, and extreme heat are foreseen to impact the sector.

Climate change related events are expected to negatively impact all transport sector players, including infrastructure managers (deterioration, damage, temporary closures of infrastructure sections/nodes), transport operators (higher operation costs and disruption of operations), transport users (delays, longer transit times, trip discomfort), and end-consumers and society as a whole (higher costs for transport infrastructure and operations – e.g. business, contracts, supply chain disruptions).

### STRATEGIC OBJECTIVES

In its Action Plan, the Strategy highlights the following, strategic objectives for the transport sector:

- Build institutional capacity and knowledge base of the transport sector;
- Mainstream climate change adaptation considerations into key planning and decision-making processes.

### OPERATIONAL OBJECTIVES AND ACTIVITIES

In more detail, the actions in the two strategic areas could be described as follows:

#### 1. Build institutional capacity and knowledge base

- Building institutional capacity (*assign climate change adaptation responsibilities in statutes and internal procedures of stakeholders, assess training needs and implement training, raise public awareness*)

- Building knowledge base (*introduce/improve climate change adaptation relevant data collection and practices, including building database/s for dedicated studies; carry out dedicated studies assessing more specific climate change risks and vulnerabilities*)

#### 2. Mainstream climate change adaptation consideration into key planning and decision-making processes

- Review and enhance project preparation procedures (*develop and enforce guidelines for considering climate change adaptation issues in project management cycle*)

- Review and improve operation and maintenance (*develop and implement programs for strengthening the road and railway networks' resilience to extreme weather events*)

- Review and update design norms (*update guidelines for design of roads' and railways' culverts and bridges, regularly update road and rail design norms*)

### PRIORITY ACTIONS

The Action Plan identifies the following priority actions:

- \* Assign climate change adaptation responsibilities in the statute and internal procedures of relevant stakeholders per transport subsector based on review and gap analysis;
- \* Assess training needs and implement training programs;
- \* Introduce and/or improve climate change adaptation relevant data collection practice and gradually build database/s for dedicated studies;
- \* Develop guidelines for considering climate change adaptation issues in project management cycle;
- \* Update guidelines for design of roads' and railways' culverts and bridges.

## **INVOLVED STAKEHOLDERS**

Public sector stakeholders include Ministries and their bodies related to the sector. The private sector has an important role to play as it runs the services, along with infrastructure maintenance. Key are the consumers and society as a whole and nongovernmental transport sector associations need to actively work with consumer protection civil society representatives to build alliances and raise awareness. Last, but not least, local and regional authorities will also play an important role.

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## BULGARIA – CLIMATE CHANGE ADAPTATION

# Urban Environment Sector

October 2018



Following strong EU commitment to act upon the climate change challenge, the Bulgarian government started developing its National Climate Change Adaptation Strategy and Action Plan (NASAP) counting on the knowledge and expertise of the World Bank (WB). In 2016, Bulgaria signed a contract with the WB for the provision of analytical and advisory services in support of the NASAP. The WB team of experts prepared an assessment of climate change related risks in nine economic sectors, including urban environment. The assessment findings for urban environment (see Appendix 8 to the NASAP) include an overview of sector relevant climate risks, a description of the policy

context, and a set of adaptation options. The Action Plan to the NASAP shows a full set of adaptation measures for the urban environment.

### CLIMATE CHANGE IMPACTS

In urban areas, expected impacts from climate events include damage to buildings and urban infrastructure, health effects, endangered key services including food supply and electricity, reduced mobility and accessibility and water stress, as well as increased financial pressure on municipalities for infrastructure maintenance and for emergency aid facilities and staff.

Extreme weather events will leave big cities more vulnerable, as their central areas generally have higher density, intensive traffic, reduced green and open spaces, and old infrastructure with limited capacity. Extreme weather events will also more significantly affect vulnerable groups, including those living below the poverty line, in poor housings, the homeless, the elderly, and the sick.

### STRATEGIC OBJECTIVES

In its Action Plan, the NASAP mentions the following, strategic objectives for the urban environment:

- Strengthen the policy and legal framework to mainstream adaptation to climate change;
- Build adaptive capacity;
- Develop financial, social and risk management policies for adaptation to climate change;
- Enhance knowledge management, research, education and stakeholder communication.

### OPERATIONAL OBJECTIVES AND ACTIVITIES

In more detail, the actions in the four strategic areas look, as follows:

#### 1. Strengthen the policy and legal framework to mainstream adaptation to climate change

- Policy – mainstream climate change adaptation in regional and urban development (*organize a discussion forum on adaptation policy and strategy, mainstream adaptation into*

*policies of regional and urban development by revising the Spatial Planning Act, and in the new National Housing Strategy)*

- Revise and amend legislative documents to transpose climate change adaptation issues after a regulatory impact assessment (*mainstream adaptation in all legislative documents related to regional and spatial/urban planning; revise/update tools such as National Concept for Spatial Development, spatial development schemes and plans, detailed plans)*

- Technology/construction – implement new Eurocodes and technical norms in planning, design, construction, technologies and building materials (*improve construction and maintenance supervision and monitoring and control by competent bodies, and Total Quality Management systems on projects and construction through sustainable building certification; stimulate creative urban design, promote green, smart, and innovative cities, building and technologies planning, design and certification)*

#### 2. Build adaptive capacity

- Develop sustainable institutions capable of providing climate change adaptation policy at all administrative levels (*organize horizontal coordination between involved authorities; organize vertical and horizontal internal ministerial coordination related to urban environment adaptation and disaster risk management; improve cooperation between national, regional and local authorities; develop capacity in public administration – retraining, additional expert employment; provide guidelines and methodological support to municipalities to develop local CC adaptation strategies)*

- Develop and upscale institutional, administrative, and expert capacity (*build disaster risk management and emergency response capabilities and provide sufficient modern equipment and financial support; provide accurate and updated information; develop awareness, commitment, knowledge and climate change adaptation culture among the public)*

### 3. Develop financial, social and risk management policies for adaptation to climate change

- Change financial, social, and insurance policies (*revise financial instruments and design new ones; explore EU funds' potential; plan state budget and provide financial support to municipalities; revise existing disaster risk management fund for better social protection of the most vulnerable; expand financial inclusion measures through adaptation safety nets, contingent finance and reserve funds for the poor and most disadvantaged*)

### 4. Enhance knowledge management, research, education and stakeholder communication

- Information – secure institutionally regulated exchange of information and data according to the EU INSPIRE directive obligations (*create common standards for type, structure, scope, and format of metadata and data, harmonize with EU at city level; exchange information with European countries and international institutions; provide open access to information for the public*)

- Research – build common long-term vision and objective in urban climate change adaptation research through amendment of National Scientific Research Development Strategy (*identify priority scientific topics; support innovations in construction, technologies and services through funded studies by construction business*)

- Education – train the trainers (*organize education and training for all levels – from politicians to the public; establish joint multidisciplinary courses for planners, [landscape-] architects, engineers, ecologists, economists, sociologists etc.; provide tutoring and organize thematic PhD; develop interactive climate change adaptation platform for distance and open learning*)

- Partnership – build partnerships and communicate knowledge (*promote partnerships, networking, and collaboration among different age, gender, ethnicity, professional and social groups; organize social network for support of vulnerable groups; realize public-private partnerships in support of disaster risk management and unified national system for citizens' protection; work with media to promote the climate change adaptation system*)

## PRIORITY ACTIONS

The Action Plan identifies the following priority actions, to be implemented on the short and medium term:

- \* Organize a discussion forum to agree on a common vision and develop common understanding on a climate change adaptation policy and strategy for the urban environment (short term);
- \* Mainstream adaptation into policies or regional and urban development (short term);
- \* Incorporate climate change adaptation into the new National Housing Strategy (medium term);
- \* Build disaster risk management and emergency response capabilities, provide sufficient and modern equipment, and financial support (short term);
- \* Create common standards for the type, structure, scope, and format of metadata and data, harmonized with EU at city level (short term);
- \* Identify priority scientific topics, linked with the city, open and green spaces, building, infrastructure, construction materials and human health, and their risk resilience assessment (short term);

- \* Set up appropriate education and training for all – from politicians to the public, based on an educational needs assessment (short term);
- \* Promote partnerships, networking, and collaboration among different age, gender, ethnicity, professional, and social groups, including the disadvantaged ones (short term).

## INVOLVED STAKEHOLDERS

Public sector stakeholders include Ministries and their bodies related to the sector. Sector professional unions and associations, construction and insurance companies, and private consultancies are other important actors for the successful implementation of the Action Plan. Academia and research institutes also play an important role, along with civil society, and local and regional authorities and their institutions.

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## BULGARIA – CLIMATE CHANGE ADAPTATION

# Water Sector

October 2018



Following strong EU commitment to act upon the climate change challenge, the Bulgarian government started developing its National Climate Change Adaptation Strategy and Action Plan (NASAP) counting on the knowledge and expertise of the World Bank (WB). In 2016, Bulgaria signed a contract with the WB for the provision of analytical and advisory services in support of the NASAP. The WB team of experts prepared an assessment of climate change related risks in nine economic sectors, including water. The assessment findings for the water sector (see Appendix 9 to the NASAP) include an overview of sector relevant climate risks, a description of the policy context, and a set of adaptation options. The Action Plan to the NASAP shows a full set of adaptation measures for the water sector.

### CLIMATE CHANGE IMPACTS

Climate change is expected to have significant effect on the hydrology of Bulgaria's rivers with discharge rates projected to drop by some 10 percent over the next 30 years. Significant shifts may occur in the seasonal distribution of rivers' runoff, showing an increase in winter and spring and a decline during summer and autumn.

Water related risks and vulnerabilities include flood and drought hazards. Flood risks concern the entire country, while drought risks regions with projected water scarcity. Regions using groundwater are at lower risk. Higher risks are likely in regions using surface water and having considerable tourist activities. The Black Sea regions appears to be most vulnerable to scarcity risks.

Key vulnerabilities to climate change are hydropower production systems, water services (supply, sanitation and melioration), the state and preparedness of the water infrastructure, and the preparedness of the operators and population due to a lack of historical experience with floods and droughts. Infrastructure and services risks derive from damage, improper operation and low-level or insufficient services. Biodiversity is at risk, resulting from floods and droughts.

### STRATEGIC OBJECTIVES

In its Action Plan, the NASAP mentions the following, strategic objectives for the water sector:

- Enhance adaptive governance;
- Strengthen knowledge base and awareness for adaptation;
- Enhance adaptive management of water system infrastructure.

### OPERATIONAL OBJECTIVES AND ACTIVITIES

In more detail, the actions in the three strategic areas look as follows:

#### 1. Enhance adaptive governance

- Adapt the legal framework to make it instrumental for addressing climate change impacts (*clarify roles and responsibilities for climate change adaptation, synchronize planning periods between water and sanitation support organizations' plans and River and Flood Risk Management Plans, introduce economic incentives for behavioral change*)

#### 2. Strengthen knowledge base and awareness of adaptation

- Maximize the use of research and education institutions (*secure funds for climate change adaptation research and implementation off related innovations, provide research support to River Basin Directorates through framework agreements*)
- Enhance awareness, education and training (*prepare and distribute climate change adaptation brochures and video, enhance primary and secondary education curricula for climate change adaptation, prepare and carry out training of public administration and water operators*)
- Enhance monitoring and flexibility (*extend and upgrade climate change related monitoring networks of precipitation, water resources and water use; establish dynamic, publicly available GIS database*)

#### 3. Enhance adaptive management of water system infrastructure

- Adapt design and construction (*Revise and update design and construction norms*)
- Adapt operation (*develop methodology and assess adaptive capacity of significant water infrastructure, include climate change adaptation measures in the infrastructure operational plans*)

## **PRIORITY ACTIONS**

The Action Plan identifies the following priority actions, to be implemented on the short and medium term:

- \* Clarify roles and responsibilities for climate change adaptation (short term);
- \* Prepare and distribute climate change adaptation brochures and video (short term);
- \* Extend and upgrade climate change related monitoring networks of precipitation, water resources, and water use (medium term);
- \* Establish dynamic, publicly available Geographic Information System (GIS) database (medium term);
- \* Revise and update design and construction norms (short term).

## **INVOLVED STAKEHOLDERS**

Public sector stakeholders include several Ministries and their bodies operating in the sector, including river basin directorates. The state regulator is also an important stakeholder. Academia and research institutes play an essential role, along with civil society, and local and regional authorities and their institutions.

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