

Introduction

This workshop looks at innovative bioeconomy pathways for health and well-being through the lens of regional cooperation. The covid-19 pandemic revealed vulnerabilities in the global economy as well as providing a reminder of the relation between human, animal, and ecological health. After a brief plenary, we will discuss and debate innovative bioeconomy approaches to health and well-being in breakout groups along thematic and regional lines and aim for some synthesis to provide a global and cross-cutting perspective.

The outcome of the thematic sessions will feed into the regional sessions to consider innovative bioeconomy pathways that go beyond business-as-usual approaches. Rather than only emphasizing substitution of fossil resources with biomass, we look for bioeconomy opportunities to achieve improved human well-being while also maintaining and restoring ecosystems and biodiversity. These efforts can build on transnational partnerships and innovation systems to develop bioresources and bio-based industries while reducing trade-offs and promoting synergies between human, animal, environmental and planetary health.

An inclusive bioeconomy with fair distribution of costs and benefits along supply chains depends on regional and global cooperation so as to add value downstream while facilitating environmentally sustainable sourcing. One important issue in view of the pandemic is whether to aim for shorter supply chains and more local production and consumption, or more diverse (and longer) supply chains and networks that enhance resilience and prevent the spread of shocks, i.e. the right balance between globalization and localization (*glocalization*).

Transnational innovation can complement national efforts and contribute to robust solutions for more resilient and sustainable bioeconomies, following agro-ecological principles, contributing to multi-functional diverse and carbon-positive landscapes with new livelihood opportunities. Innovation can improve the allocation of scarce bioresources and valorisation of by-products, reduce losses and waste, promote circularity, and eventually generate more value and human well-being without overexploiting bioresources.

Regional bio-economy strategies can support further integration across different sectors (e.g. agriculture, forestry, livestock) while mainstreaming climate and biodiversity aims and promoting policy coherence. In the case of the EU, bioeconomy policies and strategies need to be aligned, for example, with the Green Deal, the Common Agricultural Policy, the Farm-to-Fork Strategy, and the Circular Economy Strategy. Such entry points for aligning bioeconomy strategies with other existing policies can be explored in other world regions, with potential also for synergising such strategies with regional trade agreements and resource regimes.

Ultimately, regional cooperation on the right strategies for engineering maritime and terrestrial bioresources and for expanding bioresource production and bio-industries can improve human, animal, ecological and planetary health. The workshop emphasises regional cooperation, exploring the range of measures, data, and new tools and frameworks for knowledge-based bioeconomies.

Thematic Sessions

The three thematic sessions will explore different pathways for innovation and resilience through broad and inclusive approaches for:

- i. Bio-based resources and industries
- ii. Bioeconomy for health and well-being
- iii. Transnational innovation systems

Theme 1: Bio-based resources and industries

The Covid-19 pandemic has caused unprecedented economic damage, sending shockwaves through the trading system, and revealing weak links in regional and global supply chains. Yet the crisis also provides an opportunity for both developed and developing nations to comprehensively re-assess their renewable (bio-) resource base, innovate across key technologies and develop new modalities of value-addition and bio-based resource and industry transformation. Regional cooperation can complement national efforts to promote bio-based products and processes that can meet the burgeoning demand for food, feed, renewable fuels, materials, and health and wellness products.

Although bioresources are renewable, they are not infinite. Strategies need to ensure sustainable production of raw materials and efficient conversion into bio-based products. Awareness and pursuit of well-being and healthy lifestyles has led to increased demand for bio-based products in some countries and regions. Other success factors include international partnerships, access to capital, and policy support such as the Bio-preferred program (www.Biopreferred.gov) in USA. Disparities in availability of bioresources and biotechnology calls for cooperation on technology transfer, capacity building, market access and supply chains. The first thematic session will feature presentations on bioresources, bio-products and bio-based industries to stimulate a fruitful dialogue to enable collaborations and partnerships towards more sustainable and resilient economies.

Guiding questions for Theme 1: Bio-based resources and industries

- 1) How to effectively harness bioresources for value-addition to improve health and well-being?
- 2) Which bioresources are best suited for promoting key relevant aims such as food security, health, livelihoods, construction, textiles, packaging, energy, and climate protection?
- 3) What are the most promising advances and potentials for sustainable bio-based products?

Theme 2: Bioeconomy for health and well-being

Health and well-being are recognised as integral to a modern bioeconomy through approaches such as OneHealth and EcoHealth, including human, animal, ecological and planetary health. Sustainable exploitation of bioresources and biodiversity is an important pillar of the future bioeconomy. Increasing demand for bio-based products due to high economic growth in low- and medium-income countries requires a careful combination of environmental conservation, sustainable production, and suitable market applications. The Covid-19 pandemic demonstrated the links between the outbreak of zoonotic diseases and intensification of land use and agriculture, bringing wild animals, livestock and humans into closer contact and providing breeding grounds for pests and diseases.

The Covid-19 pandemic has also demonstrated the vulnerability of global supply chains. Local production may help to reduce vulnerability, but some countries cannot afford domestic production and furthermore the distribution of bio-resource potential and biodiversity is uneven. Medicine and health treatments span major global markets but could also provide opportunities for locally-produced products. The benefits of local production and livelihoods must then be weighed against cost reductions available through the economies of scale of global supply chains.

Guiding questions for theme 2: Bioeconomy for human health and well-being

- 1) How can nations and regions sustainably harness their bioresources through value-addition for improving health and well-being while preserving biodiversity and maintaining ecosystems?
- 2) How can implementation of national and regional bioeconomy strategies enhance synergies between animal, human and ecological health?
- 3) What resource transformations or improvements in policy coherence and institutions are needed?

Theme 3: Transnational innovation systems

This session addresses transnational cooperation on innovations for the bioeconomy. We will consider whether and where transnational innovation cooperation is already happening and discuss the important networks, actors, and institutions. In recent years, transnational cooperation has been impacted by anti-globalisation efforts in the U.S., UK and elsewhere and by related ongoing trade disputes. We therefore seek to explore the benefits of regional cooperation to fill this void. From an innovation perspective, this collaboration across borders on a regional level might be promising for bioeconomy pathways since many regions share commonalities such as language, resource endowments or cultural norms. There is a significant cross-border element in innovation networks and knowledge flows. However, we are not only interested in bilateral innovation networks but also the broader transnational view that includes non-state actors such as NGOs, labour unions and research institutes as driving forces. Innovation and sharing of knowledge and skills does not only increasingly cross borders but also includes a significant number of actors that are not companies or state entities.

Guiding questions for theme 3: Transnational innovation systems

- 1) How can transnational cooperation facilitate exchange of knowledge, skills, and talent to foster transnational innovation systems?
- 2) Are there any best practice examples and/or actor networks who cooperate across borders on bioeconomy innovation pathways?
- 3) What are the barriers (but also the opportunities) to transnational innovation systems in bioeconomy pathways? And what can be done to overcome those barriers?

Regional sessions

Regional cooperation could bridge the gap between local and global approaches, identifying the complementarities and synergies that arise in modern bio-economies. Regional efforts to evaluate sustainable bio-resource bases, compare best practices, build capacity, and promote technology transfer can augment national strategies. The ultimate aim is to link local entrepreneurship and/or traditional knowledge to modern biosciences to promote health, well-being, innovation, and resilience. The regional sessions aim to pick up the results from the three thematic sessions:

Bioresources and bio-industries: The focus here is on the cross-cutting importance of new bioresources and bio-industries and the role of governments and policy makers in promoting bio-based products and processes, and particularly to identify how regional cooperation could support the sustainable development of bio-based enterprises.

Bioeconomy for health and wellbeing: In a modern health bioeconomy, biological resources and biodiversity could offer a platform for locally-produced drugs and health treatments, so that biodiversity is exploited sustainably with local benefits. Regional efforts could aim to link local entrepreneurship and/or traditional knowledge to modern biosciences for health and well-being. At the same time, market requirements might require a scale of biomass which may not necessarily be compatible with traditional cultures and/or indigenous populations.

Transnational Innovation Systems: Cooperation of bioeconomy actors across national borders may complement national and local cooperation and help to stimulate innovation through learning about best practices, technology transfer mechanisms or through taking advantage of comparative advantages in different countries. Transnational cooperation networks can facilitate improved knowledge sharing, methodological comparisons, and identification of new options for value chains.

General guiding questions for regional sessions (Africa, Asia, EU/OECD, Latin America):

- 1) In building bio-based industries sustainably sourcing and adding value to bioresources, what can regions learn from each other? How can learning between regions be fostered and enhanced?
- 2) When is regional cooperation most useful and in what areas? (e.g. creating regional markets, international standard setting, catalysing national bioeconomy strategy, policy development, financing, protecting fragile ecosystems). What are the limits to regional cooperation as compared to local, national, and transnational or global cooperation?
- 3) Which comparative (dis-)advantages do countries and regions have for bioresources and bio-based products (e.g. land availability, ecosystems, processing, value-adding) and how can regional cooperation enhance capacity without increasing dependency on potentially fragile supply chains?

Regional Session: European Union + OECD

The regional focus here is based on common background of participants working in EU and/or OECD countries and may thus include North America and/or Oceania as well as Europe. Workshop participants will discuss the previously identified global challenges and opportunities while targeting the areas prioritized by the high-income countries and considering regional characteristics. The implementation of a sustainable bioeconomy in high-income countries requires far-reaching changes in value chains, business models, bioresource systems, policy domains and governance approaches. The large number of actors involved, and the wide range of ideas, attitudes and goals influence the regional decision-making processes. It is therefore necessary to pay particular attention to the transparency of these decision-making processes and the opportunities for active participation. Accordingly, objectives of this workshop will be to generate ideas for moving towards a coherent bioeconomy understanding around the challenges arising from policy priorities, regional heterogeneity (e.g., in climate conditions, socio-economic systems, etc.) and from the currently isolated sectoral bioeconomy considerations. An important aspect will also be the potential scope and challenges for regional cooperation between the EU and its member countries and other OECD member countries.

Guiding questions for the EU/OECD regional session:

- 1) Which regional visions of future bioeconomy transformation pathways exist?
- 2) How can regional cooperation promote a successful transformation towards a sustainable bioeconomy?
- 3) What are the key drivers, contextual mediators, and barriers affecting the sustainable regionalization of bioeconomies?

Regional Session - Latin America:

The Covid-19 crisis has significantly affected Latin American countries, with Brazil, Mexico, Argentina, Colombia, and Peru in the top 10 countries with the most confirmed cases in the world. The crisis puts pressure on organizing a sustainable recovery process, and the bioeconomy has been proposed by some governments (e.g. Colombia) as a way to build back better. Ecosystem health (to prevent future epidemics/pandemics) must become a high priority in the region considering the globally important ecosystems and biodiversity, as well as the issue of markets vs. traditional culture and knowledge.

The potential for sustainable bioeconomies is restricted by particular structural opportunities and challenges, including (a) high endowment of bioresources, with Brazil, Colombia, Ecuador, México, Peru and Venezuela among the 17 mega-biodiverse countries of the world; (b) high levels of inequality, with Latin America hosting 8 of the 20 most economically unequal countries in the world; (c) high levels of informal employment, with around 60% employed in the [informal sector](#), many without access to

employment benefits or guarantees; and (d) low levels of science and technological development. The key challenge is to develop the bioeconomy while addressing inequality, informality, and preserving ecosystems. A few examples related to the thematic sessions are noteworthy:

Bioresources and bio-industries: In Latin America, there is opportunity to follow models focus on developing export-oriented commodities (e.g. soy in Brazil, beef in Argentina), but also to develop more local production models that aim to generate high-value addition within countries.

Bioeconomy for health and wellbeing: In Latin America, there are opportunities to expand into high-biodiversity areas (i.e. tropical forests) in the name of the bioeconomy, but this may pose risks to biodiversity and may not necessarily be compatible with traditional culture or indigenous populations.

Transnational Innovation Systems: In Latin America, when talking about niche or commodity markets, the discussion is often about competition. Is regionalization a viable option?

Guiding questions for the Latin America regional session:

- 1) How can these three elements: (i) bioresources and bio-industries; ii) bioeconomy for health and wellbeing; iii) transnational innovation systems) be applied in supporting recovery in Latin America from the Covid-19 crisis while building resilient, sustainable, and fair bioeconomies?
- 2) What are the best practices (policies, standards, capacity building, technology transfer, financing) for environmental and social sustainability in the bioeconomy in Latin America?

Regional Session - Africa:

Endowed with vast biodiversity and arable land relative to its population, Africa's biophysical capacity coupled with a youthful population suggests that the bioeconomy could be a major engine for growth and sustainable development. Participants will consider the key drivers and mechanisms for a multifaceted development agenda that utilizes indigenous knowledge and bioresources. For example, the West Africa sub-region is a leading producer of the world's tubers and biomass but often employs fragile unsustainable agro-ecological systems, generating unutilized wastes with tremendous potential value for animal feed. In East Africa bioeconomy blueprints strongly encourage transnational collaborations, capacity building in adaptive technologies for value addition.

Guiding questions for the Africa regional session:

- 1) Harmonizing strategies/sharing strategy development experiences: what are the best opportunities for regional cooperation, capacity building and entrepreneurial skills in Africa?
- 2) Regional funding/financing strategies - how to attract foreign investments and expanding exports of bio-based products (a regional clearing house).
- 3) Which measures, policy frameworks and economies of scale, are necessary to stimulate trade within the continent and between its economic blocks? What is the best model to facilitate cooperation within the African market and collaborations for African-made bio-products?

Regional Session - Asia:

China and India are major centres of biotechnology development with public and private investment in biomedical innovation and agricultural bioprocesses for food, feed, fibre, and fuel. In India, a major initiative on biodiversity for well-being has been launched with potentially global implications because of its innovative and integrative approach. The bioeconomy in Southeast Asia with Thailand and Indonesia as major players is becoming an area of strategic focus, with social aspects increasingly viewed alongside technology. Civil society organisations promote a community-driven bioeconomy that emphasizes well-being over growth, and thus there are also key tensions and trade-offs.

Guiding questions for the Asia regional session:

- 1) Considering the tremendous diversity across the continent, what is the feasible scope in particular sub-regions for greater regional cooperation to promote bioeconomy development while also respecting ecosystems and biodiversity?
- 2) With major multinational and national corporate actors, particularly in China, India, and Thailand, how can local and national interests be safeguarded while drawing on the advantages of financing, trade, and investment flows to expand the circular bioeconomy?
- 3) How can sectoral policies and market developments in energy, agriculture, forest products, health and materials be better aligned and made more coherent so as to improve effectiveness and efficiency in regional bioeconomy development pathways?

Disclaimer

This workshop pre-paper is intended only to stimulate discussion and should not be cited or quoted. References will be added when the final post-workshop paper is completed, which will also incorporate the discussions from the workshop.

Timing and structure of the workshop

NOTE: Thematic sessions are largely identical on both days/parts, while regional sessions may differ

Monday 16 November (Part 1)		
Time	Session label	Session name
16:00	P1	Opening Plenary
16:20		Thematic break-outs
	T1	Bioresources and bio-industries
	T2	Bioeconomy for health and well-being
	T3	Transnational Innovation Systems
17:00	MP1	Middle Plenary
17:10		Regional break-outs**
	R1	EU +OECD/North America
	R2	Latin America
	R3	Africa and/or multi-region
17:50	P2	Closing Plenary
18:00		End
Wednesday 18 November (Part 2)		
08:00	P3	Brief Plenary and re-cap
08:10		Thematic break-outs
	S1	Bioresources and bio-industries
	S2	Bioeconomy for health and well-being
	S3	Transnational Innovation Systems
08:50	MP2	Middle Plenary
9:00		Regional break-outs**
	R4	Africa and/or multi-region
	R5	Asia
	R6	EU +OECD/Oceania
09:40	P4	Closing Plenary
10:00		End workshop