Climate Strategy & Action Plan
Republic of Serbia

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Climate Change Adaptation Options
Report of stakeholder workshop for the agriculture sector

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Climate Strategy and Action Plan
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1  GENERAL DISCUSSIONS AND FINDINGS

The meeting aimed to acquire stakeholder input for the assessment of the risks associated with sector specific climate change impacts and to create a short list of measures to address the highest risks as assessed during the workshop. The ultimate goal of the meeting was, to identify three priority adaptation measures for the sector, which will now enter the planning stage.

The stakeholder engagement is foreseen as an element of the second stage of the Adaptation Planning Framework (APF), which is being developed in the Climate Strategy and Action Plan project. Stakeholder engagement is essential to the APF as the expertise of relevant Serbian individuals and organisations is needed in order to assess climate change risks and potential adaptation measures.

The APF is a user friendly tool currently under testing and development, which provides a step by step guide focused on assessing the risks associated with climate change and related extreme weather impacts and identifying and prioritising adaptation options to reduce key risks. It will be made available in 2018.

The APF is divided in four stages, as shown in figure 1. The stakeholder assessment reported in this document is part of stage two.

Figure 1 – The stages of the Adaptation Planning Framework

The stakeholder workshop started with a brief presentation to frame the meeting within the scope of the project “Climate Strategy and Action Plan. The presentation also highlighted that the strategy will be focused mostly on mitigation (measures to reduce greenhouse gas emissions), but that it will also include specific adaptation measures for three priority sectors: water resources – hydroelectricity production; forestry – bioenergy production; agriculture – food production.

Ružica Stričevi the project expert on agriculture, briefly introduced the topic by highlighting the key climate and climate change drivers as contained in Serbia’s Second National Communication (SNC). She also listed the adaptation measures included in the SNC for the sector.
Stakeholders were then invited to assess the severity of the consequences of the identified climate change impacts. The methodology was explained and stakeholders cast their votes for each impact.

The project team provided the assessment of likelihood based on the information contained in the SNC while stakeholders assessed only the consequences of the impacts on the agriculture sector. (See next session for more detailed information).

After the risks were assessed, the project team examined the suggested adaptation measures provided in the experts presentation and simplified the list to only include adaptation measures, which addressed the highest risks. Participants asked for an additional measure to be included in the list, due to the importance of considering the adaptation of cultivation technologies (selection of species and agro technical measures. Participants were then invited to evaluate each measure from the short list, taking into account a proposed set of evaluation criteria (see below for further details).

The meeting was closed with the team thanking the stakeholder for their extremely valuable inputs and promising to send a meeting report and a satisfaction questionnaire by the end of the week.
2 OUTCOMES OF DISCUSSION ON RISK ASSESSMENT

Participants were asked to assess the risks of the following impacts of climate change:

- **Impact 1: Drought (likelihood: 4)**
  - 1: Reduce the yield of main field crops being grown mainly in rain-fed condition
  - 2: Negative impact on yield quality (especially on fresh fruits and fruits of vegetable)
  - 3: Reduced water supply for irrigation
  - 4: Disable germination if occur in sowing period
  - 5: Reduce yield of fruit in the following year (two year effects in fruit production)
  - 6: Reduce water supply for livestock and inhabitants in rural area
  - 7: Soil salinity hazard
  - 8: Dry soil is prone to wind erosion

- **Impact 2: Water logging (water excess) due to heavy rainfalls (likelihood: 3)**
  - 9: Yield loss if lasts longer that 3 days in spring
  - 10: Reduce yield and quality of yield
  - 11: Delay of picking fruits, lost of yield by rotting (significant in berry orcharding)
  - 12: Delay the sowing period and disable two cropping per year
  - 13: Disabled cash crop production e.g. orchard production
  - 14: Risk associated with crop and soil during irrigation practices (e.g. soil salinity)

- **Impact 3 Extreme weather**
  - **High temperatures (likelihood: 4)**
    - 15: Damage to crops
    - 16: Negative health effects on livestock and fish
    - 17: Increasing energy and water consumption in green-housing and stable for cooling
    - 18: Impossibility of growth heat sensitive crops
    - 19: Appearance of new invasive pests and plant diseases (e.g. fungus that attacks maize and produce aflatoxin and when consumed by cow could be found in milk)
  - **Late spring frost/ snow (likelihood: 3)**
    - 20: Frost killing buds and yield in orcharding, and impact vegetables
  - **Hail occurrence** (likelihood: 3)
    - 21: Reduce yield and quality of fruits, vegetable, especially if selling for fresh consumption

- **Impact 4 Flooding /torrential flooding (likelihood: 3)**
  - 22: Loss of soil
  - 23: Loss of crops
  - 24: Drowning of livestock
• 25: Loss of stored forage food
• 26: Potential hazard of soil pollution with heavy metals or other unfavourable substances from river mud, (e.g. Danube, Sava) and from affected industries if affected in neighbouring (petrol oil, gasoline, various chemicals), disabling growth of vegetables grown for fresh consumption
• 27: Health risk of rural inhabitants and animals
• 28: Damage of assets (stable, barns, house holding dairy, etc)

The assessment of likelihood was proposed by the team (as per above), in accordance with the following definition and scale:

**Likelihood scale** – this represents the likelihood that a severe hazard event will occur under the selected climate change scenario (IPCC A2) and at the future time period (2050s) that the risk assessment is focused on:

- 1 – Low (Very unlikely that the hazard event will occur)
- 2 – Moderate (Hazard event as likely to occur as not)
- 3 – High (Likely that the hazard event will occur)
- 4 – Very high (Virtually certain that the hazard event will occur)

Stakeholders agreed with the proposed likelihood assessment, aside from changing the likelihood of frost/snow events from 1 to 3.

Stakeholders were then asked to assess the severity of the consequences associated with the impacts to agriculture, using the following definition and scale:

**Consequence scale** – this represents the severity of the consequences associated with climate change and extreme weather related impacts being considered within the risk assessment. This assessment should be based around the consideration of a reasonable worst case scenario (i.e. the hazard event impacting on the sector is a major one)

- 1 – Low (The impact has little or no negative implications to the sector)
- 2 – Moderate (The impact has some negative implications to the sector, but there are at a scale that can be managed enabling key functions to continue)
- 3 – High (The impact has widespread negative implications to the sector, which in some cases may lead to sustained loss of key functions)
- 4 – Severe (The impact has major negative implications to the sector which in some cases may lead to complete loss of key functions)
The results of the stakeholder assessment of risks of climate change impacts are included in the following matrix:

**Figure 2 – Stakeholder determined climate change impact risk matrix**

Taking into account the results of the risk assessment above, a short list of adaptation measures was created, drawing on the long list that addresses the impacts identified as having the highest risks. According to Figure 2, impacts that have a very high likelihood and a high severity are located in the red zone, which is assessed as the zone with the highest risk. Those impacts are: 1 to 8 (Impacts related to drought); and impacts 15-19 (impacts related to high temperatures).

The short list of measures has consequently been chosen as follows:\(^1\):

1. Highly functional reversible drainage pumping stations and use of drainage canals for irrigation
2. Multipurpose accumulation lakes (dams) for water supply, irrigation, erosion control, ecosystem services
3. New irrigation systems construction and efficient use of existing ones

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\(^1\) Due to the need for a manageable number of measures to be evaluated in the workshop, the team decided to include in the short list only the structural/physical measures (as classified in the Second National Communication).
4. Energy supply for irrigation systems functioning (preferable from renewable sources)
5. Food processing industry/ freezing facility in vicinity of irrigation schemes
6. Shadowing nets for water savings
7. Forest belt planting in plain area to reduce wind erosion, reduce drying out soils, ensure irrigation uniformity, increase biodiversity
8. Adaptation of cultivation technologies (selection of species and agro technical measures)
3 OUTCOME OF EVALUATION OF MEASURES IN SHORT LIST

Stakeholders were invited to evaluate each of the measures in the short list based on the evaluation criteria presented in Table 1.

Table 1 – Criteria for evaluation of adaptation measures

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description of criteria</th>
<th>Weight</th>
<th>Scoring the options against the criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness</td>
<td>How effective is the adaptation option in reducing the target impact?</td>
<td>3</td>
<td>1 – No evidence it reduces the target impact 2 – Limited evidence it can reduce the target impact 3 – Proven to reduce the target impact</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Do the benefits of the adaptation option exceed any associated costs?</td>
<td>3</td>
<td>1 – Benefits unlikely to exceed costs 2 – Benefits likely to exceed costs 3 – Benefits significantly exceed costs</td>
</tr>
<tr>
<td>Mitigation</td>
<td>Does the adaptation option support or conflict with the achievement of mitigation goals?</td>
<td>1</td>
<td>1 – Conflicts with the achievement of mitigation goals 2 – Potential to support the achievement of mitigation goals 3 – Strongly supports the achievement of mitigation goals</td>
</tr>
<tr>
<td>Urgency</td>
<td>Is the target impact that the adaptation option aims to reduce already being experienced?</td>
<td>2</td>
<td>1 – No experience of the impact 2 – Isolated records of the impact 3 – Impact regularly experienced</td>
</tr>
<tr>
<td>Multifunctionality</td>
<td>Does the adaptation option generate other benefits in addition to addressing the target impact?</td>
<td>2</td>
<td>1 – Solely addresses the target impact 2 – May generate several benefits in addition to addressing the target impact 3 – Will generate a range of benefits in addition to addressing the target impact</td>
</tr>
</tbody>
</table>

Stakeholders were asked to evaluate each measure along the five criteria described in table 1. Weighting of criteria has previously been defined together with the expert and remained same for all measures: Effectiveness 3, Efficiency 3, Mitigation 1, Urgency 2 and Multifunctionality 2. The results were obtained by multiplying the scores for each of the measures from 1 to 3 with the weighting factor of the criteria. The scores achieved for each measures are presented in Table 2.
The ranking of the measures based on the stakeholder evaluation is as follows:

Table 2 – Ranking of short list measures

<table>
<thead>
<tr>
<th>Rank</th>
<th>Measure</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>New irrigation systems construction and efficient use of existing ones</td>
<td>32,18</td>
</tr>
<tr>
<td>2</td>
<td>Multipurpose accumulation lakes (dams) for water supply, irrigation, erosion control, ecosystem services</td>
<td>30,18</td>
</tr>
<tr>
<td>3</td>
<td>Adaptation of cultivation technologies (selection of species and agro technical measures)</td>
<td>28,64</td>
</tr>
<tr>
<td>4</td>
<td>Highly functional reversible drainage pumping stations and use of drainage canals for irrigation</td>
<td>27,91</td>
</tr>
<tr>
<td>5</td>
<td>Forest belt planting in plain area to reduce wind erosion, reduce drying out soils, ensure irrigation uniformity, increase biodiversity</td>
<td>27,91</td>
</tr>
<tr>
<td>6</td>
<td>Energy supply for irrigation systems functioning (preferable from renewable sources)</td>
<td>27,73</td>
</tr>
<tr>
<td>7</td>
<td>Shadowing nets for water savings, temperature reduction and hail protection</td>
<td>27,73</td>
</tr>
<tr>
<td>8</td>
<td>Food processing industry/ freezing facility in vicinity of irrigation schemes</td>
<td>26,64</td>
</tr>
</tbody>
</table>

Based on this outcome, the measures ranked as 1, 2 and 3 will be proposed to move to stage 3 of the APF: Planning.
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Climate Strategy and Action Plan,
Republic of Serbia
(Contract No: 2016/375-531)

A project implemented by a GFA Consulting Group led consortium

# Attendance List

<table>
<thead>
<tr>
<th></th>
<th>Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Zeljka Rudic</td>
<td>The Jaroslav Cerni Institute for the Development of Water Resources</td>
</tr>
<tr>
<td>2</td>
<td>Zoran Vuckovic</td>
<td>“Srbijavode” - Public Water Authority of Serbija</td>
</tr>
<tr>
<td>3</td>
<td>Milan Malencic</td>
<td>“Vodevojvodine” - Public Water Authority of Vojvodina</td>
</tr>
<tr>
<td>4</td>
<td>Ljiljana Dudukovic</td>
<td>Ministry of Agriculture, Department for agriculture policy</td>
</tr>
<tr>
<td>5</td>
<td>Vladimir Djurdjevic</td>
<td>Institute of meteorology, Faculty of Physics</td>
</tr>
<tr>
<td>6</td>
<td>Klara Sabados</td>
<td>Institute for nature protection of Vojvodina</td>
</tr>
<tr>
<td>7</td>
<td>Stevan Petrovic</td>
<td>Belgrade Open School - Energy, Climate and Environment</td>
</tr>
<tr>
<td>8</td>
<td>Zeljko Mardesic</td>
<td>AQUADUCT doo Beograd</td>
</tr>
<tr>
<td>9</td>
<td>Kis Alen</td>
<td>Institute for nature protection of Vojvodina</td>
</tr>
<tr>
<td>10</td>
<td>Ana Vukovic</td>
<td>Faculty of Agriculture, Belgrade</td>
</tr>
<tr>
<td>11</td>
<td>Ana Repac</td>
<td>Ministry of Environmental Protection, CC Unit</td>
</tr>
<tr>
<td>12</td>
<td>Marko Ilic</td>
<td>Ministry of Environmental Protection, CC Unit</td>
</tr>
<tr>
<td>13</td>
<td>Aleksandar Popovic</td>
<td>Ministry of Environmental Protection, CC Unit</td>
</tr>
<tr>
<td>14</td>
<td>Ariana Savic</td>
<td>Ministry of Environmental Protection, CC Unit</td>
</tr>
<tr>
<td>15</td>
<td>Ruzica Stricevic</td>
<td>Climate strategy and Action Plan, Agriculture Adaptation Expert</td>
</tr>
</tbody>
</table>