DNC2020 Session 1

Session Title	Circular Economies in Agri-Food Systems at Different Levels																
Background, Research Gap and Objectives	Agriculture plays a central role in building circular economies for a sustainable society. In agriculture, the principles of circular economy have always been applied to improve the efficiency and productivity of agricultural systems. Recirculation of above- and below-ground organic matter and the interactions of crops and livestock via crop residue and manure management by farmers, are classic examples of circular economies at the field and farm level that are commonly applied in agricultural systems research. Circular economies in the agri-food systems are also emerging with studies at (sub)national, regional, and global levels (scale). This session will mainly focus on research and implementation at landscape and regional levels. The circular economies in the agri-food systems still need to be explored and better understood as trade-offs in terms of its efficiency, and sustainability must be assessed. Understanding the interactions between different levels and types of circular economies in the agri-food systems is required to develop robust alternatives to the present situation. The objective of the session is to collectively review recent advances exploring and/or implementing circular economy models in a range of agro-ecologies/geographies and draw priority research questions, to develop an impact pathway for a transition to more sustainable agricultures.																
Target Audience	Academics			Practitioners			Decision makers / Legislators				NGO						
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SGDs addressed	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
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DNC2020 Session 2

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<tr><td>Session Title</td><td colspan="17">Sustainable Management of Soils: Linkages between Organic Matter and Minerals</td></tr>
<tr><td>Background, Research Gap and Objectives</td><td colspan="17">The increasing demand for food, fibre, and fuel induced by population growth is a serious challenge for sustainable development. Soil organic matter is a key component of soil fertility for ensuring sustainable biomass production and ecosystem functioning, particularly in tropical ecosystems that have evolved on highly weathered and acidic soils. Furthermore, soil minerals have a major influence over nutrient availability and the decomposition of organic matter. Therefore, understanding the interactions between organic matter and minerals is crucial for sustainable soil management in rural, peri-urban, and urban areas. An improved insight into these interactions depending on soil and site properties is necessary to predict the impact of organic and mineral amendments on soil properties and processes, such as nutrient and water availability, carbon storage, and greenhouse gas emissions. The use of biochar might be particularly useful in tropical soils with an inherent low fertility. Sustainable waste management and the use of different kinds of compost could be combined with the supply of rock dust to replace weatherable soil minerals.

We are looking for disciplinary and interdisciplinary contributions addressing the interactions between organic matter and soil mineral that are critical for soil fertility, carbon storage, and greenhouse gas emissions. This session aims to bring together experts and scientists from around the world to discuss and provide quantitative and mechanistic insights into these processes as the basis for sustainable soil management.</td></tr>
<tr><td rowspan="2">Target Audience</td><td colspan="3">Academics</td><td colspan="3">Practitioners</td><td colspan="4">Decision makers / Legislators</td><td colspan="3">NGO</td><td colspan="4"></td></tr>
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DNC2020 Session 3

<table>
<tr><td>Session Title</td><td colspan="17">Circular Water Management: Resource Recovery and Reuse Potentials</td></tr>
<tr><td>Background, Research Gap and Objectives</td><td colspan="17">Wastewater includes three types of resources: water, compounds and nutrients, as well as energy. Following a conventional centralised approach, water is discharged to surface waters and thus the water cycle is accelerated while groundwater recharge does not take place. Nutrients are hardly used any more, as the willingness of the public and farming communities to use sludge as a fertiliser is rapidly diminishing. The energy content of wastewater can be used to a considerable extent with available technology, due to the presence of organics; however, implementation and efficiency are still not satisfactory. The question remains as to the effectiveness of water reuse and compounds recycling in reducing regional water scarcity and, for example, the loss of phosphorous, which is a non-renewable nutrient.

In this session, we would like to explore and discuss the options for wastewater use in industry, urban green space irrigation. groundwater recharge, and in agriculture – for both food and energy-crop production. Future-oriented strategies may require flexible and adaptive process chains; depending on the boundary conditions and the varying water availability, the application and thus the required effluent quality are different.

We will also discuss direct or indirect nutrients recovery: while nitrogen is subject to a global cycle even with conventional wastewater treatment, phosphorous is a geogenic, non-renewable resource that – as it cannot be substituted for food production – deserves paramount attention. The options for discussion and evaluation vary from direct use of wastewater, where nitrogen, phosphorous and potassium are not removed, while pathogens are – to produce safe irrigation water. For indirect use, wastewater is treated as far as the process will allow, while nutrients (and potentially other sources in the sense of urban mining) are recovered from the residuals, such as sludge or the ash after incineration of the sludge.

Furthermore, we will cover the possibilities of using organic compounds either to replace soil loss and to revitalize degraded arable land, or to produce energy through digestion or incineration processes. Here, co-digestion or co-incineration with bio-waste or residual waste, respectively, are an interesting option.

In this session we aim to discuss the options for flexibility in efficient and tailor-made resource recovery, while still not deteriorating surface and groundwater quality. The interlinkages between water, soil, and waste management are of crucial importance and offer the potential for synergy.</td></tr>
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DNC2020 Session 4

<table>
<tr><td>Session Title</td><td colspan="17">Circular Economy for Building with Secondary Construction Materials to Minimise Resource and Land Use</td></tr>
<tr><td>Background, Research Gap and Objectives</td><td colspan="17">Urbanisation has become a global trend in recent decades; this development is accompanied by a considerable number of challenges. The construction industry is one of the most resource-intensive sectors in the global raw material economy and has a multi-level impact on land use. On the one hand, the extraction of primary raw materials, such as sand and gravel, generates very high land consumption. On the other hand, construction and demolition (C&D) waste is subject to downcycling or is deposited after demolition, which causes demands in interim storage and landfill sites. Furthermore, the production of mineral commodities, such as concrete, leads to high contributions to greenhouse gas emissions. The ratio between the release of CO_2-equivalents and resource utilisation is disproportionate if the life cycle of the material is cut after demolition.

By implementing circular economy (CE) concepts, the developments described above can be counteracted. Mineral waste is recycled, raw material productivity is increased and the construction industry's contribution to the greenhouse gas production is reduced. In addition, economic concerns are addressed by the recycling of mineral waste. The supply of primary raw materials depends both on the market situation and the extraction rate in the opencast mines, which can quickly lead to a supply bottleneck (e.g., in 2017 and 2018). For these reasons, better resource efficiency combined with intelligent and flexible recycling must increase to meet future needs for building materials, reduce CO_2 emissions and limit land use.

The most important approach to tackling this problem is the reuse of mineral waste and residual materials. However, the industry is prevented from exploiting this potential due to the following challenges: concentration on short-term objectives, complex supply chains, lack of cooperation between stakeholders with misaligned incentives and goals, complex uncertainties, legal barriers, and the lack of a commonly agreed definition of closed-loop recycling within the industry.

In this session we will discuss the following questions: What methods are suitable to quantify the effects of CE for building of secondary construction materials? What support can be provided by the methods and concepts discussed in the research field of using C&D waste for building construction or demolition? Who are the stakeholders and how can they be involved in the procedure? We will also give an overview about material flow analysis, life-cycle assessment, ecological footprint, and circular economy. Case-study oriented contributions are welcome.</td></tr>
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DNC2020 Session 5

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<tr><td>Session Title</td><td colspan="17">The Role of Green Infrastructure for Sustainable Water Management in a Circular Economy</td></tr>
<tr><td>Background, Research Gap and Objectives</td><td colspan="17">Green infrastructure elements are a prime example of nature-based solutions (NbS) for sustainable resource management. NbS are ecosystem related approaches that make use of existing ecosystems, restore a natural ecosystem, or mimic their functions. Green and natural infrastructure approaches are often applied in water management. This infrastructure performs the same functions as grey infrastructure, for instance constructed wetlands as sewage treatment plants, or extended floodplains as water retention ponds for flood protection. Wetlands – both natural or constructed – cycle resources, be it water or nutrient, producing clean water and biomass for bioenergy production and creating habitats for wildlife.
Green infrastructure can be used in multiple settings to substitute similar grey infrastructure, providing the additional benefit of habitat creation. Green infrastructure is also gaining attention in urban spaces for air pollution control, to reduce heat island effects and to support overall human health.

In the framework of the United Nations Sustainable Development Goals (SDGs), SDG Target 6.6 particularly looks at the extent of wetlands, whereas SDG Target 11.7 encourages the use of multifunctional green spaces in cities. Understanding the boundary conditions of the usefulness of either protecting, restoring, or constructing entirely green infrastructure systems is still a challenge, as communities of practice are not the same across different modalities.

We must ask: What are the limitations of using different types of systems in different settings? What are the risks, trade-offs, and synergies of using green infrastructure and how can they contribute to circularity? In which settings do they make sense and where might they create an increased risk? When are they sustainable?

The objectives of this session include detailing the settings in which different systems of green infrastructure have worked for which purpose, discussing the set of limitations under which these systems do not make sense and outlining a set of tools that can help in deciding on the sustainability of the systems.</td></tr>
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DNC2020 Session 6

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<tr><td>Session Title</td><td colspan="17">Urban Agriculture: A Systemic Approach for Integrated Natural Resource Management and Socioeconomic Benefits</td></tr>
<tr><td>Background, Research Gap and Objectives</td><td colspan="17">Society and researchers are increasingly more focused on urban food production – questioning the globalised food system and its negative impacts on the environment (e.g., high water demands, soil degradation, food waste). The production of food within cities through urban agriculture can be considered a nature-based solution, providing multidimensional environmental, economic, and social benefits depending on the type of production. Integrated natural resource management, through urban agriculture, can include technical (e.g., vertical farming) and nature-based (e.g., permaculture) food production types, with a market-, prosumer-, or subsistence-focus.

In this session, we will discuss the multidimensional benefits and risks of urban agriculture as well as drivers and constraints of its implementation. The session is open for different types of urban agriculture and can include urban farming and urban gardening activities, such as peri-urban farming in urban agglomerations, community-supported agriculture, vertical farming, community gardens, or edible cities.
Suggested topics:
- Sustainable food production in cities
- Impact assessment of urban agriculture (environmental, social, economic)
- Life-cycle assessment of urban food production
- Spatial implications for urban agriculture
- Governance of urban agriculture
- Best practice examples for upscaling sustainable urban food production</td></tr>
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DNC2020 Session 7

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<tr><td>Session Title</td><td colspan="17">Implication of Urbanisation on Building Material Induced Land Use, Soil, Water, and Waste in Urban Regions</td></tr>
<tr><td>Background, Research Gap and Objectives</td><td colspan="17">Urbanisation is a global trend. Since 2007 more than 50 per cent of the world´s population live in urban areas – and the trend is still ongoing. With increasing urbanisation rate and increasing prosperity, the demand for building materials, such as stones, sand, and clay, is growing; the result is a regional shortage of building material resources, which are often transported over short distances due to their low added value. The continued intensive mining of building materials has far-reaching consequences – land interventions and land-use conflicts in urban regions are becoming more acute. Riverbank subsidence, destruction of agricultural land, and landscape destruction are examples of the dramatic consequences in the hinterland of cities.

One of the prerequisites for effectively tackling this issue is a developing a better understanding of the links between urbanisation, building material consumption, and their indirect effects on land, water, and soil. This includes determining which methodological approaches are suitable to quantify these indirect effects in a regional context, developing starting points for making urban regions more resource-efficient as an overall system, and what support can be provided by the methods and concepts discussed in the research field of industrial ecology, such as material flow analysis, life-cycle assessment, ecosystem services, ecological footprint, and circular economy – and how do they have to be adapted. These key points will be addressed in this session with the contributions and discussions submitted. Case study-oriented contributions are welcome.</td></tr>
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DNC2020 Session 8

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<tr><td>Session Title</td><td colspan="17">Economic Policy Instruments for a Transition towards a Circular Economy</td></tr>
<tr><td>Background, Research Gap and Objectives</td><td colspan="17">This session will offer a critique on available economic policy instruments (i.e., landfill taxes, material consumption taxes, waste disposal tariffs, EPR schemes, R&D subsidies, etc.) and their impacts related to a large-scale transition to a circular economy and improved resource efficiency. The macroeconomic impacts of such market-based or market-creating instruments must be evaluated with respect to important trade-offs (e.g., issues of inequality), effectiveness, and cost-efficiency. Beyond that, the session will ask how the policy mix can be extended in different spatial levels – from cities to global extended producer responsibility (EPR) schemes, as well as contexts, such as using various soft and non-market measures like eco-design standards and integrated or nexus approaches.</td></tr>
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DNC2020 Session 9

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<tr><td>Session Title</td><td colspan="17">Business Models for a Circular Economy in a Sustainable Society</td></tr>
<tr><td>Background, Research Gap and Objectives</td><td colspan="17">The circular economy concept provides a large variety of economic opportunities on the pathway towards a sustainable society. Nevertheless, the “circular mindset” – a term used by the World Business Council for Sustainable Development – is not yet a component of the DNA of companies. This reflects the general perception of environmental management as a “must” instead of an economic opportunity: For more than 40 years the prominent question in environmental management has been “Does it pay to be green?”. Even if there is empirical evidence for a positive relationship, this ex-post approach does not support the search for business models for a circular economy.

In this session the focus will be on the question “How does it pay to close the loop?”.

The following questions might be addressed:
Value proposition
• Which products and services can be developed?
• Who might be customers?
• What relationships are crucial?

Value creation
• What are key activities?
• What resources are needed?
• What channels are relevant?
• Who are partners?
• What technology is needed?

Value capture
• What costs are involved?
• What revenues can be generated?

This session shall be a platform for presenting empirical evidence on business models for a circular economy. The presented studies will be used by researchers to identify research gaps, and to provide guidance and recommendations to decision makers.</td></tr>
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DNC2020 Session 10

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<tr><td>Session Title</td><td colspan="17">Chances and Limitations of Circular Economy in a Resource Efficient Society</td></tr>
<tr><td>Background, Research Gap and Objectives</td><td colspan="17">Waste generation rates are rising around the world; in 2016, the worlds' cities generated 2.01 billion tons of municipal solid waste, amounting to a footprint of 0.74 kilograms per person per day. With rapid population growth and urbanisation, annual waste generation is expected to increase by 70 per cent from 2016 levels to 3.40 billion tons in 2050. Globally, more than 90 per cent of that material ends up on landfills or dumpsites. Managing waste in a more efficient manner is the first step towards a circular economy (CE), where most products and materials are recycled or re-used repeatedly. By promoting closing-the-loop production patterns within an economic system, CE aims to increase the efficiency of resource use with more in-depth consideration for extended producer responsibility. It places a special focus on urban and industrial waste, to achieve a better balance between economy, environment, and society. Therefore, an understanding of interactions between sustainable waste management and the production process, the product design, and the decoupling of economic growth and resource use, is needed for a circular economy.

Within the last years, waste recycling rates have increased even in developed countries. Waste and pollution prevention are the foremost aim developing a circular economy. A better reuse and recycling of waste, by using better and more recycling-friendly construction processes for goods, should be demanded to fulfil higher recycling rates. Additionally, new economic patterns of production must be established to combat the potential threat of unsafe products entering the market; resulting from closing the loop in a global scale with products of unknown specification. CE implies the application of cleaner production patterns at company level, an increase of producers and consumer's responsibility and awareness, the use of renewable technologies and materials as well as the adoption of suitable, clear, and stable policies and tools.

This session will bring together experts and scientists from around the world to discuss and provide insights into these principles in a sustainable circular economy. We are looking for disciplinary and interdisciplinary contributions addressing the cradle-to-cradle principle under consideration of extended producer responsibility – such as sinks of hazards, reduction of negative environmental impacts, and conservation of resources.

Contributions are welcome – particularly those looking at the field of certain material flows before and after consumption and how to connect them.</td></tr>
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DNC2020 Session 11

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<tr><td>Session Title</td><td colspan="17">Ecosystem Services Informing the Transition Towards a Circular Economy</td></tr>
<tr><td>Background, Research Gap and Objectives</td><td colspan="17">Ecosystem Services (ESS) refer to the benefits that humans derive from nature. They provide many processes and products necessary for life on earth and support economic activities. ESS research focuses on identifying and assessing these benefits to make them visible for decision-making processes and subsequently understanding of trade-offs between different services for planning and sustainable management.

The ecosystem services and circular economy (CE) concepts are both interdisciplinary in their nature and both highlight the importance and dependence of human well-being on nature and the overuse of natural capital, however, these concepts follow different methodological approaches. Over the years, ESS research has developed and amended numerous methods to specify and quantify the benefits for informing stakeholders and decision makers. This knowledge can support sustainable solutions of CE by applying existing methods of assessing, mapping, and valuing ecosystem services, or by using the results, such as from trade-off analyses (e.g., which benefits arise from protecting natural resources through the application of a CE?).

Questions addressed in the session:
• What are key challenges of fostering a CE and to which of these can the ESS concept contribute?
• What can be learnt from ESS trade-off analyses for CE?
• What are the advantages of methods used for ESS valuation and mapping and how can these be effectively applied to the CE?
• How far do ESS assessment methods need to be adapted to support CE analyses?
• Can CE also inform the ESS assessment and how?

The session aims at uncovering how ESS research, including trade-offs among them, can inform the transition towards a CE in both practical and theoretical terms. We invite contributions that present conceptual and empirical research findings, as well as practical applications of ESS research for implementing a CE. Based on insights from presentations, an interactive panel discussion will shed light on the required next steps to increase the synergies between both concepts, from not only a methodological but also practical perspective.</td></tr>
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DNC2020 Session 12

Session Title	Financing the Transition towards Sustainable Resource Management and Circular Economy																
Background, Research Gap and Objectives	Inertia and resistance prevent the transition from linear to circular economic models. Concerted actions by many stakeholders are needed: policymakers, businesses, innovators, consumers, and investors. One issue is the evaluation of the economic potential versus the risks of CE companies or start-ups. If increasingly the product becomes a service and if consumers pay smaller amounts for these services over longer periods of time, there might be a negative impact on risk and therefore creditworthiness. How do financial institutions adapt their risk assessment frameworks and their standard operating procedures (SOP) on lending? How do they cope with service-oriented businesses, the return of near valueless material streams, or small revenue streams? How would concepts such as 'Total Costs to Access' (TAC, Ellen MacArthur Foundation) help shaping the agenda? More and more multilateral organisations (IFC, EIB, etc.), wealth and pension funds, or financial technology innovators enter the stage to finance CE, along with the low carbon finance agenda. What is their role vis-à-vis traditional banks, both short and long term? The session also aims to address the challenges in developing countries, taking account of co-creation and crowdfunding approaches, which seem to play a role in various investment projects. The goal of this session is to identify the role of finance to get CE markets to work, and to identify some obstacles that would inform policymakers how to shape and perhaps incentivize the transition.																
Target Audience	Academics			Practitioners			Decision makers / Legislators				NGO						
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DNC2020 Session 13

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<tr><td>Session Title</td><td colspan="17">Systems Concepts Supporting Sustainable Economy Concepts and Nexus Approaches</td></tr>
<tr><td>Background, Research Gap and Objectives</td><td colspan="17">Circular, green, and bio-economy concepts as well as nexus approaches are inspired by systems thinking. On the one hand, they are informed by natural processes that are studied in physics, biology, and ecology. On the other hand, they consider the society in a comprehensive manner, including cross-sectoral interrelations. However, the theoretical foundation of these integrated concepts and approaches is still in its infancy. One reason for that seems to be their comprehensiveness and complicatedness, which cannot be covered by individual disciplines. Another reason could be limitations of combining theories from relevant disciplines to jointly address the relevant material and immaterial interdependencies. The lack of theoretical foundation leads to ambiguity of the integrated concepts and approaches, as well as restricts description and explanation of empirical findings. This raises the question of what can be learned from a more detailed understanding of different systems theories and frameworks and the exploration of possible interrelations.

The session explores systems theories and frameworks from natural/formal sciences and humanities with the overall aim of advancing the conceptual foundation of sustainable economy concepts and nexus approaches. The spectrum of concepts considered in the session ranges from general systems theory to human-environment and socioecological system frameworks; also reflecting recent discussions on, for example, systemic risks. We will aim to publish contributions and discussion outcomes as special issue.</td></tr>
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DNC2020 Session 14

Session Title	Sustainability Assessment of Natural Resources Use in a Circular Economy																
Background, Research Gap and Objectives	A circular economy for natural resources, applying a nexus approach, requires sustainability assessment across a number of sub-processes. The scope of relevant sub-processes ranges from (i) sources and their regeneration and (ii) processing, flows and (re-)use in the society to (iii) attribution to natural sources or sinks again with their regeneration. On the one hand, this involves a number of rather different approaches such as impact assessment for sources and sinks and material flow analysis, and so on, for material processing, flows and (re-)use. Moreover, assessment in line with the concept of sustainability needs to consider the ecological, social, and economic dimensions of sustainability in a balanced manner involving specific indicators and valuation methods. It also depends on the institutional context of the society mainly regarding to the (legal) procedural frameworks and the valuation references for the assessment. Accordingly, comprehensiveness of sustainability assessment for the use of natural resources in a circular economy in principle involves a multitude of natural science and humanities disciplines. However, the methodological repertoire of these disciplines is highly diverse and fragmented and thus questions provision of the required comprehensive evidence and transparency of sustainability. The multidisciplinary session provides a forum for identification of gaps, opportunities, and research demands referring to a consistent and comprehensive sustainability assessment of natural resources use. Its methodological focus will be illustrated by examples from selected natural resources and international empirical studies. We will aim to publish contributions and discussion outcomes as a special issue or edited volume.																
Target Audience	Academics			Practitioners			Decision makers / Legislators				NGO						
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DNC2020 Session 15

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<tr><td>Session Title</td><td colspan="17">Science-Policy Interfaces for Managing a Natural Resource Nexus</td></tr>
<tr><td>Background, Research Gap and Objectives</td><td colspan="17">The nexus concept is one that has recently emerged and aims at moving beyond the bio-physical, environmental, or technical understanding towards political and societal behaviours and needs. There is a wide debate about different ways of addressing “the Nexus” that range from which resources and sectors can or are being addressed to which methods can be used and how to determine nexus impacts. Nexus goals are varied but often connected to an overall aim of advancing towards sustainability and sustainable development. Similar in nature to integrated management approaches, nexus thinking is based on holism and systems thinking, necessitates interdisciplinary approaches, and intends to foster participation and inclusion of stakeholders in decision-making.

The nexus concept is focused on three features:

(i) Interlinkages between natural resources (i.e., water, energy, food, and soil) are taken into account, trade-offs among them are made explicit and potential synergies are exploited. In light of this, natural resources are managed sustainably and in an integrated manner. Such an approach will require a focus on bio-physical, socioeconomic, and policy interactions;

(ii) Governance processes are an explicit part of the nexus concept, including policy coherence. Policy coherence is an attribute of policy reducing conflicts and exploiting synergies within and across policy areas at different spatial scales. A lack of policy coherence has the risk of trade-offs from inadequate decision-making. Optimising food production, for example, might cause trade-offs with other natural resources (e.g., water and soil). The nexus concept allows us to seek synergies and overcome trade-offs; and

(iii) Transdisciplinary approaches, where practitioners (from business, policy, and civil society organisations) work with the scientific community and are recognised as co-producers of knowledge, are an essential building block to implement the nexus concept.</td></tr>
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DNC2020 Session 16

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<tr><td>Session Title</td><td colspan="17">Circular Economy and Social Inclusion: Participatory and Equitable Approaches for Sustainable Resource Management</td></tr>
<tr><td>Background, Research Gap and Objectives</td><td colspan="17">To achieve a circular economy as a system that meets our needs within planetary boundaries, we need to be comprehensive and think beyond environmental quality and economic prosperity.

In this session, we investigate the multidimensional linkages between sustainable resource management and social inclusion, for example by studying networks. We particularly welcome contributions that integrate poverty and inequality analysis in the conceptualisation of a circular economy. Input that analyses gender effects at the macro and micro level is also highly appreciated.

We intend to explore an inclusive, innovative approach to activate people to strive towards a sustainable resource management across ages and disciplines.

Further questions guiding this session are:
• Where do we have blind spots and might need to change our perspectives?
• How can innovation be accelerated in the light of pressing environmental challenges?
• Which groups of people are not considered enough as potential enablers of circular economy?</td></tr>
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