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BioEast: Central-Eastern European initiative for knowledge-based agriculture, aquaculture and forestry in the bioeconomy

Abstract: The territory of the Central and Eastern European (CEE) countries mostly belongs to the Continental and Pannonian Bio-geographical Regions. Specific and extreme changes in the weather resulting from the very nature of these Regions can be expected in the near future, and adaptation in agriculture and the bioeconomy is a challenge. Furthermore, in many of these countries the current levels of research, innovation, cooperation and lobbying are substantially below the European Union (EU) average, and this research and innovation divide in Europe hinders both the unlocking of excellence in the CEE region and the development of the European Research Area. BioEast is a new strategic research agenda designed to address these challenges. This paper, firstly, introduces the objectives and focus areas of BioEast; secondly recounts the CEE countries' actions so far; thirdly describes the institutional set-up of BioEast; fourthly summarises the conclusions from the BioEast workshop held in Budapest on 21-22 February 2017; and fifthly shows how BioEast can help to focus the EU's agricultural research agenda, especially Horizon 2020, the research and innovation framework programme for the period 2014-2020. Five specific topics are proposed: (a) coordination of bioeconomy-related research and innovation activities; (b) response to climate change and socio-economic challenges; (c) a buffer zone against pathogens; (d) freshwater fish production; and (e) integrated biomass production. Finally, some future actions for BioEast are suggested.

Keywords: biogeographical region, Visegrad countries, climate change, socio-economic challenges, Horizon 2020.

Over the last ten years the resources of the Common Agricultural Policy have helped the Central and Eastern European (CEE) countries of the European Union (EU) to improve their agri-food sectors, environment and rural areas, thus increasing economic and social cohesion. However, in order to achieve further progress in the sustainable growth of agriculture, aquaculture and forestry in the bioeconomy, much more emphasis is needed on research, innovation and transnational cooperation for knowledge-based development. BioEast, the Central-Eastern European Initiative for Knowledge-based Agriculture, Aquaculture and Forestry in the Bioeconomy, is a new strategic research agenda for achieving this greater emphasis. Based on the recognition that, owing to the global challenges, sustainability is only achievable at the macro-regional level, BioEast offers a shared strategic research and innovation framework for working towards sustainable bioeconomies in the CEE countries that form part of the Continental and Pannonian bio-geographical regions of Europe.

A biogeographical region can be defined as an area of animal and plant distribution having similar or shared characteristics throughout. The EU has nine terrestrial biogeographical regions (Alpine, Atlantic, Black Sea, Boreal, Continental, Mediterranean, Macaronesia, Pannonian and Steppic). Most of the territory of the CEE countries of the EU belongs to the Continental and Pannonian Bio-geographical Regions (EEA, 2002). Specific and extreme changes in the weather resulting from the very nature of these Regions can be expected in the near future, and adaptation in agriculture and the bioeconomy is a challenge. Building sustainable national bioeconomies requires this challenge to be addressed, alongside the common social and governance issues of the CEE macro-region. The sustainability criteria for a circular economy add an additional feature. Furthermore, the research and innovation capacities of the CEE countries are facing significant internal disparities: in many countries, the current levels of research, innovation, cooperation and lobbying are substantially below the EU average. In terms of the CEE countries effectively joining the European Research Area (ERA) this is also a challenge to be tackled.

The CEE macro-region's societal, geopolitical, cultural and historical homogeneity and complexity may help to bring about the framework conditions favourable to bioeconomic growth. But joint efforts are required to address successfully the above-mentioned present and future challenges. A genuine macro-regional perspective, along with more vigorous EU-wide cooperation, is necessary for implementing in an effective and efficient way tailored actions that are conducive to safe, secure and sustainable development for all. Furthermore, the existing research and innovation divide in Europe hinders both the unlocking of excellence in these regions and the inclusion of specific research topics relevant to the Continental and Pannonian Bio-geographical Regions in the work programmes of Horizon 2020, the EU's research and innovation framework programme for the period 2014-2020.

In Horizon 2020, the focus of BioEast is on Societal Challenge 2 (SC2): Food security, sustainable agriculture, marine and maritime research and the bio-economy. SC2 has four components (a) Sustainable agriculture and forestry; (b) Sustainable and competitive agri-food sector for a safe and healthy diet; (c) Unlocking the potential of aquatic living resources; and (d) Sustainable and competitive bio-based industries. Work Programmes were published for 2014-2015 and 2016-2017, and a third programme is planned for the period 2018-2020. The low research, development and innovation performance of the CEE macro-region and the inadequate topic representation in Horizon 2020 not only blocks the realisation of the ERA but also the development of synergies with the European Agricultural Fund for Rural Development (EAFRD), the European Maritime and Fisheries Fund (EMFF) and the European Structural and Investment Funds (ESIF).

This paper, firstly, introduces the objectives and focus areas of BioEast; secondly recounts the CEE countries' actions so far; thirdly describes the institutional set-up of BioEast; fourthly summarises the conclusions from the BioEast workshop held in Budapest on 21-22 February 2017; and fifthly shows how BioEast can help to focus the EU's agricultural research agenda, especially Horizon 2020, the research and innovation framework programme for the period 2014-2020. The identification and implementation of specific research areas would not compromise the principle of excellence in research, on the contrary it would enhance it. Similarly, it would not mean the exclusion of other countries or macro-regions from the research: the experiences of other Regions (e.g. Mediterranean drought and Atlantic storms) would be essential for reaching relevant results. The paper concludes by suggesting some future actions for BioEast.

Objectives and focus areas of BioEast

BioEast pursues the seven objectives listed below. The achievement of these objectives would bridge the above-mentioned research and innovation gap in the CEE macro-region and could serve as the thematic framework of a Co-ordination Support Action (CSA) under Horizon 2020 for the macro-region:

- Initiate cooperation and the development of knowledge-based policies: establish a multi-stakeholder network and cluster at European level to facilitate joint actions, backed up by a renewed commitment to closer cooperation at both the political and operational levels through close personal contacts and communication between the countries concerned at the operational level;
- Identify common challenges and validate common research topics: map specific challenges for a Strategic Research Agenda and foster innovative multidisciplinary research and cooperation activities. These should address the relevant common CEE challenges by means of common work carried out by experts as a follow up to the Visegrad4+3 Common Declaration (discussed below);

- Initiate strategies: create a cross-sectorial approach for the development of a national circular and bioeconomy strategy;
- Provide an evidence base: establish data-driven support for implementation of policies through the creation of an interoperable, fully integrated observing and forecasting system. This would promote continuous, long-term observation based on open data structures to guarantee easy access;
- Improve skills: train a new generation of dedicated multi-stakeholder actors;
- Initiate development synergies: promote regional, national, EU and international funding opportunities to develop innovative technologies, methodologies and approaches. The purpose would be to boost the sustainable and circular economic growth of the European bioeconomy sectors and the conservation and upgrading of the regional environment, resources and cultural heritage;
- Increase visibility: draw attention to specific challenges and research potential of the macro-region, through involving society and promoting public awareness.



Figure 1. Observed and projected climate change and impacts for the main biogeographical regions in Europe

Source: EEA (2017).

BioEast has already developed and validated two common focus areas for the CEE macro-region (BioEast, 2017). These two focus areas can incorporate all the present and future research topics of the macro-region and could serve as the thematic framework of an ERA-NET Cofund call under Horizon 2020 for the macro-region:

- Response to challenges arising from the climatic and climate change specificities of the Continental and Pannonian Bio-geographical Region (Figure 1). A game changer would be to have region-specific research topics and CSAs in Horizon 2020 which reflect the current climate specificities, and address the distinctive and extreme changes in the weather that can be expected in the macro-region in the near future, as is already the case in Horizon 2020 for the Mediterranean Bio-geographical Region. Key topics include crop production, animal husbandry, forestry, aquaculture and food processing, and topics such as cooling and heating, pest and disease control, risk management, and knowledge sharing;
- Response to the policy and governance challenges arising from the socio-economic characteristics of the CEE macro-region. The countries of the CEE macro-region have several social and governance challenges in common which influence directly the development of agriculture, bioeconomy and rural areas. A game changer would be to conduct research on how to involve CEE society in solving the big societal challenges, and to overcome such common economic and social challenges for agriculture, bioeconomy and rural areas as the low uptake of innovation and modern technologies, the low level of cooperation, the implications of population ageing, the difference between the employment rate in predominantly rural regions and predominantly urban regions, or the extremely low level of consumer awareness.

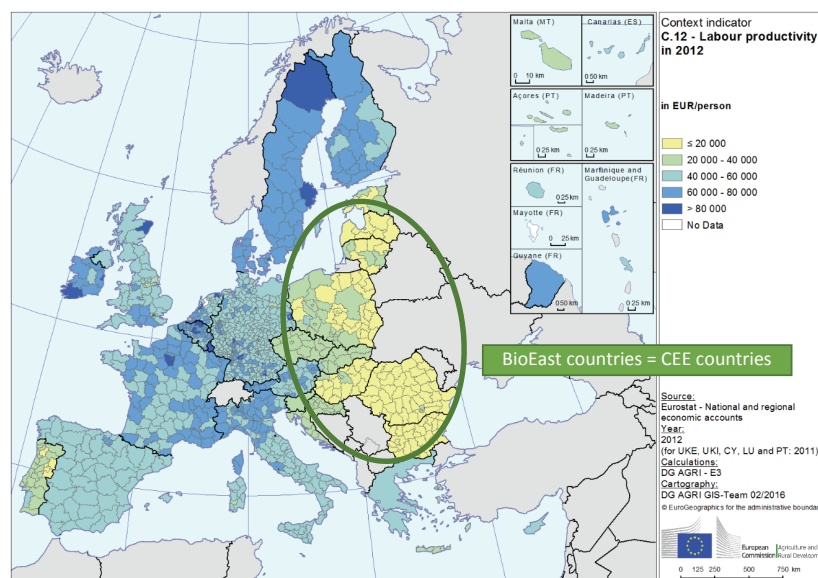


Figure 2. Labour productivity in the EU at NUTS 3 regional level in 2012

Source: EC (2016).

The countries concerned are committed to working together and to contributing to the further development of the ERA by organising joint programming exercises. A long-term process was initiated in 2015. The macro-regional research and innovation needs of the CEE countries have thus been communicated at the political and expert levels several times. Support from all the EU Member States and the European Commission (EC) is now crucial to maintaining the commitment of the supporting countries and organisations. Among the numerous CEE actions are the following milestones:

- The *EU Bioeconomy Strategy – How to develop the Hungarian Research and Innovation Agenda* conference held during the National Agriculture and Food Exhibition (OMÉK in Hungarian) in Budapest. This was jointly organised by the Hungarian Ministry of Agriculture and the Research Institute of Agricultural Economics (AKI) and took place on 25 September 2015;
- AGRIFISH COUNCIL – policy discussion concerning (a) the Fourth Standing Committee of Agricultural Research (SCAR) Foresight and (b) EU strategy in the field of agricultural research and innovation, presenting the position for more effective use of the research potential of the EU-13 in the field of agriculture within Horizon 2020. Events were held on 15 December 2015 (a) and 15 February 2016 (b);
- Presentation and repetition position during SCAR works since the end of 2015;
- Active participation in the consultation process on the long-term EU strategy in the field of research and innovation in agriculture – consultation conducted by the EC from December 2015 to January 2016;
- Priority of the Polish Presidency of the Visegrad Group (2016-2017): more effective use of the research potential of the Visegrad Group countries in the field of agriculture within Horizon 2020;
- *Policy Guidelines for Agricultural Research* workshops (I, II, III) organised jointly by the Hungarian Ministry of Agriculture, AKI and the Hungarian Chamber of Agriculture (NAK) on 10 November 2015, 14 January 2016, 27 and 31 May 2016, and 3 June 2016 in Budapest, Pápa, Kecske-mét and Debrecen, Hungary (with Hungarian participants – researchers, farmers, advisors and other stakeholders);
- A meeting between Robert-Jan Smits (Director-General of DG Research and Innovation at the EC) and the Hungarian Ambassador on 15 February 2016 and a meeting between Jerzy Bogdan Plewa (Director General of DG Agriculture and Rural Development at the EC) and the Hungarian Ambassador on 16 February 2016;
- Workshop on the bioeconomy in Bratislava on 18 April 2016; participants came from the Czech Republic, Hungary, Poland, Slovakia and the EC;
- BioEast-CEE cooperation between research institutes organised by AKI on 8 June 2016 in Budapest; participants came from the Czech Republic, Hungary, Poland and Slovakia and Romania;

- Budapest Innovation Week (comprising the annual conference of the European Rural Development Network, a meeting of the SCAR Strategic Working Group on Agricultural Knowledge and Innovation Systems (AKIS), and a workshop in the frame of the DANUBIONET project), organised in Budapest by the Hungarian Ministry of Agriculture, AKI and NAK from 3 to 7 October 2016;
- Lodz Declaration of Bioregions, signed on 6 October 2016 on the occasion of the European Bioeconomy Congress;
- Bratislava Bioeconomy Conference organised by the Slovak Presidency of the EU together with EC under the auspices of SCAR, held on 17 October 2016;
- Common efforts under the Polish Presidency of the Visegrad Group – Meeting of the Ministers of Agriculture of the V4+3, adoption of the *Visegrad4+3 Common Declaration* for the stronger inclusion of the research potential of the EU-13 Member States in the implementation of projects within Horizon 2020 in the field of agriculture and the bioeconomy, with common proposals for topics as part of the Declaration;
- AGRIFISH Council held on 15 November 2016 – official presentation of the *Visegrad4+3 Common Declaration* broadly supported by the EU Member States and the EC prior to the Council meeting, a letter addressing EU Commissioners Carlos Moedas (Research, Science and Innovation) & Phil Hogan (Agriculture and Rural Development);
- Competitiveness Council (COMPET) ‘Any Other Business’ point on 29 November 2016;
- The BioEast initiative was presented to and welcomed by the Visegrad Group Agricultural Chambers on 1-2 December 2016 in Balatonfüred, Hungary;
- SCAR Plenary meeting including ‘Bioeconomy developments’ in Brussels on 6 December 2016, where the *Visegrad4+3 Common Declaration* and the BioEast initiative were presented;
- Horizon 2020 SC2 Programme Committee meeting - Presentation of the *Visegrad4+3 Common Declaration* on 18 January 2017;
- The BioEast initiative was presented and discussed at a COPA-COGECA Working Party on Research in Brussels on 15 February 2017;
- BioEast workshop in Budapest on 21-22 February 2017, discussed in detail below.

Institutional set-up of BioEast

After two years of enthusiastic actions it was evident that, to be able to operate effectively via a truly multi-stakeholder approach and at the macro-regional level, a more formal cooperation mechanism (contributing to the first objective) was needed. Despite the common aims of the CEE countries, the actions carried out so far have been fragmented and uncoordinated, and

thus less efficient than they might have been. During the last two years, several actions were launched and different organisations have been working in parallel.

The Common Declaration of the Ministers of Agriculture of the four Visegrad Group countries (the Czech Republic, Hungary, Poland and Slovakia), and Bulgaria, Romania and Slovenia (the so-called *Visegrad4+3 Common Declaration*), was signed in Warsaw on 26 October 2016 and created a political base to act uniformly and represent the various interests imperiously both within and outside the borders. It was stated in the Declaration that, in order to achieve progress in a sustainable increase in the biomass potential of agriculture, aquaculture and forestry, the emphasis must shift to research, innovation and transnational cooperation for knowledge-based development. The *Visegrad4+3 Common Declaration* was presented at the EU AGRIFISH and Competitiveness Council meetings in November and December 2016. It underlined the need to find effective solutions to ensure a stronger recognition of the research needs and potential of the CEE countries in the co-creating and functioning of the ERA in the field of biomass production and processing.

The BioEast initiative aims to align the research and innovation efforts of the countries that are parties to the Declaration, while being open to other EU Member States. The Visegrad4+3 Common Declaration contains the goals and the BioEast Initiative can be the necessary tool capable of formalising the operation and facilitating the achievement of those goals. During the policy meeting held on 21 February 2017 the participants agreed on the elaboration of this tool.

The countries of the CEE macro-region are expected to communicate with the EC at both the expert and political levels. The former includes representatives of ministries, research institutes, academies of sciences, universities, and chamber organisations involving the industry. The political-level discussions will happen in the Visegrad Group working groups in the constellation of the different ministries, the communication will involve the H2020 SC2 Programme Committee and SCAR. Both levels will be governed by the Secretary, Mr. Barna Kovács (who used to work for the European Commission) who will give a face to the Initiative and furthermore will communicate with the Visegrad Group Presidency. The latter rotates yearly among the four countries. The Polish Presidency runs from July 2016 to July 2017, and will be followed by the Hungarian Presidency.

Conclusions from the BioEast workshop held in February 2017

Since the *Visegrad4+3 Common Declaration* was signed, several expert meetings and other events have been held that have confirmed that the proposed

topics listed in the annex of the Declaration are of extremely high importance for the CEE macro-region. Foremost among these is the workshop held in Budapest on 21-22 February 2017 that was organised by the Hungarian Ministry of Agriculture in cooperation with AKI and NAK. It gathered together approximately 100 participants from ministries, research institutes, academies of sciences, universities, chamber organisations and PC and SCAR members with relevant expertise at an operational level. The aim of this workshop was to deepen cooperation in the field of agricultural research in the bioeconomy. During the workshop some common research topics were further developed by research experts representing the CEE countries. After developing a more stable operational structure, it is also crucially important to harmonise and prioritise the most important common research topics of the CEE countries (contributing to the second objective of BioEast).

At the workshop it was highlighted that the CEE countries are being required by the EC to demonstrate profoundly their specific challenges and own resources while sharing their proposed research topics. That is why the experiences gained during the workshop justify a revision of the annex attached to the *Visegrad4+3 Common Declaration*. The BioEast proposal does not intend to rewrite or constrict the common situational analysis that is currently at our disposal. It is only expected to focus and group the topics from the point of view of the CEE specificities. In this way the macro-region's research needs will be better represented and built in the adequate policy tools and funding programmes. Two changes are therefore proposed.

Firstly, the two focus areas of BioEast have so far proved to be relevant throughout the work of the initiative, thus we believe that these two focus areas should form the organising principle of the *Visegrad4+3 Common Declaration* annex.

Secondly, certain topics proved to be more clearly defined and more relevant for the CEE participants than others, and these are missing from the first draft version (dated March 2017) of the Horizon 2020 SC2 work programme for the period 2018-2020. It is proposed that these two topics (which are described in detail in the next section of this paper) should be included and ranked as top priorities in the first table of the *Visegrad4+3 Common Declaration* annex that contains the topics that are of particular importance for the CEE region. Both topics have the support of networks that are already operational in CEE (Eurotransfop and NACEE).

- Strengthen the CEE countries as a buffer zone for emerging and changing pathogens caused by globalisation and climate change in the Continental and Pannonian Bio-geographical Regions;
- Sustainable, efficient and competitive freshwater fish production in the changing climate of the Continental and Pannonian Bio-geographical Regions.

BioEast's recommendations for Horizon 2020 SC2 WP 2018-2020

BioEast welcomes the draft of the Horizon 2020 SC2 work programme 2018-2020 (EC, 2017). It offers a wide range of relevant and useful topics, ranging from climate to supply chain related issues. This work programme could truly help CEE countries to find knowledge-based solutions to the challenges they face. Reference to bio-geographical region in topic SFS-21 is especially welcome, and acknowledged as a huge step forward. BioEast also views positively the inclusion of the new digital focus in the work programme as it can be a crucial element in reducing the development and innovation divide between the different macro-regions of Europe. However digital topics are only useful for CEE countries if they are also strongly focused on human capital and on the differences in the AKIS between the different macro-regions, shortly if the uptake of technology is provided for among different social and governance circumstances. Furthermore, BioEast welcomes the geographical focus of some topics prioritising China, Africa, Mediterranean and the countries of the Atlantic region. Such focusing of topics will help to implement the different actions and flagship initiatives and would have mutual benefits for societies in both Europe and other regions.

Nonetheless, BioEast can contribute significantly to making the work programme more specific, especially from the perspective of the CEE macro-region. The most urgent priority is to make it compulsory in some specific bioeconomy-related topics for the future consortia (chosen based on excellence, of course) to fully take into account the Continental, Pannonian and Boreal biogeographical region focus. The aim is not to impose an exclusive approach but rather to introduce a compulsory aspect to the specific topic without introducing any particular criteria for the provenience of the excellence. The scope is to solve some specific regional needs based on worldwide excellence without placing burdens on research.

Coupled with this, supporting the cohesion of EU Member States via cross-sectorial policy implementation based on research and innovation should be a horizontal activity of the work programme (Box 1).

Box 1. Proposed new horizontal activity for the Horizon 2020 SC2 work programme for the period 2018-2020

Title: Supporting the cohesion of EU Member States via cross-sectorial policy implementation based on research and innovation.

Specific challenge: The EC promotes policies such as on food or bioeconomy or circular economy which could help to solve the big societal challenges, but these require cross-sectorial approaches. The most developed EU Member States are able to face the challenge involving research and innovation excellence as an overarching principle and the governments developed cross-sectorial national strategies. By contrast, in the most affected cohesion countries, EU funds are spent on sector-specific projects without considering interlinkages. ‘Economic, social and territorial cohesion’ is achieved less and less, and the sustainability principle considering the environmental and societal approaches is missed. There is a need for research and innovation, and knowledge-based policy development.

The solutions for the ‘sustainability’ challenge of the national economies are only possible to achieve at the macro-regional level. The sustainability of the renewable resources including water is very much a macro-regional challenge, indeed a global challenge. The support actions should target the macro-regions. In the EU, most of the territory of the cohesion countries is located in the Continental and Pannonian Biogeographical Regions.

Scope: The scope of this action should help to recognise the need for national-level strategic thinking. A multi-sector specific approach such as a national bioeconomy strategy could help to build up sustainable national economies embedding the primary production sectors together with processing sectors including the food-feed, materials-chemicals and energy sectors. Framing the objectives of a sustainable bioeconomy would help to govern the European Structural and Investment Funds and also to involve other investments.

Source: own composition

BioEast also proposes the inclusion in the work programme of five Region-specific topics:

- Support to the BioEast Initiative: Coordination of bioeconomy related research and innovation activities (Box 2);
- Response to challenges arising from the climate change and socio-economic characteristics of the Continental, Pannonian and Boreal macro-region (Box 3);
- Strengthen CEE countries as a buffer zone for emerging and changing pathogens caused by globalisation and climate change (Box 4);
- Sustainable, efficient and competitive freshwater fish production in the changing climate (Box 5);
- Integrated biomass production for the multi-directional use taking into account management of land with the fragmented agrarian structure and marginal areas (Box 6).

Box 2. Proposed Horizon 2020 Research and Innovation Action on the topic of coordination of bioeconomy-related research and innovation activities

Title: Support to the BioEast Initiative: Coordination of bioeconomy related research and innovation activities in the Continental and Pannonian Biogeographical Regions.

Specific challenge: Addressing relevant challenges of the Continental, Pannonian and Boreal biogeographical region's countries towards its economic, environmental and societal sustainability, calls for a stronger knowledge basis that requires the coordination of bioeconomy research and innovation activities leveraging on past and ongoing regional, national and EU initiatives.

Scope: Proposals should deliver a long-term strategic R&D plan towards a sustainable prosperous Central and Eastern European area integrating policy, industry (including aquaculture), research and education, society, taking into consideration experiences from the developed EU countries and existing initiatives. Actions should support the BioEast Initiative which aims at coordinating the research and innovation activities to support a new sustainable approach to manage and exploit the potential of the Continental, Pannonian and Boreal biogeographical region in agriculture, forestry, aquaculture, for sustainable food processing, material and chemical use and energy industries. The ultimate aim to build sustainable national level food, bioeconomy and circular economy policies.

Expected impact: The implementation of the support action will help to have impact at macro-regional, national and micro-regional levels: (1) setting-up national and international cooperation and policy development; (2) supporting national bioeconomy strategies building; (3) SRIA development; (4) data and monitoring provision; (5) skills improvement; (6) initiating synergies development; (7) cross-sectoral cooperation fostering, engaging industrial stakeholders for development of the existing and new value chains; (8) increasing visibility and social awareness.

Source: own composition

Box 3. Proposed Horizon 2020 ERA-NET Cofund on the topic of responses to climate change and socio-economic challenges

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Topic: Response to challenges arising from the climate change and socio-economic characteristics of the Continental, Pannonian and Boreal macro-region.

Specific challenge: Agriculture, forestry, aquaculture and the agri-food sector are integral parts of the European economy and society. They are subject to multiple pressures from external drivers, which include rising food, feed, fuel and fibre demand, globalisation, environmental changes and public health aspects, and are constrained by planetary boundaries such as land and water limits. In the context of the sustainable biomass production the Continental, Pannonian and Boreal biogeographical region has a specific role in Europe and in the future of the sustainable European processing sector developments. With the expected increase in global population, demand for animal food products and competition for natural resources, agriculture, forestry and aquaculture will need to become more efficient, and sustainable. The sustainability criteria will be the game changer in bringing back the biomass production of the biomass in Europe for European society, as close as possible to the processing and consumption but being sustainable. The sustainable bioeconomy as part of a European circular economy would require macro-regional approach, specific macro-regional climate, ecosystem and societal pillars. The Continental, Pannonian and Boreal biogeographical region by its biomass production potential will play a key role in developing the European circular economy and common food policy.

Scope: Supporting the development of the Common European Food Policy, Central and Eastern European national level bioeconomy and circular economy strategies and policies, to enhance knowledge transfer from the best European knowledge hubs, to build up and enforce a cross European research network based on the priorities.

Expected impact: It is foreseen one call in 2020 to cover three topics from the perspective of the Continental and Boreal macro-region: (1) sustainable food production in the context of the European Food and Nutrition policy, considering the food system approach; (2) sustainable biomass production for material and chemical uses in the context of the Bioeconomy policy, considering the cascading use of the bioresources; and (3) societal acceptance in the context of circular economy policy, considering the innovative solutions and their acceptance by the society, developing models and methodologies on how to involve the Central and Eastern European society into policy making and acceptance.

Source: own composition

Box 4. Proposed Horizon 2020 Research and Innovation Action on the topic of a buffer zone against pathogens

Topic: Strengthen CEE countries as a buffer zone for emerging and changing pathogens caused by globalisation and climate change in the Continental and Pannonian Biogeographical Region.

Specific challenge: The gap is the thorough understanding of the synergetic effects of climate change, European integration and globalisation. Trade liberalisation offers easier trade of living and processed animal and plant products (and their packaging material). The economically advantageous trade liberalisation increases our vulnerability from the animal health and phytosanitary point of view (e.g. African swine fever, bovine besnoitiosis). Moreover, the impact of climate change increases the possibility of modified disease behaviour making spreading easier and causing a European level problem (e.g. grape and apricot phytoplasma).

Scope: The game changer would be to understand the synergetic effects of these two trends (increased trade and climate change) on animal and plant health with the help of forming a “buffer zone scientific network” to support monitoring and stopping these transboundary pathogens in the CEE countries and where possible save the rest of Europe from the economic losses. Preference will be given to consortia focusing on Continental, Pannonian and Boreal biogeographical regions of Europe as defined by the European Environment Agency

Expected impact: Owing to the advances in molecular diagnostics in microbiology, specific and sensitive technics are becoming available for the detection and rapid identification of significant pathogens. Improved methods of sample collection from wild animals and invertebrate vectors, with the combination of remote sensing techniques, epidemiological modelling and risk assessment; as well as reasonable and state of the art combination of target pathogens, could lead to the the development of an internationally standardised, comprehensive, cost-effective and real-time monitoring system for the early detection of significant, emerging animal pathogens. The well-planned and harmonised application of the monitoring system could reduce significantly the risk of the insidious spread of these pathogens in the EU. Preventing the introduction or immediately blocking the spread of such diseases is a key element of cost-effective animal and food production.

Source: own composition

Box 5. Proposed Horizon 2020 Research and Innovation Action on the topic of freshwater fish production

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Title: Sustainable, efficient and competitive freshwater fish production in the changing climate of the Continental and Pannonian Bio-geographical Regions.

Specific challenge: The challenge is related to the fact that, while freshwater aquaculture is known to provide 21 per cent of the total EU aquaculture production, it is still a largely unexplored (and, on an EU-wide policy level, somewhat neglected) area, which is also affected by the changing climate. The freshwater fish farming sector and, in particular, pond farming, whose European core area lies mainly within the Continental and Pannonian Bio-geographical Regions, is facing the challenge of maintaining sustainable and efficient production using limited resources, one that will become even more pressing in the future because of increasing water scarcity and the growing incidence of climatic and hydrological extremes. The largely unacknowledged and uncompensated provision of multiple ecosystem services, which also includes feeding of certain protected wild animals (e.g. the great cormorant, *Phalacrocorax carbo* L., or otter, *Lutra lutra* L.) represents an increasing challenge for fish farmers struggling to maintain their competitive position. Research on how to unlock the potential of freshwater aquaculture to promote the rural economy and to provide ecosystem services would be a game changer. Thus, it is important to gain knowledge on how to improve the economic viability of freshwater aquaculture practices with increasing environmental sustainability.

Scope: The objectives of the project should include, firstly, building detailed, standardised databases by collecting missing and additional supplementary data and, secondly, analysing production performance by evaluating potential fish production and efficiency under various pond conditions, taking into account the expected effects of different climate scenarios and sustainability. Preference will be given to consortia focusing on the Continental and Pannonian biogeographical regions of Europe as defined by the European Environment Agency.

Expected impact: The results of the comprehensive analysis will support farmers and farmers' associations in making decisions on implementing improved management practices to facilitate adaptation to climate change and market conditions in a sustainable manner and to improve resource use efficiency. This will contribute to sustainable intensification, i.e. a form of production where yields are increased without affecting the environment (an example being the use of combined intensive-extensive fish production systems and integrated multitrophic aquaculture or recirculating aquaculture systems). The results are also expected to contribute to a more rational development and expansion of multi-functional fish production systems (i.e. those diversifying their income through angling, tourism and ecosystem services). Creation of genome banks will permit the maintenance of the genetic diversity of crucial fish populations by storing individuals (and their sperm) with desired genotypes. Such material can be used for the 'revitalisation' of endangered populations, ensuring optimum proportions of particular genotypes.

Source: own composition

Box 6. Proposed Horizon 2020 Research and Innovation Action on the topic of integrated biomass production

Title: Research in this area is very important as the global demand for biomass used for food and non-food purposes is constantly growing. On the other hand, the area of land available for production is decreasing, especially in the developed and developing countries. Therefore, it is necessary to break structural barriers that reduce the effectiveness of biomass production. An important issue on a European scale is to restore marginal land to production and to improve the effectiveness of its management and help to develop the value chain approach of production and usage of biomass within the regions. The proposal should help to create innovative approaches and help to create new products and services in the regions. A multi-actor approach should be implemented in order to achieve these goals.

Specific challenge: Undertaking the research in this area is very important as the global demand for biomass used for food and non-food purposes is constantly growing. On the other hand, the area of land available for production is decreasing, especially in the developed and developing countries. Therefore, it is necessary to break structural barriers that reduce the effectiveness of biomass production. An important issue on a European scale is to restore marginal land to production and to improve the effectiveness of its management.

Scope: Proposals should specify the conditions for producing and using biomass in a closed cycle as well as the conditions for developing the non-food uses of agricultural products. It should allow the development of a selection of relevant species and agricultural technology for biomass production in certain regions of Europe, depending on the local soil and climate conditions. It should also indicate the directions of the biomass production, depending on the local market conditions and the agrarian structure.

Expected impact: The impacts of the work will include: (a) diversification of the agricultural production; (b) increase in the effectiveness of production; (c) improvement in and stabilisation of farmers' income, and (d) a reduction in negative pressures on the environment.

Source: own composition

Discussion

In summary, the aim of BioEast is to address agricultural, bioeconomy and rural policy and governance challenges in the less-developed EU regions that form part of the Continental and Pannonian bio-geographical regions of Europe. It recognises two key challenges, the likely negative impacts of climate change in a very sensitive part of Europe, and the common economic and social challenges for agriculture, bioeconomy and rural areas of the region. Addressing these challenges would benefit the EU as a whole but this activity is in turn compromised, partly because of the lack of region-focused topics in Horizon 2020, and also by the low research, development and innovation performance of the CEE macro-region.

BioEast has arisen from the recognition that the most directly affected EU Member States must take the lead in formulating and promoting a strategic research agenda for solving these problems. Coupled with this, there is a need for national-level strategic thinking, and specific cross-sectorial policy deve-

lopment, which requires research and innovation, and knowledge-based policy development. Most of the CEE EU Member States and regions are still building their national policies on primary sectors such as agriculture, forestry, fisheries and aquaculture, without thinking in broader terms such as sustainable food systems, or circular economies including the waste streams, or the job opportunities in the materials and chemical sectors for the advanced use of the available biomass. Most of the job opportunities in rural and remote areas are linked with the primary sectors, and one objective must be to stop the decline. The bioeconomy offers a sustainable use of biomass by creating new value chains and added value to the products. The CEE countries have the potential to produce biomass in a cost-effective way; however, the missing government-level strategic thinking hinders the development of sustainable circular bioeconomies.

The progress achieved by BioEast until now, including the staging of various events, the mobilisation of a wide range of actors across the CEE region and, maybe most importantly, advancing clear proposals on topics to be included in the forthcoming H2020 work programme, has been impressive. However, there is much more to be done. Therefore, apart from the formalising the network and harmonising the list of priority research topics, the following common and immediate BioEast actions are proposed:

- Active involvement in the development of the Horizon 2020 SC2 2018-2020 work programme;
- More workshops to be organised, the first in Poland to cover the remaining CEE-relevant research topics;
- Building a website for the BioEast initiative;
- Starting the dissemination of a regular newsletter;
- Starting to discuss and lobby for the setting-up of a common Coordination and Support Action and a common ERA-NET instrument with the thematic content defined in this paper.

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