LIFE ViVaCCAdapt

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ADAPTING TO THE IMPACT OF CLIMATE CHANGE IN THE VIPAVA VALLEY

EXPERT ASSESSMENT OF THE MEASURES PRESENTED IN THE CLIMATE CHANGE ADAPTATION STRATEGY FOR AGRICULTURE IN THE VIPAVA VALLEY FOR 2017-2021

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Expert assessment of the measures presented in the Climate Change Adaptation Strategy for agriculture in the Vipava Valley for 2017-2021 (LIFE15 CCA/SI/000070).

INSTITUTE FOR WATER OF THE REPUBLIC OF SLOVENIA (IZVRS)
DUNAJSKA CESTA 156
1000 LJUBLJANA
SLOVENIA

UNIVERSITY OF LJUBLJANA
BIOTECHNICAL FACULTY (UL BF)
JAMNIKARJEVA 101
1000 LJUBLJANA
SLOVENIA

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TABLE OF CONTENTS

FIGURES

1. Starting points

The strategic document "Climate Change Adaptation Strategy for Agriculture in the Vipava Valley for 2017–2021", has been prepared as part of the LIFE ViVaCCAdapt (LIFE15 CCA/SI/000070) Project. This document presents measures for enhancing agricultural climate change adaptation capacity in the Vipava Valley. The implementation of such measures will facilitate the better management of the risk associated with drought, flooding, frost and strong winds. Moreover, it will enable better responses to the agricultural opportunities arising as a consequence of climate change. Based on this strategic document, and by 2021, the Vipava Valley agricultural sector will implement the strategy's key adaptation measures to enhance its resilience in terms of the anticipated effects of climate change. The strategic document has been prepared with a focus on following objectives: (1) to provide expert starting points for the adaptation of local agriculture to climate change; (2) to determine a range of priority measures for the adaptation of local agriculture to climate change; and (3) to provide recommendations for the implementation of priority measures.

This strategic document is based on extensive analysis of all key national and local development programmes in the field of agriculture, and environment and water conservation, including measures directly or indirectly connected with adaptation to climate change. A range of key priority measures have been prepared in terms of the adaptation of agriculture in the environs of the Vipava Valley in response to climate change.

Of the 46 key priority measures, 32 are taken from the Rural Development Programme of the Republic of Slovenia 2014–2020 (MKGP, 2017), six from the Water Management Plan for the Danube River and Adriatic Sea Areas for 2016–2021 (NUV II; RS, 2016; RS, 2016a) and related Water Management Measures Programme (PU NUV II; RS, 2016b), three from the Regional Development Programme of the Northern Primorska (Goriška) Region 2014–2020 (Regional Development Agency of Northern Primorska, 2015), three from the Action Plan of Flood-Related Intervention Activities (Ministry of Environment and Spatial Planning, 2014), and two not included in the existing national and regional strategic documents.

The purpose of this document is to provide an expert assessment of the potentially negative and positive environmental impact pursuant to the implementation of measures proposed in the Climate Change Adaptation Strategy for Agriculture in the Vipava Valley for 2017–2021. Individual environment segments, i.e. nature, surface and groundwater, climate and soil, are discussed in detail below.

2. A brief description of the area and an overview of the current state of discussed environmental segments

The collected measures are planned for implementation in the area of the Vipava Valley basin where agricultural activity most concentrated. The Vipava River basin and its valley extend

throughout the south-eastern part of Slovenia. The central segment of the Vipava Valley is flysch formed, its outer reaches by limestone and the Dolomites (Pavšič, 2013). Favourable climatic conditions enabling a longer growing season in relation to in inland Slovenia and fertile soil suitable for growing a large number of cultivated plants are key to ensuring that agricultural production is widespread in this area (Prus, 2013; Honzak et al., 2017). The majority of land in the less-elevated segments of the Vipava Valley is used for agriculture, whilst its outer reaches and more-elevated segments are mostly covered by forest. Arable land has been shrinking over the years on account of once-intensive agricultural areas being reassigned as meadows and urban areas. Between 2002 and 2015, 2.1% of the arable land in the Vipava Valley area was reassigned as urban and meadow, and 3.5% of meadows into forest and scrubland (Magjar et al., 2017). If this trend continues, agriculture will need to be optimised in order to achieve the same volume of production and food self-sufficiency utilising a smaller land surface area. Urbanisation is moderate in the Vipava Valley and its environs, and concentrated in its lowlands: Ajdovščina, with a population of just above 6,600 (SURS, 2017), is its largest city. Industry is developed, particularly in the larger cities of the central and lower segments of the valley, such as Vipava, Šempeter, and Nova Gorica.

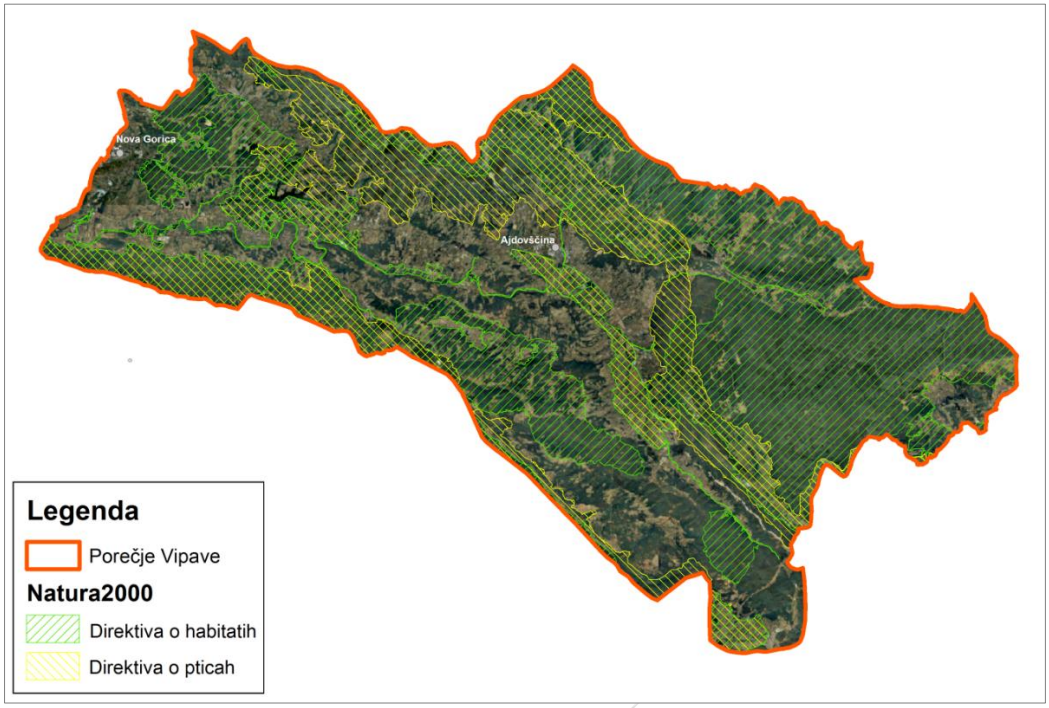
3. Current state

3.1 Nature

The natural vegetation in the Vipava Valley is sub-Mediterranean, and its growth has been severely limited due to the intensity of its use. Prior to extensive regulatory work, the typical floodplains along its watercourse were overgrown with hygrophilous vegetation. Riparian strip overgrowth was primarily attributed to tree and shrub species, which further enhanced the tessellation of this agricultural landscape. The predominant hedge-forming species were the black alder, common hornbeam, common maple, manna ash and ash, common oak, wild cherry, wild pear, and willow (Kladnik, 2013).

Despite human activity and intensive land use, the Vipava Valley and Vipava River Basin include a large share of Slovenia’s important nature protection areas, whose biodiversity is resultant of its specific geology and morphology. As much as 72% of the Vipava River Basin represents ecologically important areas, with 65% included in the Natura 2000 network, and 12% representing protected areas (IzVRS, 2017). The Vipava River Basin includes six Natura 2000 sites, based on the Habitats Directive, that is, the Vipava Valley, Trnovski Gozd Forest and Nanos, Branica Valley and Vrhe nad Rašo. Vipavski Rob Edge and Nanoščica are Natura 2000 sites, as based on the Habitats Directive and the Birds Directive (Figure 1). The broad reach of the Vipava Valley includes a rich representation of animal species, with qualification species amongst birds, fish, amphibians, reptiles, crustaceans, crabs, bats, butterflies, dragonflies, insects, and mammals. Plant species characteristic of this area are the Bertoloni Columbine, Genista Holopetala, Lady's Slipper Orchid (Cypripedium calceolus), Fen Orchid **(**Liparis loeselii), Zois' Bellflower (Campanula zoysii), Arabis Scopoliana, Primula Carniolica and Hladnikia Pastinacifolia, which is a so-called paleoendemic, and the only species endemic species to Slovenia. Important habitat types in this area protected in the context of Natura 2000

include various forest ecosystems, caves, extensive meadow and grassland, and rocky slopes and scree (Natura 2000 Network Viewer; Natura 2000 in Slovenia).



Legend:

The Vipava River Basin

Natura 2000

The Habitats Directive

The Birds Directive

Figure 1: Natura 2000 areas in the Vipava River Basin (IzVRS, 2017).

According to the report prepared by the Institute of the Republic of Slovenia for Nature Conservation for Reporting to the European Commission in 2013 (Aggregate Report under the Habitats Directive 2013), habitat types and species in the area of the Vipava Valley face unfavourable conditions. In general, habitat types in Slovenia are tied to agricultural landscape, such as extensive meadows and grasslands in unfavourable, or poor condition. The existence of these various habitat types is often endangered pursuant to urbanisation, watercourse regulation, and agricultural intensification with excessive mowing and fertilisation, whilst on the other hand, the existence of certain habitat types is endangered due to the progressive abandonment of mowing and concomitant surface overgrowth. This is evident in the Vipava Valley where the main problem in terms of habitat and species preservation is the abandonment of mowing and pasturing in remote areas on the one hand, and, on the other hand, intensive use with frequent mowing, fertilisation and ploughing in the flatland part of the valley. In terms of nature conservation, what remains of the unfertilised wet meadows, which have become almost extinct in the Vipava Valley and most concentrated in Mlake pri Vipavi, are extremely important (Wraber, 1998; Kaligarič, 2000). Wet meadows provide living space for many species and Mlake represents the “hot spot” for butterfly species diversity in Slovenia

(Verovnik, 2013). Wet meadows also include the corncrake (*Crex crex*), a globally endangered bird species whose largest population is found on Ajševica's meadows, followed by Nanoščica and its environs (Vipavski Rob Edge). Meadows at higher altitudes are becoming overgrown, although this process is slightly slower pursuant to the bora wind's strong influence.

3.2 Surface water and groundwater

The Vipava Valley and its environs is part of the Soča River and Adriatic Sea basins. In accordance with Directive 2000/60/EC of the European Parliament and Council of 23 October, 2000, establishing a framework for Community action in the field of water policy (Water Directive), the Vipava River Basin, as with the other river basins in Slovenia, is regulated in accordance with the National Strategic Water Management Plan and relevant programme of measures (NUV II and PU NUV II). According to climate change projections (Honzak et al., 2017), the Vipava Valley will witness water shortage and periods of drought in the warmer periods of the year, as well as increased precipitation in the Winter and Spring, in the future. The main challenges in the field of water will, in the future, arise pursuant to the necessity of flood and erosion risk reduction, water use optimisation, and achieving and preserving water's good ecological, chemical and quantity status.

In accordance with the criteria for the evaluation of the ecological status of surface water bodies provided in the Decree on Surface Water Status (Official Gazette of the Republic of Slovenia nos. 14/2009, 98/2010, 96/2013, 24/2016) and in the Rules on Monitoring the Status of Surface Water (Official Gazette of the Republic of Slovenia nos. 10/2009, 81/2011, 73/2016), the chemical status of all surface water bodies in the area of the Vipava Valley is good. Good water body ecological status is achieved in the upper and central parts of the Vipava Valley, whilst in the lower part, ecological status is assessed as moderate due as a result of increased nutrient content. Nutrient pollution has an important impact on water status at the Miren sampling site; in the central and upper part of the Vipava Valley, the impact of dispersed sources of nutrient pollution are present, though do not significantly affect water status (RS, 2016a). Agricultural activity, which is widespread in the catchment area, represents an important dispersed source of nutrients. In the Vipava Valley, the quality of water for freshwater fish species is assessed at two sampling sites; at both sampling sites, Velike Žablje and Miren, the quality of water was found to be suitable for freshwater fish species (RS, 2016a) as no parameter exceeded limit values set in the Decree on the Quality Required of Surface Waters Supporting Freshwater Fish Life (Official Gazette of the Republic of Slovenia nos. 46/2002, 41/2001 – ZVO-1). A moderate ecological potential with a medium level of confidence was assessed between 2009 and 2015 (ARSO, 2016) for the Vogršček Retention Basin. In the said period, the retention basin's chemical status was assessed as good. A good chemical status with a high level of confidence was assessed for groundwater bodies between 2007 and 2015, and groundwater quantity status of was also assessed as good (RS, 2016a).

According to the methodology of Cvejić et al (2015), the starting point for the use of water for irrigation in surface water bodies, Hubelj, Vipava Brje-Miren, and the upper part of the Vipava River Basin, Brje, is good, as both chemical and ecological status are assessed as good. A moderate ecological potential provides an unfavourable starting point for the use of water for

irrigation at Vogršček Retention Basin, despite its good chemical status. Disregarding accessibility, reliability and groundwater source abundance, a favourable starting point for the use of water for irrigation is found at the groundwater body Goriška Brda and Trnovsko-Banjška Plateau.

3.3 Climate

Agricultural production is also affected by climate; anticipated climate change is a burden on the agriculture (ARSO, 2014). It is expected that, pursuant to decreasing quantities of available water, and increasing temperatures and evapotranspiration in the growing season (Honzak et al., 2017), it will negatively impact on agricultural production in the Vipava Valley in the future. All of the aforementioned impact is reflected in agricultural and hydrological drought, a consequence of which is increased water consumption in the growing season, especially during the summer months when water availability is even scarcer (Gregorčič and Muri, 2014).

4. Anticipated impacts of measure implementation

4.1 Nature

4.1.1 RDP measures

The Rural Development Programme (RDP) 2014–2020 encompasses national priority tasks emphasising care for the environment and nature, for example, the programme promotes agricultural practices that have a favourable impact on the conservation of natural resources, climate change adaptation, green job creation, the harmonious and sustainable development of rural areas based on the development of local environment endogenous potential, the transfer of knowledge, and innovation. The measures in the RDP include many sub-measures promoting farming methods compatible with nature conservation and natural resources sustainable use. The conservation of nature, habitats and biodiversity is particularly attended to in the following measures: Agri-Environment-Climate Payments (Measure M10), Organic Farming (M11), and Payments to Areas Facing Natural or Other Specific Constraints (M13). All of these measures combine various operations with the purpose of contributing to: the preservation and/or improvement of agricultural landscape habitat biodiversity; the diminution of agriculture's negative impact on surface and groundwater quality; decreasing negative impact on soil, air and landscape; and the mitigation of and adaptation to climate change. The implementation of the aforesaid measures positively affects agricultural landscape ecosystems by promoting the implementation of, so-called, above-standard sustainable practices, which represents higher demands when compared to ordinary agricultural practice. The implementation of above-standard sustainable practices can significantly reduce environment nutrient and phytopharmaceutical pollution pursuant to their use being controlled in terms of both quality and quantity. As result, the leaching of these substances into the environment is reduced, as well as their negative impact on other, non-target, bodies. In the context of the agri-environment-climate payments measure, farming is promoted and introduced in a way that is adapted to the preservation of certain habitats and types, e.g. the preservation of grassland

habitats, and habitats important for typical butterfly and bird species. The adaptation of agricultural practice to the ecological requirements of certain species delivers a positive impact in terms of the preservation of Natura 2000‘s qualification habitat types and qualification species; the payments to areas facing natural or other specific constraints measure, which covers more remote areas with prevailing rich biotic grasslands, also importantly contributes. Compensation, therefore, directly contribute to conserving the favourable state of grassland in these areas, which would otherwise be overgrown and, as a consequence, lead to the disappearance of characteristic habitats and species. In addition to the aforesaid measures, a positive impact on nature is also delivered by RDP 2014–2020 measures, which refer to the advising and training of farmers and forest owners, e.g. Support in Using Advisory Services (M2.1). The proper provision of information to land users is a prerequisite for raising awareness on the importance of nature conservation, sustainable land use and increasing interest in RDP inclusion and, consequently, the implementation of measures that have a positive effect on the environment and nature.

Negative impact on the natural environment could be delivered by implementing the investments in physical assets measure, which includes melioration, agromelioration and irrigation systems. Likewise, potentially negative effects on the natural environment and forest ecosystem biodiversity could be delivered by measures that promote investment in forest management, more intensive felling and deforestation; these are, particularly, measures found in M4, M8 and M16. Potentially negative effects on nature could also be delivered by measures that involve investment in agricultural activity, and farm and company development; this being reflected in increased agricultural surface volume and more intensive farming in the environs of the Vipava Valley, and, potentially, a diminishment in the extent of natural habitats and species diversity endangerment in this area. Such intervention changes ecosystems and, thereby, require suitable planning and judgment in accordance with the applicable regulations prior to implementation.

4.1.2 PU NUVII measures

The measures found in the national strategic document Water Management Plan for the Danube River and Adriatic Sea Water Areas for 2016–2021 (NUV II) and the relevant Water Management Measures Programme (PU NUV II) refer to water and related ecosystem conservation. In the strategic document, the following measures are taken from the Water Management Plan: Water rights granting system (R1a); Restrictions, prohibitions and conditions of water use (R3a); Promotion of effective and sustainable water use (R5a); Water use decision-making support system (R1b1); Monitoring surface and groundwater (OS6a); Water use decision-making support system (R1b1); and Preparation of a range of indicators to announce different levels of strength and thresholds of drought/water shortage (OS3.2b8). These measures promote and regulate the use of water to ensure the long-term protection of available water resources and their quality.

All of the aforementioned measures endanger the achievement and preservation of the good ecological and agricultural status of surface waters, and good chemical and quantity status of groundwater, pursuant to the overuse of water in accordance with the Water Directive

(2000/60/EC). These measures promote agricultural production adaptation in dry areas by promoting the cultivation of more drought resistant crops; furthermore, water reuse and rational irrigation method utilisation are promoted. All of these measures have a positive effect on the natural environment by means of their inherent water and riparian ecosystem protection. These measures contribute to a reduced nutrient and pollutant intake by surface and groundwater bodies. Nutrient intake is especially problematic in the lower part of the Vipava Valley, diminishing, as it does, surface water status.

These measures also contribute to the provision of an ecologically acceptable flow, which is particularly important in the summer months when there is less precipitation. Also typical of the aforementioned measures is that, in general, they mitigate the negative impact of agricultural production on water status, and related species and habitat types. In the area of the Vipava Valley, water-related environments include many characteristic animal and plant species. It is expected that these measures will indirectly and positively impact on the status of these species and habitats. Together with RDP measures, where a positive impact on the natural environment is recognised, these measures have a cumulative and synergistic effect. It is expected that the implementation of the selected measures taken from NUVII will not negatively affect the natural environment.

4.1.3 Regional Development Programme measures

The measure taken from the Regional Development Programme for the Northern Primorska Region 2014–2020, Establishment of a forestry-wood processing chain and increased wood use in the industry and energy sectors (R1), promotes the effective and sustainable use of wood biomass in the region, and this positively affects the natural environment as it can contribute to the preservation of forest habitats. Moreover, this measure also promotes the integration of forest owners for the purpose of stronger market performance. Moreover, this measure anticipates the establishment of a forestry-wood processing chain, biomass logistic centres, and the promotion of wood use. On the other hand, such activities can negatively affect the natural environment due to the concomitant intensification of felling and consequent shrinking of forest ecosystems. If the sustainable aspect of wood use is properly applied in felling, such negative impact will be negligible.

The measure “Development of irrigation in the Vipava Valley and Goriška Brda” (R2) anticipates an arrangement of retention basins and irrigation systems which could negatively affect the natural environment. The construction of new retention basins and irrigation systems changes natural habitats, leaving the environment degraded and with lower ecological value. Improving the operation and maintenance of existing systems and making better use of their potential prior to the construction of new retention basins is most appropriate. If new retention basins and irrigation systems are constructed, we suppose that their geographical location will be properly assessed and that they will be acceptable in terms of the environment. It is expected that of such projects, only the projects with acceptable environmental impact will be implemented and that the requirements for their management and monitoring of the situation regarding impact for each individual facility will be accurately determined. This is procedurally ensured by the need to obtain suitable consent, permits and provisions in accordance with the

applicable legislation. With proper intervention planning and assessment of the environmental acceptability of the proposed solutions for the implementation of measures, the potentially negative impact of the arrangement of irrigation systems resulting from more intensive agriculture and consequent increased use of nutrients and phytopharmaceuticals can be substantially reduced and limited to the smallest possible areas. At the same time, it is most important to raise the level of knowledge about irrigation as the professionally correct implementation of irrigation reduces potential water environment pollution.

The implementation of the measure "Flood Safety of the Area Along the Vipava River" (R3), with its purpose of ensuring flood safety in the Soča River Basin, has a potentially negative impact on the natural environment due to its inherent intervention on surface water bodies and related ecosystems. Similar to the previous measure, it is expected that, prior to implementation, such activities will be properly assessed and that their negative impact will be reduced by the maximum possible extent.

4.1.4 Independent measures

Testing the cultivation of new plant species and agricultural varieties has an indirect positive impact on the natural environment. The cultivation of plants resilient to unfavourable weather conditions, such as, flooding, strong wind, and drought, helps to reduce the use of water for irrigation and the use of nutrients and phytopharmaceuticals. All this means a reduction in negative environmental impact pursuant to human activity. Introducing new crops can increase the heterogeneity of living areas in agricultural landscapes, potentially increasing species diversity in such areas. The impact of introducing new species and agricultural varieties can also be negative if new organisms start spreading beyond controlled areas, which could endanger autochthonous species and lead to biologic environmental burden. The risk of negative environmental impact is, however, significantly diminished or prevented, if the relevant legislation is consistently observed.

Comprehensive renovation of windbreaks in the Vipava Valley would have a potentially direct positive impact on the natural environment, increasing habitat heterogeneity and consequent species diversity in the agricultural landscape. These measure would deliver an indirect positive impact on the natural environment with their improvement of agricultural conditions, which could be reflected in decreased water use on account of reduced wind strength. Here, special attention must be paid in the selection of suitable tree and shrub species, that is, species which have a higher ecological value and can positively contribute to landscape image need to be chosen. The LIFE ViVaCCAdapt Project will include a demonstration area with a green windbreak to provide education related to the positive effects of windbreaks. In order for green windbreaks to be effective, it is vital that they are comprehensively renovated and maintained. Negative environmental impact is not expected if the measure is implemented correctly.

The implementation of measures arising from the "Action Plan of Intervention Activities Due to Floods" can negatively impact habitats and species as a result of various construction and non-construction intervention in water and riparian ecosystems. It is expected that these measures be assessed during implementation in terms of environmental acceptability and that their negative impact be minimised.

4.2 Surface and groundwater

4.2.1 RDP measures

The implementation of many measures from the RDP contributes to achieving the objectives set in the Water Directive (2000/60/EC), i.e. achieving and keeping the good ecological and chemical state of surface water, and good chemical and quantity status of groundwater in the area of the Vipava River Basin. A positive impact will mainly be delivered pursuant to a reduction in nutrient and phytopharmaceutical water pollution, as supported by the measures taken from Agri-Environment-Climate Payments (M10) and Organic Farming (M11). In the context of these two measures, many sub-measures and operations restrict the use of nutrients and phytopharmaceuticals, and promote the use of substances that pose less risk to water status. A positive impact on surface and groundwater status is also expected from the implementation of measures that include advice and training for farmers and forest owners. In this, the promotion of a correct and rational use of substances that potentially pollute surface and groundwater is expected. Moreover, advice and training is aimed at promoting investment that improves wastewater management. As part of the organic farming measure, expert advice and training is provided for beneficiaries on mitigating the negative impact of agricultural activity on the environment, particularly in terms of groundwater pollution prevention. This measure, amongst other things, prevents the use of synthetic substances for plant protection, such as, herbicides and other phytopharmaceuticals, and readily-soluble mineral fertilisers, which directly prevents groundwater pollution by pesticide residue and, to a certain extent, nitrates. In the context of these measures, a more effective use of water in agriculture is promoted, delivering a positive effect on ecological and chemical water status, as well as groundwater quantity status.

A negative impact on water status in the Vipava Valley region could be delivered by the measures that promote irrigation system arrangement. Increased use of water can have a direct negative impact on water quantity status, which could, moreover, be reduced by the reuse of waste water for agricultural irrigation, which has not been addressed in any of the strategic documents to date. The indirect negative impact of measures that promote irrigation system arrangement could be related to the intensification of agriculture pursuant to irrigation. Increased agricultural production can increase the use of nutrients and phytopharmaceuticals and, consequently, aggravate water status due to the leaching of such substances into surface and groundwater. Even so, in the context of the RDP, only those projects that ensure irrigation sustainability and observe the Water Directive and NUV II should be supported. If irrigation systems arrangement leads to a more efficient use of water, this would have a potentially positive effect on water status. Furthermore, it needs to be emphasised that professional of irrigation implementation reduces the potential for water pollution by nutrient and phytopharmaceutical residue; therefore, special attention needs to be paid to the training of farmers in terms of professionally-adequate irrigation, or they need to be provided with a decision-making support system for facilitating professionally-correct irrigation.

4.2.2 PU NUVII measures

The implementation of measures taken from these two national strategic documents would have a positive effect on the ecological, chemical and quantity status of water. All of the measures taken from these two documents support the sustainable use and protection of surface and groundwater. No negative impact pursuant to the implementation of these measures on water status is expected.

4.2.3 Regional Development Programme measures

The development of irrigation in the Vipava Valley and Goriška Brda measure anticipates the arrangement of retention basins and irrigation systems which can have similarly negative effects on water status, such as, those described in the irrigation systems arrangement measures taken from the RDP. The construction of retention basins delivers substantial physical change, which lead to hydromorphological burden and diminution of the ecological and chemical status of water bodies. The construction of retention basins and irrigation systems means the agricultural intensification, which can negatively affect the water status, as described in the measures taken from the RDP. Negative impact on surface water status can also be delivered by the implementation of the measure flood protection in the area along the Vipava River measure", as the setting up of flood safety leads to hydromorphological burden in surface water bodies. Such burden negatively affects the ecological status of surface water bodies. Similar negative effects can be expected from the implementation of the measures arising from the Action Plan of Flood-Related Intervention Activities. In implementing these measures, it is expected that they be assessed in terms of environmental acceptability and negative impact minimisation.

4.2.4 Independent measures

Testing the cultivation of new plant species and agricultural varieties has an indirect positive impact on water status as such measure can help decrease the use of water for irrigation, as well as the use of phytopharmaceutical and mineral fertilisers; no negative effect on water status is expected.

The comprehensive renovation of windbreaks in the Vipava Valley is expected to deliver a positive impact on water status by improving agricultural conditions. Improved conditions will be reflected in reduced water utilisation pursuant to wind strength reduction; the use of nutrients and phytopharmaceuticals can also be reduced. When locating windbreaks, the impact of work on watercourses and new hydromorphological burden must be prevented. If the measure is implemented correctly, no negative impact on water status is expected.

4.3 Climate

It is expected that none of the anticipated measures will have any effect on climate, nor accelerate or decelerate expected climate change.

4.4 Soil

All of the measures taken from the RDP promoting a reduction in the use of phytopharmaceuticals in agricultural production prevent or diminish soil burden. Reduced soil burden contributes to the improvement of its properties and management thereof. The arable farming and vegetable cultivation operation, included in the agri-environment-climate payments measure, contributes to the improvement of soil conditions by: improving soil fertility and structure; increasing soil microbiological activity; protecting soil from harmful weather effects, such as, soil crusting, loss of moisture, and erosion; positively affecting plant health effects, such as, fewer weeds, pests and pathogens; and preventing subsoil nutrient leaching. The measures connected with promoting irrigation will positively affect soil microbiological activity, and its ability to use excess nutrients and decompose phytopharmaceutical residue. The measures taken from the RDP are not expected to deliver any negative soil impacts.

The measures taken from the NUVII can have a positive impact on soil, particularly in terms of water use arrangement and excessive irrigation prevention, a result of which is nutrient and polluter leaching in the form of phytopharmaceuticals into the soil; negative impact of these measures on Vipava's soil is not expected.

5. Conclusion

Implementation of the measures recognised as a priority and collected in the "Climate Change Adaptation Strategy for Agriculture in the Vipava Valley for 2017-2021" will not deliver any material negative impact on the natural environment, surface and groundwater status, soil, and expected climate change. It was found that, potentially, most of the discussed measures have positive effects on the condition of the discussed segments of the environment. The measures that are expected to positively affect several segments of the environment have a synergistic effect. Potentially negative effects, however, have been identified for certain measures, particularly those mainly referring to spatial intervention in the form of construction work, e.g. retention basin construction , irrigation systems, and setting up flood protection. It is expected that such intervention will be properly assessed prior to implementation in accordance with the applicable legislation. In the context of obtaining consent, permits and decisions, all environmental factors and impact of every individual intervention should be considered. Proper planning of procedures and assessment of the environmental acceptability of the proposed solutions diminishes and/or entirely prevents the negative effects of measure implementation.

Indirect negative effects can be delivered by investment-promotion measures, which can intensify agricultural activity in the discussed area. The majority of measures are focused on sustainable land and natural resource utilisation, which requires finding the balance between nature conservation and increased economic performance.

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