

# Enhancing science–policy interfaces for food systems transformation

The anticipated failure of many countries to achieve the Sustainable Development Goals by 2030 necessitates the assessment of science–policy engagement mechanisms for food systems transformation. We explore options for enhancing existing partnerships, mandates and resources — or reimagining a new mission — for science–policy interfaces.

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The global food system is facing major interconnected challenges, including climate change, natural resource depletion, biodiversity loss, malnutrition, food insecurity, inequity and preventable ill-health<sup>1,2</sup>, all of which are exacerbated by the fragmentation of food systems and policy incoherence. Addressing these challenges will require a transformation of food systems that shifts humanity towards healthier diets from sustainable food systems, thus ensuring more equitable food and nutrition security<sup>3,4</sup>.

Progress towards more sustainable, equitable and fair food systems is hampered by several factors<sup>5–7</sup>. These include gender inequality, a lack of representation from diverse value systems and Indigenous peoples' traditional knowledge, gaps in knowledge on the interactions among food system activities, an under-appreciation of sustainability issues, and disjointed policies<sup>8</sup>. For instance, little information is available on the effects of trade regulation on the environment, dietary patterns, smallholder and Indigenous peoples' production systems and aspects of gender equity<sup>9–11</sup>. Such gaps combined with divergent interests and values across constituency groups leave policy makers unsure about how to integrate food policies that support food systems transformation. Therefore, a major investment is needed in better and more relevant knowledge systems and in more efficient science–policy interfaces (SPIs).

Efficient SPIs must deliver at least the following three priorities: (1) the integration of research and data across food systems to support multi-sectoral and cross-scalar policies that combine food and nutrition security, public health, environmental sustainability and societal wellbeing and equity; (2) the provision of a robust,

transparent and independent synthesis and assessment of knowledge, including scientific evidence and insights from the relevant stakeholders; and (3) the provision of a relevant, policy-related research agenda. Together, addressing these priorities will help to ensure the legitimacy of policy advice through an independent, transparent, credible and authoritative consensus on scientific evidence and other forms of knowledge, thereby helping to overcome both controversies and uncertainties and to fill knowledge gaps<sup>12</sup>.

Multiple groups and organisations are currently debating the best pathways to transform food systems, including the Scientific Group of United Nation Food Systems Summit (UNFSS), the High-Level Panel of Experts on Food Security and Nutrition (HLPE) of the UN Committee on World Food Security (CFS), and this group of authors, the High Level Expert Group (EG) of the European Commission. Here, our focus is on exploring potential options for enhancing SPIs to better support food systems transformation in the coming decade(s).

## Assessing current SPIs

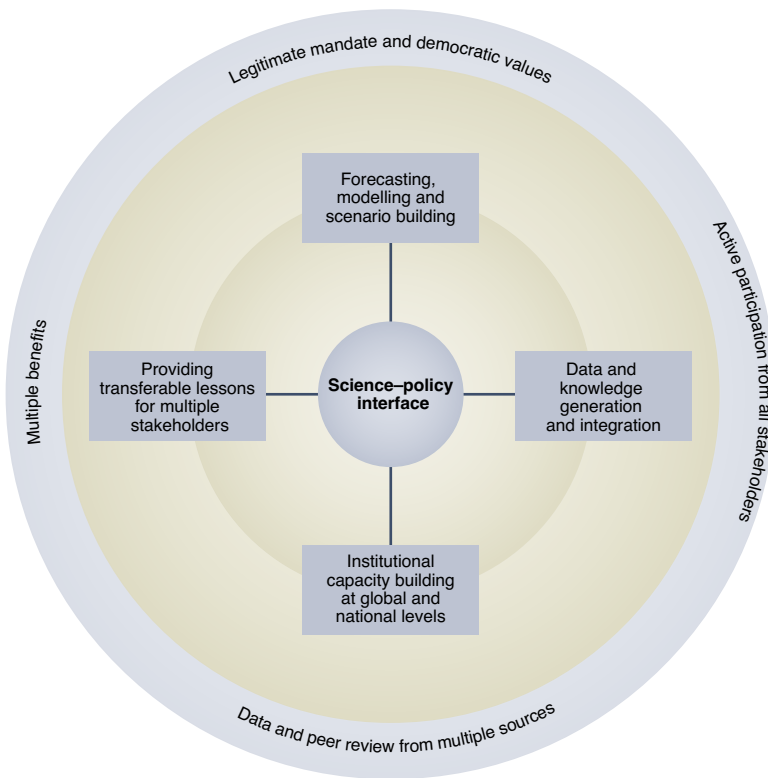
Given the complexity, scale, and urgency of food systems transformation, better integrated and funded SPIs are needed to fulfil at least the key functions outlined in Fig. 1. They must generate, collect and integrate different forms of knowledge that build on the FAIR (findability, accessibility, interoperability and reusability) data principles<sup>13,14</sup>; support the forward-looking efforts in forecasting, modelling and scenario-building needed to create multi-stakeholder dialogues on co-benefits and trade-offs, risks, and opportunities, as well as the costs and benefits associated with pursuing specific strategies; facilitate

the use of transferable lessons from multi-stakeholder and multi-level dialogues in food systems across the value chain from the regional to global scale; and catalyse global and local institutional capacity building to ensure that the generation and integration of knowledge support policy decisions, fair, equitable and better practices, and progress tracking.

Existing food-related SPIs play different functions and roles in the food systems landscape (Table 1). These include assessing the latest scientific literature, promoting a better understanding of food system conditions, catalysing dialogue and setting research and innovation priorities<sup>11</sup>. There is little overlap among these different SPIs in topical and sectoral focus, membership, modalities of governance, and relationships with the UN, EU or other agencies offering secretariat support and funding. All SPIs offer unique and valuable contributions (for example, reports, discussion fora, evidence for prioritization, scenario building and policy advice). Yet, the current landscape lacks global, regional and national coordination as well as scientific independence. Both are vital conditions to improve efficiency and bridge knowledge gaps about emerging issues — such as local variability in food systems drivers and outcomes, the social justice dimension of value chains (for example, fair wages, health and safety matters and women's participation) and multiple food systems concerns (for example, integrating climate models into local food systems and enhancing understanding of the drivers of household food choice) — and to co-create actionable knowledge with all relevant actors<sup>8,10,11</sup>.

## Exploring possible pathways

Three broad options are proposed below to frame discussions around developing and



**Fig. 1 | Critical activities and key principles for science-policy interfaces.** The critical activities of an SPI should include generating, collecting and integrating all forms of knowledge; supporting forward-looking efforts; creating multi-stakeholder dialogues; facilitating transferable lessons across the food systems; and catalyzing global and regional capacity building. These activities must be pursued under key principles, including credible and relevant reporting that is based on appropriate data gathering, peer review and stakeholder consultations and that is of genuine value to users. Legitimacy and inclusiveness are derived from a process that is transparent, open and independent and by a mandate that is widely supported. There must be active participation and meaningful inclusion of all stakeholders in the design and use of the knowledge system and an explicit focus on multiple co-benefits, including supporting regional economic growth while respecting local and Indigenous knowledge and ownership.

enhancing SPIs to support food systems transformation.

**Increased partnerships between existing SPIs.** There are many important panels and initiatives working as SPIs for food systems transformation, as outlined in Table 1. The HLPE, for example, was established in 2010 as part of the United Nations CFS. Others include the Global Panel on Agriculture and Food Systems for Nutrition (GLOPAN), the International Panel of Experts on Sustainable Food Systems (IPES-Food), the Global Alliance for Climate-Smart Agriculture (GACSA) and the Food and Land Use Coalition (FOLU). Many of these bodies have incorporated explicit food systems foci, as evidenced by HLPE's food systems and nutrition report and the IPCC's reports on global warming and the food systems. This landscape highlights the distinction between government- and multilateral-rooted SPIs (such as the CFS and HLPE) and

other expert panels (Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services (IPBES)-Food) that are more independent from political processes. Some of these initiatives and institutions have overlapping membership and cooperate to the extent permitted by prevailing mandates, funding, timelines and interests. Altogether, this suggests that there is the potential to better align activities, indicators, data, workloads and resources and to better integrate outputs. Some 'low-hanging fruit' in this regard would be generating collaborative outputs from panels and organizations, including those anchored in a formal inter-governmental setting, such as the HLPE, IPCC, IPBES, the Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO), the World Bank, and others.

Increasing collaboration between existing SPIs and other institutions or

networks could provide new insights into and enhance representation of stakeholders from all dimensions of food systems. For example, connecting existing expert panels could lead to a regular 'report of reports' that covers multiple dimensions of food systems and fosters innovative (and largely unpredictable) initiatives. However, achieving this goal would require overcoming many challenges, especially in creating synergies across bodies and disciplines, and ensuring the inclusion of civil society and private sector stakeholders.

Fostering collaboration (including publishing collaborative outputs) would entail re-allocating resources to collect, analyze and disseminate comprehensive food systems data, information and knowledge to help global bodies aggregate inputs into accessible and cross-referenced knowledge systems, such as online portals. This would, ideally, be based on existing online portals such as the Food Systems Dashboard (<https://foodsystemsdashboard.org/>) and the Countdown on Health and Climate Change (<https://www.lancetcountdown.org/data-platform>). Financially, realigning the work and resources of existing SPIs (and other mechanisms for cooperation and networking) would not necessarily require expanding budgets or creating new institutions. However, to be effective, increasing partnerships between SPIs would require some organizations to be resourced to provide overarching coordination, facilitate data sharing and ensure multi-lingual and multi-cultural perspectives, along with gender parity and representation.

**Enhancing the mandate and resources of existing SPIs.** A second option would be to significantly enhance both the mandate of and resourcing for existing SPIs to develop their capacity to meet more complex food systems challenges and broaden their engagement to include under-represented regions as well as stakeholder groups. Doing so would ensure better interconnectedness, enhance data integration and accessibility and create spaces for discussion that includes all stakeholders. For instance, existing SPIs could be empowered to conduct modelling-based assessments to find pathways to transform food systems for specific countries and regions with explicit consideration of local (including Indigenous) concerns, solutions and innovations.

Currently, the CFS covers areas related to food security, and its HLPE provides assessments of specific issues related to food systems. However, neither has the mandate or the resources to address the

**Table 1 | Current science-policy interfaces (SPIs) in food systems**

Name	Focal and food-relevant thematic domains	Mandate	Modality	Outputs	Funding sources
IPCC	Climate change, climate and food systems	Inter-governmental	Board and plenary and nominated scientific expertise	Multi-volume assessments and summaries for policymakers (SPMs) based on peer-reviewed literature, data, and model archive; regular cycle (5 years), with special reports interspersed	WMO/UNEP Secretariat and funding from multiple donor countries
International Resources Panel (IRP)	Natural resources and natural resource use for food	Inter-governmental	Scientific experts, research and reviews	Research, syntheses, assessments, SPMs; multiple outputs per year	UNEP Secretariat and funding from multiple donor countries
IPBES	Biodiversity and ecosystem functions; biodiversity and food systems	Inter-governmental and communities	Multi-stakeholder plenary, nominated scientific expertise and technical support units	Multi-volume and focused assessments based on peer-reviewed literature and Indigenous and traditional knowledge; multi-year plan for delivery	UN Secretariat and funding from multiple donor countries and foundations
HLPE of the UN CFS	Food security	Inter-governmental and stakeholders	Steering committee of nominated experts, teams of nominated experts and FAO	Analyses of the state of food security and nutrition and scientific advice on policy issues using existing high-quality research; identifies emerging issues	FAO Secretariat and funding from multiple donor countries
Group on Earth Observations (GEO)	Environment/ environment and food systems	Inter-governmental and stakeholders	Multi-stakeholder advisory board, experts and practitioners and UNEP	Multi-volume assessments, SPMs based on peer-reviewed literature, data and model archive; regular cycle (5 years) with special reports (for example, GEO for Business) interspersed	UNEP Secretariat and funding from multiple donor countries
Standing Committee on Agricultural Research (SCAR)	Agriculture, bioeconomy, food systems and resilience	Established by regulation of the EU Council; inter-governmental	Plenary governing body, steering group, national delegates, EC experts, working groups and task forces	Periodic technical and strategy reports; source of advice on European agricultural and bioeconomy research; catalyst for coordination of national research; foresight meta-analyses	EC Secretariat funding and national governance of EU
Global Forum on Agricultural Research and Innovation (GFAR)	Food systems	International, networks of partners and non-governmental	Regional platforms in Asia, Africa, Latin America and Europe; scientists; business; policymakers; and farmers	Supports the development of a strategic agenda for agri-food research and innovation, catalyses dialogue among all relevant stakeholders and supports the strengthening of institutions and organizations to better link research	FAO secretariat and funding from FAO, IFAD, the EU and other donor countries
The Economics of Ecosystems and Biodiversity (TEEB)	AgriFood systems and capitals	International and inter-governmental	Nominated experts, stakeholders and UNEP	Periodic scientific reports and national assessments	UNEP Secretariat and funding from donor countries and foundations
GLOPAN	Food systems, diets and nutrition	International and non-governmental	Scientific experts, research, foresight and policymaker engagement	Using existing high-quality research, data and technical studies and new modelling for policy briefs; foresight reports, analytical tools and convening on policy dialogue	Multiple donor agencies and foundations
European Food Safety Authority (EFSA)	Food and feed safety	EU and inter-governmental	Board, nominated scientific expertise and EFSA	Regular reports, policy briefs and statutory analyses	EFSA Secretariat and funding from the EU budget
IPES-Food	Food systems	Independent panel of experts and non-governmental	Multi-stakeholder; co-creation of solutions based on science and experience	Regular assessments produced with a wide range of food system actors, a democratic approach and cutting-edge science, combined with experiential, Indigenous and traditional knowledge	Multiple foundations; IPES-Food does not accept funding from governments or corporations

Existing food-related SPIs play different functions and roles in the food systems landscape, with differential mandates and funding sources.

full range of concerns associated with food systems transformation in all its dimensions and scales. This could be overcome by focussing on three key areas. The first is to better integrate the knowledge frameworks, priorities, activities and outputs from existing SPIs. The goal would be to develop more coherent and mutually agreed frameworks that include more diverse inputs, address a wider set of concerns and use scientific knowledge in the search for efficient global, national and local solutions. This would also involve creating more integrated agendas across SPIs and new mechanisms to foster methodological innovations<sup>15</sup>. A second strategy would be to enhance policy-relevant data sharing, analyses and other information. Such an effort should involve, for example, Africa's Regional Strategic Analysis and Knowledge Support System (ReSAKSS), the Global Open Data for Agriculture and Nutrition (GODAN), FAO, the WHO Global Health Observatory and the World Trade Organization (WTO) Committee on Trade and Development, as well as different regional networks that have direct links to national research centers, such as the Asia-Pacific Association of Agricultural Research Institutions (APAARI) and the Forum of the Americas on Agricultural Research and Technology Development (FORAGRO). A third area for improvement could be the development of better integrated networks of institutions (globally, regionally and nationally) to ensure that the voices of under-represented food systems actors are heard and to catalyze dialogues on problems and solutions across different geographies. Using existing bodies to create these dialogues may facilitate rapid structural adaptation, which may not need legislative amendment. This option, however, would also require existing SPIs to broaden their mandates and responsibilities, expand membership and resources and compromise on institutional or political remit to deliver on shared goals.

**Establishing a new mission.** In the lead up to the 2021 UN Food Systems Summit, some raised the need to create entirely new institutions with approved mandates and new multi-scale scientific agendas — similar in scale and scope to the IPCC and IPBES, which provide periodic assessments, reports and advice on climate change and biodiversity, respectively<sup>15,16</sup>. No such body exists for food systems, although CFS and HLPE do cover food security and assessment activities. Therefore, strong arguments have been put forward to create a new institution that would advise on integrated policies (covering production, processing,

transportation, waste and trade) and link regional food systems transformation efforts with global initiatives, thereby offering support for improving diet and nutrition, the livelihood of smallholders, gender equity and environmental outcomes<sup>9,16</sup>.

This proposal has caused considerable controversy. For instance, building an entirely new SPI for food systems would demand a level of inter-governmental or international effort (with a specific budget and multilaterally agreed terms of reference) that is difficult to imagine post-COVID-19, when fiscal resources are likely to be constrained among both donor and low-and-middle-income countries. Critics have, therefore, expressed concerns about the risks involved in adopting such a time-consuming, politically uncertain and resource-intensive approach, which has also been criticized for duplication and for being difficult to define in a democratic governance process<sup>17</sup>.

### Characteristics of effective SPIs and ways forward

It is unlikely that options one or two alone can provide the required interface between science and policy for food systems transformation at local, national and global levels. As for the third option, it is widely understood that scientific panels created by intergovernmental bodies (for example IPCC and IPBES) take many years to become established, funded and operational. This does not mean that things cannot be different in the future, but the track record suggests that major institutional innovations are time-consuming. Considering that the SDGs should be achieved within nine years and that most countries are off track due to the pandemic, it is likely that an instrumental and realistic pathway may be a hybrid solution that blends several options. For example, creatively merging options two and three could provide a framework to boost short- and mid-term goals for food systems transformation, taking into consideration legitimacy and inclusiveness along with material and human constraints. Ideally, the new approach should enhance the resources and activities of current SPIs (for example, CFS and HLPE; Table 1) and promote networking by creating a coordination body (with a new mandate and small budgetary allocation). This will collect, assess and report on available data from all SPIs, national and regional governments, NGOs and private sectors and will co-create knowledge and transform it into evidence for policy action in a transparent, independent, equitable and legitimate fashion.

Existing SPIs would form the core building blocks of any such enhanced mechanism, which should deliver coordinated assessments and reporting for the entire food system, thereby promoting better cooperation among SPIs. There are many existing networks of networks (for example, the GrowAsia Forum and the Food Action Alliance) that already foster multi-constituency engagement in food systems across multiple scales. These could be enhanced, better supported and structurally linked to providers and users of information and knowledge of all kinds.

In determining an appropriate option(s) to be pursued, at least four key principles must be kept front-and-center in the dialogue. First, all work must be credible, relevant, based on appropriate data, peer reviewed and of genuine value to users. Second, any solution must put legitimacy and inclusiveness at the heart of the design process. In other words, the legitimacy of SPIs needs to be driven by a transparent, open and independent process and through a mandate that is widely supported by governments, civil society, UN mechanisms and other stakeholders. Third, any SPI should ensure the active participation and meaningful inclusion of all food systems actors. In this respect, SPIs should incorporate knowledge pluralism, value different perspectives and concerns, and encourage debates and consensus building around alternative solutions while paying explicit attention to the voices and needs of different genders and historically marginalized groups. This can be achieved through transparency, independence of process, a mandate that is widely supported by governments, civil society, UN mechanisms, the private sector and a structure that is open to including perspectives that have traditionally been marginalized. Effective SPIs must safeguard against vested interests of many kinds, including those of political and funding groups. Fourth, any pathway forward should explicitly strive to bring multiple co-benefits and work with local public and private stakeholders to design food systems that create new (green) jobs and that support regional economic development while respecting local and Indigenous resources, knowledge and ownership<sup>18</sup> (Fig. 1). Finally, transformative science is also needed to support policy and offer innovative solutions for food systems transformation<sup>12,19</sup>. While existing streams of research and other approaches to gathering evidence are important, they are often limited by disciplinary or contextual siloes or are funded to answer questions that are not always relevant



to food systems transformation. Future resource commitments must promote, facilitate, integrate and sustain new forms of transdisciplinary approaches that help to identify synergies as well as obstacles to change and support real world experimentation through mechanisms that help to contextualize data and information, such as 'living labs'<sup>20</sup>.

In summary, most food systems stakeholders share the view that improved knowledge is needed to deliver food systems transformation<sup>8–10,16</sup>. However, it is important to note that implementing effective approaches in this respect requires political investment and leadership, multi-stakeholder consultation, societal trade-offs, a call for equity and a broader approach to knowledge sharing and capacity building. A realistic analysis of where a country, region or city is starting from is essential to determine what kinds of SPIs will support transformative activities and the priorities for capacity building and investment across all stakeholder groups. This can be facilitated by including the political economy of policy action into the advice itself, alongside economic evaluation, the scalability of actions on the ground, a calculus of costs and benefits and an assessment of winners and losers.

The SPI options presented here provide a potential framework to promote consensus around ways to achieve independent scientific interaction with policy needs at different scales. Establishing more effective food systems SPIs will require financial and political capital and time-defined dialogues that go beyond cooperation among existing SPIs to include other actors (including national and regional governments, the private sector and NGOs). These dialogues should be shaped by openness, inclusivity, transparency, scientific independence and institutional legitimacy. The UN Food Systems Summit held in September 2021 provided some space for this discussion, which should be furthered during the UN Climate Change Conference in the UK (COP26) and Nutrition for Growth in Tokyo. The global community must seize on this historic moment to formulate commitments that enhance SPIs and that concretely help them to support the urgently needed transformation of our food systems. □

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#### Author contributions

All authors contributed equally to the preparation of this paper.

#### Competing interests

Authors are members of the European Commission High Level EG on International Platform for Food Systems Science. The EG acts independently and in the public interest.