

# Agroecological approaches and other innovations for sustainable agriculture and food systems that enhance food security and nutrition

HLPE consultation on the V0 draft of the report

From 4 October 2018 to 19 November 2018

Synthesis by the HLPE Secretariat

19 December 2018

The electronic consultation on the V0 draft of the HLPE report #14 on “*Agroecological approaches and other innovations for sustainable agriculture and food systems that enhance food security and nutrition*” attracted **141** unique contributions, from **37** different countries, totalling **561** pages and almost 240,000 words. 7 contributions come from national governments, 32 from civil society and NGOs, 23 from the private sector, and 57 from academic or research institutes. 26 percent of the contributions come from developing countries. In terms of regional distribution: 50 percent of the contributions come from Europe, 21 percent from North America, 12 percent from Latin America and the Caribbean, 8 percent from Asia, 6 percent from Africa, 1 percent from Near East, and 1 percent from South-West Pacific.

This note proposes a synthesis of the comments received during this e-consultation. Written by the HLPE Secretariat, this synthesis does not represent the position of the HLPE Steering Committee and Project Team. Being a short document, it is not meant to reflect with precision the richness and diversity of all the contributions received, but should only serve as a guide to ease the reading of the full proceedings of this consultation (reference is made here to the numbered contributions). The full proceedings are available online.<sup>1</sup> They will be examined by the HLPE (Steering Committee and Project Team) and used as a background document to develop the report.

This note is organised in 3 sections. The first section gathers general comments, in particular about the narrative and structure of the draft. The second presents the comments around definitions and concepts. The third describes the main issues that contributors would like to see better covered in the report. Finally, an annex presents specific chapter-by-chapter comments, as well as suggestions regarding case studies and references.

## **1) General comments: narrative and structure**

### **General appreciation of the report**

Congratulation (29, 74, 85, 111) for this important (10, 13, 44, 69, 147), timely (93) excellent (38, 40, 65, 67, 71, 112), strong (62), promising (31), very good (22, 85), very rich (94, 139), convincing (110), quite exhaustive (131), very comprehensive and interesting (5, 80, 86, 100, 107), well structured (121), very detailed and well-illustrated (74) document. We appreciate the HLPE draft report objectivity (130). The document shows the divergent views on the main topics it addresses (131). The report is welcome as an important stepping stone for future work (31, 47). It has all the ingredients to make a strong report (121). It is a good step for development organizations and governments of different

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<sup>1</sup> See: [http://www.fao.org/fsnforum/cfs-hlpe/discussions/agroecology\\_innovation-v0](http://www.fao.org/fsnforum/cfs-hlpe/discussions/agroecology_innovation-v0)

countries to adopt agroecology (6). The draft is easy to read and deeply fosters agroecology (58). If not always easy to read, the draft is excellent in coordinating current thinking, reviewing existing updated literature and providing novel frameworks and interesting food for thought (34, 40, 42). The draft contains a wealth of useful information and analysis (43, 80, 86, 121) and has the potential to become the definitive study on agroecology (43). The V0 draft is extremely rich in relevant content and indicates that the final HLPE report will represent a valuable addition to the literature (57). Collaborative reports/innovations are more unbiased, democratic and holistic (58, 115).

The CSM attaches great importance to this HLPE report and to the related workstream: however it is deeply concerned with the V0 draft (140). The draft has some interesting aspects but need significant improvement (98). The draft is lengthy and repetitive (19, 131, 132). The draft needs significant simplification, clarification, and refocusing on the crucial subject under study (59). The draft misses a strong **political economy analysis** and a strategic **social** and **environmental impact analysis** of the different approaches and of the key lock-ins and barriers to innovation/agroecological transition (22, 106, 107, 126, 127).

### Scope and general orientation

It is positive that the report seeks to provide guidance for systemic solutions and applies a food system approach (124). The draft has a challenging (15) and ambitious scope (46), both too broad, in terms of the “innovations” covered, and too narrow in terms of the sustainable food system (SFS) outcomes desired, namely only FSN (111). The draft focuses on scientific literature failing to take adequately into account other sources of knowledge (124).

Multiple frameworks and sets of overlapping principles/approaches are introduced (Box 4, Box 7, Table 3), bringing more confusion than analytical clarity (46, 59, 80, 93, 98, 106, 119, 126, 132, 134, 145). The introduction should ground the study on two frameworks now widely recognized in CFS and FAO, i.e.: a **human rights-based approach to FSN** (46, 47, 55, 59, 82, 89, 106, 115, 118, 121, 124, 126, 129, 130, 131, 134, 136, 140, 144) in line with the CFS mandate/vision, the VGGT and other CFS products including GSF (46, 69, 106, 118, 124, 126, 131, 140, 144); and the **FAO 10 elements/principles of agroecology** (46, 59, 61, 70, 73, 75, 111, 119, 126, 145). Adopting a “**rights-based**” perspective will help focus the study on the needs of the structurally marginalized groups (124, 136, 140) and most vulnerable people who cannot exercise their right to food (59, 136, 140), including the estimated 75 percent of extremely poor living in rural areas and relying on agriculture for their livelihoods (59). The draft fails to capture the dimension of “adequacy” in the right to *adequate* food – adequacy encompasses socio-economic, cultural and nutritional issues (136).

The draft is complete in nature and covers all relevant aspects (21), striking the good balance between “*agroecology*” and other “*innovative approaches*” (21, 62, 93). I applaud the importance the draft attaches to agroecology for the future (34). The draft is remarkable, especially in its ability to place the agroecological transition in a more global approach and to show clearly its critical contribution to SFSs (91). The range of innovations described in the draft in addition to agroecology is appreciated as it supports the need for options at all level of the food value chain to provide flexibility and adaptability (109, 120) and enhance farmers’ ability to make an informed choice among different options to best suit their personal circumstances (108, 109, 120). Prior decisions of FAO (COAG) to promote and “scale-up” agroecology could be mentioned in introduction and should be the starting point of the study (36, 59, 145).

The draft is biased (110) and unbalanced (42). The draft does a good job of articulating agroecology’s contributions to FSN but there is a clear bias in favor of: agroecological approaches vs. “other innovations”; small scale; low input (132). The report needs a clear and strong focus on (transition to) agroecology (75, 82, 89, 119, 121, 126, 134, 137, 140): on its origins, its main proponents and practitioners, its benefits, as well as the opportunities and barriers to advancing agroecology (126). Agroecology, the right to food and food sovereignty should be the foundations of agriculture and food policies (89). Agroecology, instead of being analysed as one approach among others, should be considered as the **general framework for all alternatives to industrial agriculture** (42, 134).

The **purpose** of the report should be stated more clearly (32, 85): is it to ascertain the role of agroecology and other methods as a means of achieving an adequate FSN, in its different

dimensions, with a view to form policies and implementation mechanisms to achieve that objective (18, 32)? The connection between agroecology and FSN needs to be better described: the report is not strong enough in analysing the structural and historical root causes of food insecurity (30, 42). The draft provides very little evidence of how agroecology and other innovations actually address FSN and advance SFSs and does not show how industrial agriculture do the opposite (46, 119). Box 6 is a good step in the right direction (46, 70).

The technical case is well made for the importance of agroecology in the past, present, and future. However, it is less clear how useful the document and its recommendations are in enhancing food security and nutrition (security?) (14, 28). The key question is not technologies but the way we can drastically reduce the humanity ecological footprint, which requires new economic models and drastic social structural changes (42, 46).

### **Structure and overall narrative**

The draft creates the perception of juxtaposed modular units (52), of a collection of discrete approaches (80, 98) that do not flow from one to the other (52).

The structure of the report should be clarified (70) and strengthened (131). The report should start with an objective description of the role of current industrial farming and food systems in environmental pollution, soil degradation, over-exploitation of water resources, biodiversity loss, weakened ecosystem services and erosion of rural livelihoods – IAASTD (128). The report should be restructured as follows: (i) problem statement: current food systems and persistence of food insecurity; (ii) various alternatives to industrial agriculture (nine approaches); (iii) characterization of the sustainable FSN system at world level; (iv) barriers to the promotion of agroecology (42). The first chapter should present agroecology, its principles and its contribution to SFSs beneficial outcomes (including FSN) (111, 119); the following chapter should assess the degree to which the “other innovations” align or not with agroecology (111, 118, 119, 126); the closing chapter should focus on creating an enabling environment for agroecological approaches (111). Chapter 3 and Chapter 4 should focus on drivers and challenges to agroecological innovations consistent with SFSs, human rights and FSN (119).

Instead of merely listing generic drivers of or barriers to “innovation in agriculture”, **Chapter 3** should analyze more deeply the drivers of and barriers to agroecology and those innovations (identified in **Chapter 2**) that contribute to SFSs, and the related political economy factors (46, 82). This would provide a stronger evidence-base to discuss, in **Chapter 4**, the enabling conditions needed to overcome the structural barriers identified in **Chapter 3**, by utilizing the promising approaches identified in **Chapter 2** (46, 49).

### **Case studies and references**

Many contributions suggest additional case studies and references for this study (among which: 23, 35, 41, 50, 51, 88, 109, 115, 117, 118, 119, 120, 123, 129, 131, 134, 135, 140, 147). Although they are not all quoted in that short synthesis, they will all be carefully considered by the HLPE.

The draft contains an impressive list of **references** (43, 62, 93) albeit mostly from northern sources (64), but misses important OECD references on innovation, sustainability and risk assessment in agriculture, all with a strong policy focus (43). The recent IPES-Food reports (2016 to 2018) (35, 42, 44, 46, 49, 66, 126) and the IAASTD (2009) report (15, 42, 43, 44, 46, 66, 82, 107, 124, 140) would be useful references not only for the evidence contained but for their analytical frameworks of change (44, 106). Appropriate references to previous HLPE reports (e.g. Food Losses and Waste (FLW, 2014), livestock (2016), and forestry (2017)) could help to strengthen the report and avoid repetitions (43, 65).

This draft shows the rather glaring shortcomings of an expertise based mainly on one language (English), combined with a formalised perception of creation of knowledge and flows of knowledge (141). Where did this term agro-ecology come from? For the very large and very diverse non English-speaking world engaged in what 'agro-ecology' describes, this term has no meaning (141).

The draft have inconsistencies and includes numerous misleading and biased statements (132). The draft generally lacks evidence, and critical assessment of the evidence, which was, in the past, one of

the main strengths of HLPE reports (46, 59). It is not clear where the draft stops being scientific and starts being political, in part due to assertions with unclear evidence basis (132). Some issues (e.g. comparative productivity of organic vs. conventional agriculture), still being debated, are presented as facts in the draft (132). The report should avoid assertions based on no or limited evidence or out of the scope of the report (43, 70). The draft is full of references most of which don't refer to the original research findings (19). The report would be stronger by bringing in a variety of references rather than including long verbatim reproductions of the reference quoted (66).

The draft misses a methodological section, in particular on how the literature review was carried out and on the motive for selecting the different innovative approaches, as well as a critical analysis of the literature quoted (30, 131, 144): for instance the draft quotes a study funded by Monsanto (15, 28). It is problematic that the funding source is quoted only for one study in the entire report: the HLPE has to adopt a consistent approach (132).

The **case studies** and examples constitute a particular strength of the report (46, 62, 80, 98, 125, 144). Additional case studies and empirical evidence from successful projects, including at the field/community level, from around the globe would strengthen the text (21, 111). This would make the report more interesting and would serve as reference material for researchers and other stakeholders interested (21). The current set of case studies is imbalanced in terms of geographic representativeness (88). The case studies included in the draft report are selective, exclusive and not representative of the current agricultural sector (132).

IPES-Food (October 2018) illustrates seven case studies of agroecological transition (35, 106, 131, 145). The proceedings of the 2<sup>nd</sup> FAO International Symposium on agroecology should be a natural source of case studies for this report (109, 120). The HLPE could consider the following case studies: the Brazilian national policy on agroecology and organic production (55, 118, 123); the innovative approach, used in China as part of the Chinese economic growth formula concept, based on policies relying heavily on land reform and highly labour intensive farming (1); the May 2018 “Beijing Declaration for Biological Control” (IOBC and CAAS) (4); the successful case of Sikkim (an organic state in India) (53, 95); farmers' innovations such as: seeds in clay pellets in India or system of rice intensification in different Asian countries (19); the Syscom project of FiBL<sup>2</sup> (42); “extensive” agroecology in Argentina (58); Inga Alley Cropping as strong example of agroforestry (81); the case of MASIPAG (106); the case studies published by GASL on intensive silvopastoral systems (ISPS) (109); Water Efficient Maize for Africa (120); the 26 cases from the Biovision Agroecology Info Pool (121).

## **2) Definitions and concepts**

The draft is useful in clarifying the main concepts (38, 64, 110, 121) and can help building a common language and reaching a better understanding of the way to transform current unsustainable agriculture and food systems (42).

### **Food system transitions**

The report would gain from using food system **transitions** as a central concept (59, 106). This would lead more readily to a practical set of policy recommendations (59). This report should highlight the **paradigm shift / radical transitions / systemic transformation** needed in agriculture and food systems towards sustainability, from industrial to ecological processes and systems (42, 44, 46, 47, 59, 93, 98, 107, 117, 119, 121, 127, 129). In order to implement this shift, we need to: (i) upscale agroecological systems while improving their performance, and (ii) integrate agroecological elements into mainstream systems (61, 91). Informing policy choices and actions to reshape food systems and advance their sustainability requires a holistic and multidisciplinary approach building on past HLPE reports (140).

The report should contain some discussions on the **dynamics** involved and some sense of scenarios or options for the future in order to avoid a bias towards the status quo (43). What can be considered as an “agro-ecological practice”, what cannot and who decides? (65). All agroecosystems can

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<sup>2</sup> See: <https://systems-comparison.fibl.org/>

continuously progress towards sustainability and “sustainable agriculture” is not a steady state (132). Rather than a static vision of the false, binary, black and white dichotomy “agroecology vs. not agroecology/conventional/industrial”, the report should adopt a dynamic notion of agroecology and innovation, as a transformative approach to food system, as a context specific transition pathway towards SFSs – see Gliessman 5-level transition framework (46, 52, 59, 98, 106, 120, 121, 125, 126, 139, 144, 145). The report should stress the gradual progression in the agroecological principles (see below) and link them to the different levels of the Gliessman framework (121). Agroecological transitions to SFSs for FSN must be thought at different scales: farm, local, territorial, national levels (58, 119, 123, 127, 129, 131).

**Measurement** issues are underrepresented in the draft (109, 120, 137): we need evidence-based means to compare the different systems at local, regional and global levels (109, 120). Beyond yield, the report should discuss **new metrics, indicators** and methodological tools for measurement of performance and of impacts on FSN (in its four dimensions) and sustainability at different spatial and temporal scales (70, 91, 93, 99, 109, 120, 121, 123), such as the land equivalent ratio (70) or the Disability Adjusted Life Year (DALY) (109, 120). The draft misses a reflection on the central role that the choice of (evaluation) indicators (covering appropriately social, environmental, economic and political dimensions) plays in the design and implementation of policies (131). “Appropriateness” (p15, L17) is not an objective metric (132).

### Agency

The addition of **agency** as a fifth dimension of FSN is positive (38, 46, 62, 93, 119, 121, 123, 124, 134). This new pillar is particularly relevant to discuss agroecology as an approach to FSN: at the same time, this could draw resistance from countries as it shifts the definition of “food security” closer to “food sovereignty” (145). In the debate on innovations for FSN, the concept of agency, the issues of governance structures, and of **who controls an innovation** are of fundamental importance (118, 119, 124, 130). “Agency” refers to the freedom of choice, as defined by the concept of “capabilities” from Amartya Sen (146). Agency implies that peasants, indigenous peoples, food producers and their communities are central in making decisions and in the genesis of agroecology (134; 140).

The definition of “agency” in the draft should be clearer and better documented (38). While the definition is rather clear, the word “agency” do not capture well its meaning (93). Agency could be used as a central concept in this report, to better articulate the dimensions of (i) scale, (ii) knowledge, and (iii) transition (52). Agency can be an enabler or obstacle to the 4 other pillars of FSN: it appears to be a cross-cutting issue to be discussed within each of the original pillars (76, 120). Increased importance could be given to governance as part of the definition of agroecology (59, 115, 126, 131, 134, 145).

Human rights, and particularly women’s rights are the central vehicle through which the agency of individuals and communities to build on existing bio-cultural diversity can be protected, respected and fulfilled (115). This concept of agency could help to strengthen the link between food sovereignty and FSN (123, 126, 134). Even though the agency dimension addresses some key issues, the report should also highlight the role of civil society in the elaboration and implementation of FSN public policy (55, 123). “Agency” is closely related to the principle of self-determination and should include the rights to adapt, grow and set individual priorities (109, 115, 120).

Agency is not a pillar for FSN and its inclusion in the draft biases the analysis, as well as the evaluation metric (132). The HLPE should stick to the widely recognized definition of FSN with 4 pillars: adding agency as a fifth pillar of FSN seems inappropriate (70, 120) and inconsistent with the other four pillars (120). The concept of agency is ill defined, ideologically-driven and aspirational whereas the other four pillars are clearly laid-out, evidence-based, and internationally recognized (132).

### Agroecology

There is no consensus on what agroecology is (18). It would be enriching to learn how agroecology is defined and conceptualized by various stakeholders across food chain (governments, corporations,

NGOs, informal networks...) (38). We expected a larger definition of agroecology, in the sense of IPES-Food (2016) (42). The definition of agroecological approaches should be clarified (70, 89, 131, 144) and simplified, keeping only the last sentence (70). This definition needs to be consistent with the HLPE 2016 definition of agroecology (132). The report should also discuss agroecology from the economic perspective (145). Agroecology does not itself address economic sustainability: if agroecology does not contribute to improved incomes and livelihood, it is not sustainable (132). The **aspirational** (idyllic and utopian) **characterization of agroecology** (where agroecology encapsulates everything good), paired with the underlying negative characterization of “industrial” agriculture: makes it very difficult to understand what is and what is not agroecology; limits meaningful analysis; and makes a valid comparison impossible (132).

Agroecology needs to be seen through the lens of deep ecology and the understanding of the agro-ecosystem (6). Agroecology is a people and planet centered system of sustainable agriculture (117, 141) combining indigenous knowledge with cutting edge science, making the best use of nature to create healthy communities and empowering a social movement that resists the corporatization of agriculture (117). Agroecology is diverse, productive, resilient, efficient (recycling resources) and culturally appropriate (117). Agroecology is an ancient paradigm of regenerative agriculture, of co-evolution with nature, nurturing spiritual connections with natural resources (6, 47, 115, 119, 128), based on the traditional knowledge and practices of indigenous, peasants and family farmers over the centuries/millennia (46, 96, 115, 128, 140). In addition to the science of agroecology there is a need to include traditional knowledge or the wisdom of our ancestors and spiritual understanding of food and natural resources from various ancient cultures (6). The report should link agroecological theory and praxis with policies for sustainable water and natural resource co-management (10)

Agroecology does not stop at the farm gate (72) but represents a comprehensive (115), holistic/systemic (28, 75, 112, 115, 118, 121, 129, 131, 140, 144) and transdisciplinary approach to food systems (28, 129). The concepts and practices of agroecology need to come from the farmers: “of the farmers, by the farmers and for the farmers” (6). Have the farmers been consulted while preparing this report? Are there farmers’ representatives in HLPE who have real field experience of agroecological farming systems? (6).

### **Agroecological principles**

The report should stress more clearly that agroecology is an approach encompassing a number of principles but not prescribing how agriculture is to be performed unlike different more prescriptive approaches (31), such as organic farming which is based on clearly defined principles, rules, regulations, standards and labels (39). Remove the prescriptive/proscriptive phrasing from the agroecological principles: so that they become a list of (environmental, economic and social) outcomes to be achieved rather than specific/restrictive ways to achieve those outcomes (132). A number of countries have also standards for agroecology (similar to organic standards) (128).

The proposed set of agroecological principles (from 3 major sources) is comprehensive (121, 143), well-discussed (21) and relevant (61), but its added value compared to the FAO 10 principles is not evident (61, 145). These principles are not well articulated and do not adequately reflect accepted principles of agroecology: see suggestions in contribution (134). Those principles should be reviewed, starting from the **FAO 10 elements** (61, 70, 111, 119, 145): all the other formulations can contribute to the debate but cannot be upgraded to something widely agreed (119). The report should highlight the interdependency and inseparability of these principles (106, 118, 126). The number of principles should not be reduced (106, 118): some of them need clarification or adjustment (35, 42, 106, 118, 131, 142, 145), other principles could be added to the list (118), including on pest resistance management (143). It is not clear how these principles were developed (139). For some of these principles, their link with agroecology is not clear (139).

The 4 “**overarching pathways**” (resource efficiency, ecological footprint, resilience and social equity/responsibility) represent a better framework (93). The 4 overarching principles are not especially useful as an analytical tool since all the 16 principles fall under the concept of socio-ecological resilience (125). Box 4 gives the reader a biased impression with many principles falling under social equity/responsibility and only one principle under each of the first two categories (93, 131,

144). The 17 agroecological principles summarized in 4 overarching principles should also be used to evaluate the “other” innovative approaches (110). The choice to use the four new and relatively unknown HLPE principles for SFSs creates confusion (145). FAO has previously developed a common vision and framework of five principles for “**Sustainable food and agriculture**” (SFA), endorsed by Member States (36, 145).

**Resource efficiency** alone will not guarantee social justice and environmental sustainability (129). **Ecological footprint** is not an agroecological principle but an aggregated indicator which doesn’t allow the identification of unsustainable aspects in a given agriculture and food system (129). The relevant concept of environmental footprint should be extended to “environmental debt”, which introduces the time dimension and the tension between short and long term (139).

**Resilience.** The draft takes for granted the unproblematic nature of this concept (127). The concept of resilience should be more clearly defined (68, 139), using a broad “social-ecological systems” perspective: definitions suggested in contribution (68). The report should distinguish “resilience” from “robustness” (139). Biggs *et al.* (2015) identified 7 principles for resilience (68). Agroecology can deliver strong and stable yields by building socio-ecological and climate resilience (48, 106, 116, 119). The yield/productivity gap needs to be closed through better knowledge and better integration in more resilient agrosilvopastoral systems (12, 36).

**Reduced dependency to external (non-renewable) inputs** (106, 129, 140) and **circular economy** (112, 115, 129, 140). Dependency does not refer only to inputs but also to credit, technologies, far away markets... (93). What is the evidence that less dependency on external inputs can reduce food insecurity and the environmental footprint when viewed in a macro context (43)? The “external inputs” criticized in this draft could mean relief from backbreaking labor, particularly for the poor, women and children (56, 120). The most important aspect for the success of agroecological projects is to produce all the inputs required for farming by using locally available resources: purchased inputs in agroecology are not sustainable and expensive (6). Seed represents 20 to 40 percent of the cost of farming: seed saving, production and storage techniques need to be taught to farmers to reduce their dependency on expensive external seeds (6). A serious issue in the draft is the low emphasis placed on **nutrient cycling**, including livestock and human waste (112). The key place of phosphorus should be highlighted when discussing the closure of fertility cycles (139).

**Diversification** is a central aspect of agroecology (65). Diversification is required to enhance FSN and resilience (116). We need to promote diversity (genetic, species and diets) (30), diversification and **integrated landscape management** (12, 40) to counterbalance monoculture systems using fewer and fewer species for commercial gain, deprecating local food cultures (18), and leading to food insecurity (30). Increasing the length of crop rotation and including perennials, lead to higher crop yields, reduce nutrient leaching, increase soil fertility and carbon sequestration (89, 131). The link between agroecosystem diversity and the diversity of nutrient/dietary output could be better stressed in the report (19, 62, 118, 119, 129, 131, 140, 143). The report should not focus only on **diversification** (sometimes understood as crop diversification) but also on **integration** of crops, livestock trees and fish (36, 89, 96, 145) in the same agro-ecosystem. The report should explore tension between conventional agriculture/green revolution based on homogenization and agroecology embracing heterogeneity (40). (Agricultural) biodiversity (seeds and genetic resources) is an essential part of innovation in agroecology (96, 126).

**Waste management** (28). There is a lack of studies on waste management and micro-plastics pollution in and around agroecological sites (13). Improved storage and transport facilities (19) and local consumption of food contribute to reduce food waste (29). Further research is required to establish the impact of surplus food redistribution and food sharing activities on FSN and on reduction of food losses and waste (38).

Resources should be managed by their users (30). **Communal management of (common) resources** should be emphasized as an agroecological principle (30).

**Solidarity economy** (115), included in the FAO 10 elements, is missing here as one of the agroecological principles (75, 106).

**Create decent employment opportunities**, especially in rural areas and for youth (75, 106, 140). The lack of decent employment is one of the drivers of poor food security and nutrition (FSN) (42, 57). Recognize the right to decent working conditions (83, 118) and the right to food of **waged agricultural workers** (83). Many points could be cited (such as labor quality, conditions, ergonomics, arduousness...) but ruling out labor productivity is not an option (142).

**Shifting diets and changing consumption patterns** (9, 40, 92). The narrative around the question of diets is insufficient in the draft (131, 140). The report misses a clear definition of what constitutes a healthy and sustainable diet – see WHO 2018 fact sheet (92, 124, 129, 131, 140). It also misses the cultural dimension of diets and the essential link between agrobiodiversity and traditional/local/seasonal diets (124, 129, 140). The FAO (2010) definition of “sustainable diets” should be quoted somewhere as a key reference (39, 114). The pursuit of diversified, nutritious and culturally acceptable diets should guide any innovations discussed by the HLPE: this would also provide an important contribution to the process towards CFS Guidelines on Food systems and nutrition (140). The draft is dominated by supply side examples and could pay more attention to food consumption (38). Ultra-processed foods (74) is a holistic indicator of food systems’ degradation (2). More fresh and less processed foods would lead to healthier diets (29). The use of wild edibles (“weeds”) (6) and a reduced meat consumption (42, 59, 89) could reduce the pressure on land and resources (6). Globally around 40 percent of crop calories are used to feed animals that convert them very inefficiently – 17 to 30 percent ratio - into meat and milk (51, 89).

### **Innovation**

The draft contains a lengthy and academic discourse on innovation theory (132). It should not emphasize old innovation theories rooted in business and manufacturing sectors, both outdated and ill-fitting for a report on agroecology (46, 52, 141). Research done by the World Bank on innovation, entrepreneurship, smart growth, innovation paradox, etc. should be included in the report (132).

The draft fails to adequately discuss and assess the role **technology** can play in sustainable agriculture and food system that enhance FSN (120). The UN has already (December 2017) formally supported the need for convergence of all the available technologies and their use in integrated solutions, able to address local needs and societal requirements (120). Precision farming techniques (60, 64); digitalization in agriculture (64, 70, 115) and big data would require much more critical investigation and analysis (115). ICT and “smart technologies” (38, 70) can play a central role, not only for information sharing, but also for emerging forms of social innovations and collaborative activities (e.g. food sharing, social entrepreneurship and digital activism) (38). The disruptive **block-chain technology** is a way to increase sustainability, traceability, visibility and accountability in food supply chains, improving food waste management and connecting small food producers to the global food market (25, 38, 143).

**Innovation** should not be associated only with technological changes but, more broadly with a social process to make transitions happen (46, 59, 98, 124, 127, 129, 140, 145). We appreciate: the distinction between innovation at farm level and agroecology applied at food systems levels (98); the emphasis on social processes of innovation (98, 115, 119); the acknowledgement that innovation is more than just “technology” and encompass multiple dimensions (98, 119). The concept of innovation needs to be decoupled from technology and primarily related to advancing FSN (140). The real purpose of innovation should be affirmed from the outset: address structural problems and realize the right to food and nutrition (124, 126). Innovations should be considered as creative responses to challenging conditions and/or the mix of processes and practices that promote transitions to a new desired state (140).

I was very interested by the discussions around **innovation processes** and **innovation systems** (86). However, there is a need not only to understand how innovation occurs and develops but also how to better support innovation at different scales from local to global (86). I was delighted to see in this draft innovations considered as a real way to improve the current food and agriculture markets (25). The report should provide additional opportunities/references to judge more equitably different school of thoughts on the subject of innovation (109, 120). The HLPE is encouraged to broaden its thinking on innovation, considering the many different innovation theories, beyond an extremely

narrow focus on the social process of innovation (109, 120). Rather than “innovation”, the concept of **socio-ecological resilience** would be more effective to frame the report and to reflect the aims of transformation towards sustainability, including improvements to FSN (125). The concept of community and system adaptive capacity is neglected in the draft and only addressed in the CSA section (130).

We welcome the recognition of social innovations in the draft but suggest to better document the role of “peasant”, “local” (48), “indigenous” (21), “grass-roots” (38) not only to improve agroecological production but also to strengthen resilience to climate change and natural disasters (48). The starting point for the **ecological transition** is very often no longer to adopt new technologies but to “de-adopt” technologies that have become problematic - “**innovation by withdrawal**” (e.g. diffusion of no-till) (100, 137) or “retro” innovation (98). Many innovations are brought in by local communities without much education and technical knowledge, based on their past experience (21). Establishing an appropriate institutional system and framework would help to better document and disseminate this kind of “indigenous”/local innovations (21). The concept of radical innovation and the role of social experiments as a form of innovation and learning could be given more attention (38, 129). The draft should explore more deeply the distinction/complementarity between incremental and transformative/breakthrough innovation (112, 128, 130, 140).

### **Innovative approaches to FSN**

There is a need to better articulate the different approaches in the draft: the presentation and treatment of approaches need to be more consistent across chapters (64, 134). In Chapters 2 and 3 agroecology and the other innovative approaches are largely unconnected (124). Most of the discussions in the current draft are too broad and general, nebulous and misleading, overlapping and confusing (64). Knowledge gaps are discussed for agroecology in Chapter 1 but not for the other approaches (80). All innovative approaches should present the same level of data and evidence (131, 134, 144).

The “**main points of convergence and divergence**” among these approaches, as well as the related political dynamics, should be analyzed more explicitly to illuminate which aspects boost or hamper the **transition** to SFSs and to make the discussion more useful and informative (46, 64, 145). The assessment framework should clearly expose the tensions and challenges related to the co-existence of different approaches (106, 118, 131, 140, 144, 145): this issue is highly relevant for transition theories and policy choices (145). Beyond a simple comparison between systems the report should recognize their diversity and context specificity, highlighting the fact that different systems can coexist within a country (43) and that farming systems are not clearly distinct but spread over a spectrum/continuum on the sustainability axis (61, 80). All farm systems can be improved by the implementation of agroecological principles (112). Such a narrative would help to overcome polarized debates (61).

The list of nine **innovative approaches** requires review and adjustment (36, 145). It is not clear how and why the nine approaches have been selected (36, 46, 80, 82, 111, 125, 129, 140) and to what extent they encompass the whole food systems (including fish) (35). The report doesn’t show why each approach is actually an innovation, an innovation system (46, 80, 98). **Conventional agriculture** should be covered in the report as an approach to be compared and contrasted with the others (40, 119).

The justifications provided are not strong enough to explain the **current list/grouping** of approaches (80). The current list is redundant: the authors distinguish different approaches but end up saying basically the same things about all of them (98). These approaches are not comparable because they are overlapping, and widely different in nature (42, 98, 111, 118, 132, 142, 145). It is not appropriate to put at the same level systemic innovations that aim to address the root causes of food insecurity and malnutrition in all its forms, and more specific innovations of limited scope that only mitigate symptomatic effects (131, 140, 144). Distinction should be made between “real” and “normative” approaches (42). Therefore we suggest to re-organize/cluster the innovations/approaches covered (118, 119) in two big blocks reflecting the **two diverging narratives/two different ways** to conceive agriculture (119) as explained below.

Nutrition-sensitive agriculture, sustainable intensification (including conservation agriculture), climate smart agriculture and value chain approaches should be grouped under a common label of “**industrial system innovations**” (106, 117, 119, 131, 140, 144). The report needs to clarify rather than blur the distinction between agroecology and these “industrial system innovations” (117). Climate smart agriculture is more a tool than a global approach (145). Climate smart agriculture is a conformist approach rather than a transformative one, justifying almost any technology or practice provided it has low GHG emissions intensity (107). Climate smart agriculture is only concerned by production techniques and does not embrace a food system perspective (107). The definition and scope of “Climate smart agriculture” should be clarified in order to assess if it could be subsumed under sustainable intensification (80). Climate smart agriculture and sustainable intensification do not offer substantive arguments to demonstrate their benefits for FSN (30, 66, 131, 144): they cannot be alternative terms for agroecology (107). Neither Nutrition sensitive agriculture (134), nor Climate smart agriculture, nor sustainable intensification (including conservation agriculture) should be included as innovative approaches to SFSs for FSN (53, 58, 89, 119, 131, 134). Biotechnologies are tools rather than approaches (145). GM and bio-fortified food should not be included in the list of sustainable innovative approaches that promote FSN (55, 58, 82, 118, 119, 123, 124, 134, 140). Rather than an innovative approach to SFSs for FSN, sustainable value chains should be considered as an “enabling condition” in Chapter 4 (53) or as a cross cutting issue for all approaches (80). Nutrition sensitive agriculture expands the definition of an approach in a good way (40). Nutrition-sensitive agriculture and sustainable value chains should not be presented at the same level than the other approaches (70). Sustainable food value chains and FLW reduction are not approaches but aspects that an approach must incorporate to be sustainable (119, 131).

Permaculture, organic farming and agroforestry should be considered as specific forms of agriculture falling under the “umbrella concept” of **agroecology** (39, 40, 42, 53, 59, 61, 70, 71, 96, 106, 118, 119, 125, 128, 129, 131, 144, 145). If agroforestry is considered, pastoralism should be considered equally (36, 145). Organic farming is the basis of agroecology and SFSs almost everywhere in the world (39). Family-based organic farming is very close to agroecology while large-scale business, export oriented organic farming is closer to sustainable intensification or climate smart agriculture and does not hold as an innovative approach to SFSs for FSN (42, 53, 59, 125). African Union has decided in 2012 to mainstream an “ecological organic agriculture” approach, exact blend between agroecology and organic farming (42). Agroforestry is a practice rather than an approach (30, 40, 53, 102). The report should consider: the role of trees in agroecology and sustainable agriculture (12, 104); domestication of indigenous trees and value chain development –marketing, processing – (12); agroforestry and biochar for “terra preta”/“terra nera” (7).

### **Criteria to assess these innovative approaches**

The draft is useful in comparing the various **innovative approaches** (42). The draft fails to document the effectiveness and impacts of agroecology and other innovative approaches in the field (59). The draft **describes** the approaches in detail but do not undertake any critical and **evidence-based assessment on** how and in what ways agroecology and other innovations contribute positively or negatively to the transition towards SFSs for FSN and to the different SDGs (46, 61, 82, 118, 129, 131). Such an evidence-based assessment could be undertaken in Chapter 2 (46). The draft does not provide an analytical framework nor develop criteria that would allow to assess and compare the different approaches, their level of “innovation” and their contribution to FSN (124, 129). The assessment framework should clearly enable policy makers to take informed decisions on which approaches need to be supported with public policies and investments (140).

The different approaches should be assessed against the specific principles of agroecology, or against the overarching principles for SFSs or against the five pillars of FSN (134). Devoting a whole chapter to agroecology is positive (80) but excluding it from chapter 2 suggests that agroecology is not an innovation system, whereas the others are (46, 80, 82, 98). To address this concern and to simplify the structure of the report, Chapter 2 could more explicitly emphasize how each approach relates (or not) to agroecology (80, 111, 126). Agroecology should be considered as a benchmark for the other approaches (118). The report should better articulate agroecology as an innovation, as an alternative approach to innovation (98).

The assessment of the different approaches doesn't clearly follow a standardized method (118). It is unclear why "innovation" is emerging as the central criterion to assess agroecology and other agricultural approaches (instead of other parameters such as: agricultural resilience, adaptation, equity, food justice, empowerment, risks and precautionary principle) (89, 98, 118). This tends to marginalize community based agricultural practices and knowledge that have evolved and fed communities for generations, and to favour new and patentable products (89).

The "**salient dimensions**" proposed in question 2 to characterise the different approaches seem very relevant dimensions describing the technical or functional elements of farming and food systems (33). We note that some of them represent the opposite ends of the spectrum on one dimension (134). These "salient dimensions" (circular economy vs. dependence to external inputs; diversification vs. specialization; local territorial markets vs. global markets) could help to unveil profoundly different food system visions, pathways and strategies (140).

This set of salient dimensions could be refined: suggestions in contributions (98, 106). The proposed "salient dimensions" are a list of the common criticisms of large scale agriculture (120). The following dimensions could particularly help characterize and compare the different approaches: (i) human rights base; (ii) local or global markets and food systems (short or long supply chain); (iii) specialization or diversification; (iv) ownership and use of modern knowledge and technology or use of local and traditional knowledge and practices (35). The CSM suggests five assessment criteria: (i) scope of the approach; (ii) primary agency and power implications; (iii) human rights assessment; (iv) contribution to FSN and its 4 pillars; (v) contribution to the HLPE evaluation principles (resource efficiency, resilience social equity/responsibility, environmental footprint) – detailed questions in contribution (140)

The different approaches should not be compared only on a technical basis but also in terms of their **values** – food sovereignty, food rights, contributive justice, food justice, empowerment... vs. maximum gain and maximum food production... - (33, 55). The different approaches are rooted in different political-economic models, food systems paradigms, cosmovisions and ideologies (46). Human rights are not just one innovative approach among others but the **bottom-line/fundamental basis that underpins all of SFSs and FSN** and the lens through which to assess all innovative approaches (35, 46, 59, 70, 80, 82, 106, 113, 118, 119, 121, 124, 125, 126, 129, 130, 131, 134, 136, 140, 144). Human rights are universal (136), they are not an option (125): governments cannot be allowed to choose approaches that harm human rights (119). The question to be addressed is "to what extent agroecology and other forms of agriculture actually fulfil these rights in practice"? (46, 59, 118, 129, 134, 140). Improving the sustainability of food systems is not the ultimate objective (140). Human rights principles (PANTHER) (136) should be used as a criteria to assess all approaches (a row in table 3) and not as a production method/approach (a column) (33, 80, 106, 118, 119, 126, 134, 136). Rights-based approaches should be pulled out from table 3 and used to frame the whole report (46). There is too little emphasis in the draft on monitoring and accountability, which are the core of the human rights-based approach (136).

The criteria of **equity, sustainability** and **effectiveness** (i.e. quantity and quality of food produced) should be the point of departure to assess of different innovations, of different methods of food production and/or harvesting (18, 49, 118, 119, 120, 131, 140). Resilience is an aspect of sustainability (18, 118). Autonomy for farmers is an element of sustainability and resilience (131). The social dimensions of sustainability are underplayed in the draft: social bonding and bridging help build resilient communities (38). All the approaches should be assessed against their capacity to address the multiple challenges our food systems are facing, including malnutrition and food insecurity (107), climate change, environmental and biodiversity collapse, profound and increasing inequalities (70; 106, 107, 140). The draft lacks a clear mention of the **precaution principle** of the CBD among its key principles despite its central role when dealing with innovation and biotechnology (140).

The report should present scientifically the different approaches based on up-to-date and sound evidence, assessing their following attributes: (i) safety for humans and the environment; (ii) its impacts on ecosystem services; (iii) the quality of the food produced (including taste, color, flavor and texture); (iv) crop yields and quantity of nutrient produced; (v) knowledge and skills needed to apply the method; (vi) costs of the method compared with the abilities and resources available (32).

### “Other innovations”

The report should better analyse the potential of innovative practices such as:

- **Animal breeding:** increase feed conversion efficiency and lower excretions/emissions (9); community breeding programmes to take advantage of local breeds adaptive capacities while improving their performance (20);
- Conventional plant breeding and **green biotechnology** (9); green manuring (19);
- Alternative sources of protein: aquaculture, algae, insects, lab meat, plant based proteins (9)
- **Biological pest control** (4, 19, 94) and weed management (19); **integrated pest management** (46, 94, 120, 143); agroecological crop protection (94); botanical crop protection and indigenous production of plant-based insecticides (120); the role of microbiota and microbiome as an intrinsic component of agroecosystems needs to be highlighted (139);
- **Integrated soil fertility management** (59); Integrated Plant Nutrient Management, Nitrogen Use Efficiency indicator (60, 77, 120); Best Management Practices (60, 77, 120, 143) based on the 4Rs (Right source, right rate, right time, right place) (77, 120); conservation agriculture (56, 80, 93, 97, 120); avoid point sources and reduce diffuse sources of pollution (143);
- Resilience Design in Smallholder Farming Systems Approach (63);
- Production ecology and Ever Green Revolution, considering local agronomic conditions – soil and water (110);
- IDF advocates for a mix of practices, tools and technologies tailored to each situation, including precision agriculture, conservation farming, drip irrigation, integrated pest management (73).

The report should cover the issue of the (correct) **use of agrochemicals** required with certain innovative approaches put forward in the report (e.g. conservation farming) (30, 129, 143).

Agrochemicals should be excluded from agroecology given their negative impact on the environment (58). Low input, agroecological and organic systems produce multiple benefits by reducing the use of agrochemicals in agriculture and antibiotics in livestock (122). Low input systems are feasible where land is available (122).

The approach adopted in the report of limiting or avoiding mineral fertilizers ignores the benefits that mineral fertilizers bring to farmers in regions where organic sources are not sufficiently available and put at risk farmers ability to achieve good yields and ensure an acceptable income (60, 77, 120). Organic fertilizers can actually lead to higher movement of nutrients into the ground or surface waters, because they continue to mineralize during times of year when the crop is not as actively taking up the nutrients (56, 120). The production of composts, common in organic farming, leads to very significant GHG emissions (56, 120). Fertilizers have an important role to play for our dietary requirements: there is a direct correlation between micronutrient deficiencies in soils and plants and micronutrient deficiencies in humans (60, 77). Adaptive and efficient fertilization involves both organic and mineral fertilizers, and appropriate farming practices, adapted to local conditions (soil, water, climate), to optimize yields and maintain/improve soil fertility (60, 120). The implementation of increased fertilizer usage needs to be combined with other technologies such as an effective herbicide option and rust resistance traits (120).

### Consistent use of terminology

The use of terminology should be checked throughout the report (36). The key terms need a proper and consistent definition in order to prevent confusion (42). The relationships between sustainable agriculture and food systems, FSN, “agroecology” and “innovative approaches” should be clarified (42, 46, 49, 132). The draft conflates the notions of “food security” and “nutrition”: the current draft mainly focuses on food security but should give equal attention to nutrition (security) (99, 124, 131, 137, 140). The previous HLPE report on Nutrition could be used as a reference (131, 140). The report should use more consistent and inclusive terminology not focusing only on “farmers” but considering also other food producers (small scale fishers, pastoralists, forest dependent people, and indigenous peoples) and agricultural sectors (livestock, aquatic foods...) (35, 36, 124, 140, 145). The draft uses some words that have loaded meanings and connotations (e.g. contamination) and is biased in favour of the precautionary principle, which conflicts with the intended objective and evidence-focused nature of the

HLPE (132). The draft frequently uses the term “industrial agriculture” in a mostly disparaging way but provides no definition (56, 120). “Ecological footprint” is not defined in the draft (85). What is meant by “food justice” and “contributive justice” (132)? The HLPE is invited to use FAO/WHO definition of “pesticide” (145).

The term “innovation” is overstretched: why should agroecology be an approach and organic farming an innovation (42)? It is not clear how innovation is defined and what it includes (132). The report should provide a much better definition of an “innovation system” (46). The report should define “innovation” and “technology” (71) and precise what innovation are covered here (75, 85). The meaning of “other innovations” in the title is not clear (85). “Other innovations” undermine rather than complement agroecology (89). The definition of innovation in the draft should be broadened beyond its current technological bias (59).

The use of some terminology is not minor (29), e.g.: “peasant” vs. “rural” (132); “ecosystem services” vs. “ecosystem functions” (29, 45, 124, 129); “scale” vs. “size” (46, 52, 111); “producers” rather than “enterprises” (124); “small-scale farmers”, vs. “smallholders” or “food producers” (130). The acronym “SAD” is not defined (132). The acronym “CSA” brings confusion between “climate smart agriculture” and “community supported agriculture” (75). “Gender equality” should be used instead of “gender equity” as it more truly helps eliminate all gender discrimination (31). Replace “global warming” by “climate change” (70). The concept of “green economy” is very controversial and should not be used in the report (129). The language of human rights and women’s rights rather than empowerment should be used throughout the document: women’s rights are not explicitly mentioned in the draft (115, 119, 124, 126, 140). “Rights over seeds” should be broadened to “rights over genetic resources” used for food and agriculture (36).

### **3) Main issues to be (better) covered in the V0 draft**

#### **Main challenges to sustainable food production**

We need to produce more without depleting our natural resources any further (19). The problem of famine and hunger is not a primarily matter of food production but one of **power** and **access to food** (58, 92). Availability is not the only issue, access and other FSN dimensions are also important (3, 85).

Contributions highlight some of the main challenges to sustainable food production that would deserve to be (better) covered in the report:

- human **overpopulation** (18);
- **urbanization**: rural to urban migrations affect agriculture (19, 40); infrastructures and services in rural areas (57);
- reducing **poverty** (27, 144) and **inequalities** (27, 64, 98, 106, 107); **power relations** (19, 107); market **concentration** (15); growing concentration of market/economic power (19, 98, 115) that can be counterbalanced by **cooperative farming** (19);
- **access and control of access to food** (15, 106, 107, 145) and **natural resources** – land, water, seeds (46, 49, 55, 57, 72, 98, 107, 113, 117, 123, 129, 147); ownership of land and (women’s) rights to participate in land use decision-making process (117); need for participatory integrated natural resource management (105); access to (local/territorial) markets (115, 117, 119, 131, 140) and rural financial services (31, 76, 130), (micro) credit (46, 49, 117, 120, 130) and information (4, 46, 49, 74, 143);
- **land tenure rights** and **land grabbing** (17, 30, 52, 53, 58, 59, 72, 82, 131, 136); land concentration and food insecurity (66); displacement of indigenous and peasant communities from their territories (17);
- **water rights** are key (in particular for aquaculture) (36, 49, 53); FSN and water availability and safety are interlinked (53); the draft doesn’t discuss **irrigation** (71) nor integrated rainwater management (120); participatory and community based irrigation water management (76); water footprint is a key indicator for SFSs (22);
- **climate change** mitigation and adaptation (7, 18, 28, 39, 46, 49, 59, 70, 71, 81, 89, 107, 117, 121, 137, 140, 145): climate change gets a limited coverage whereas it’s a key driver of food insecurity: the report should be framed in the context of the Paris Agreement (106, 131, 145);

IPCC 1.5°C report calls for a radical and urgent shift (89, 106, 140, 145); need to study agro-climatic conditions at local and regional levels to address weather based risks (19); climate change is not addressed only by climate smart agriculture (121) and the report should stress the potential of agroecology for climate change mitigation and adaptation (46, 119, 121, 131, 144); carbon sequestration (60, 77, 81, 89);

- **degradation of land** (12, 19, 29) and **ecosystems** (18, 39, 46, 49, 59, 106, 140); **ecological footprint** (29) and **planetary boundaries** / limited resources (42, 47, 68, 106, 140): there is no “planet B” (47);
- deterioration in **soil health** (19, 75, 94, 115) and soil fertility (9, 46, 49, 59, 139); soil characteristics (95, 110) and earthworms should be given more attention (95); role of soil variability and of isolated wetlands in semi-arid regions (104, 105); soil compaction management and controlled farm traffic (143);
- **biodiversity** loss (28, 29, 51, 70, 106, 107, 140); degradation of (agro)biodiversity (18)
- **food losses and waste** (18): create a law on food donation (58);

### **Design an appropriate institutional environment for innovation**

The report should provide a critical reflection on the institutions needed to regulate the action of big economic agents (129). Any comfort or support to “BigAg” and “BigFood” should be removed from the report (47). Governments, codified rules and legislations, policies and incentives (subsidies) shape agriculture and food systems (116). They can play an important role in promoting agroecology and other sustainable approaches to agriculture and in changing the productive system (42, 58, 116). States play a central role in the promotion of science and technology, training and creation of markets, all essential to innovation (123). Farmers are business owners: guidance and resources can be developed at the global level but decision-making for farmers should remain local (109, 120).

The report should better cover issues related to **intellectual property rights** (12, 15, 46, 49, 52, 53, 59, 106, 115, 119, 126, 129) including: human rights to the world germplasm (29); protection of farmers’ rights to save and exchange seeds (17, 28, 55, 59, 106, 115, 116, 119) and genetic material (42) – see new EU regulation (2018/848) on organic farming (42), seed laws and international agreements such as ITPGRFA, Nagoya Protocol and CBD (116, 117, 119, 124, 129); collaborative and open source intellectual rights (140). Effective intellectual property protection stimulates the breeders to invest in the development and delivery of new varieties to farmers – 1991 act of the UPOV convention (108). Seed is key to agricultural innovation and the most important input in crop production (108). The role of the organic movement in the conservation of seeds and in the protection of farmers’ rights over seeds should be mentioned in the report (53). Agroecology is based upon free information and (genetic) resources sharing, putting farmers, rather than corporations, at the centre of the process (28, 31). Many communities reject collective or individual forms of IPRs because they entail commodification of nature and common resources (17). GMOs are not compatible with agroecology: no patent should be granted on genetic resources, which should remain freely exchangeable and available to breeders and farmers (53, 106). Principle 14 on “fair treatment of intellectual property rights” should be clarified or removed (106). The statement “barriers to diversification of food systems... include intellectual property protection and seed legislation...” is not based on any scientific/economic studies (108).

The report should give more attention to the **political economy** of and to the **power dynamics** behind the proposed nine innovative approaches to food systems transitions (42, 46, 98, 119, 129, 134, 140), using more widely available the knowledge in social and historical sciences (42). Inequities, power imbalances, governance and power structures shape innovation (64, 98). We can learn a lot from indigenous conceptions of governance across the world (115). The report should raise the following questions: innovation for whom and by whom? Who gains and who loses from these innovations? How to approach innovation in ways that deliberately address social, political and economic inequality? (FAO, 2018) (98). The report should assess: the roles and divergent interests of, as well as the power relations between all stakeholders (**public and private actors, civil society and scientists**) (14, 30, 35, 46, 52, 55, 98, 110, 143, 145); the role of and controversies around multi-stakeholder (including public-private) **partnerships/engagement** and the related conflicts of interest (14, 30, 34, 46, 52, 55, 69, 108, 143); the perspective of citizens and their role as consumer and voter

(61); the role of farmers' organizations and cooperatives (72, 147). The draft idealizes community and local dimension (38, 42) but should recognize **community level power relations** (including class and gender) (38). The role of community based processes and institutions (e.g. VSLA or CBA) and of ecosystem-based adaptation (EBA) in the innovation process should receive more attention (130).

### **Strengthen investments in agricultural and food systems R&D**

The report should stress the importance of research and development, taking a whole farming systems approach, and considering farming and related value chains as complex social-ecological systems (10, 109, 120, 136). Responsible research should be the foundation of practices recognized as genuinely innovative (109, 120). A re-prioritization of as well as strengthened public (and private) investments in research, education and extension are needed to transition towards equitable and sustainable food systems (46, 52, 67, 71, 82, 89, 117, 136). Pimbert and Moeller (2018) show that aid for agroecological projects is less than 5 percent of agricultural aid and less than 0.5 percent of the total UK aid (89, 126). We need to mobilize more funds to make the expected transformations possible (93). Multiple functions and benefits of agroecological systems are largely unsupported and undermined by institutional innovation systems (98).

Both agroecology and conventional agriculture have been handicapped by a lack of dialogue between science and local knowledge (127). Local knowledge is the starting point for agroecology (142). Agroecology is a space for bottom-up, participatory and transdisciplinary knowledge co-creation, involving not only academic institutions but also farmers and their organizations (48, 61, 111, 129, 144), all actors along the value chain, social movements, consumers and their organizations (61, 129), and including a dialogue between science and local/"non-academic" knowledge (129, 142, 144, 147). Not only the source of knowledge (modern vs. traditional) is important but also the way it is created plays a role in innovations: knowledge co-creation/co-construction (transdisciplinary and participatory research) is a key element (29, 30, 33, 61, 98, 126): see the case of Honduras (126). Farmers', traditional, local, indigenous knowledge and technologies, emerging from the grassroots, should play a central role in a bottom-up innovation process (19, 46, 49, 96, 98, 115, 119, 124, 126, 144). States should allocate sufficient funds to collect and promote this traditional knowledge (19).

The draft misses some references and theoretical frameworks used for farm advisory services (FAS), knowledge processes, and evolutionary economics (30). The report should examine ways to reinvigorate "**farming systems research (FSR)**" as a suitable way to promote sustainable agriculture and ways to encourage interdisciplinary science for a holistic analysis of farming systems (4).

### **Strengthen capacities and facilitate access to knowledge and information**

**Education** is the main thing if we want to see changes: (consumer) education and information should be given more importance in the report (29, 92, 101). Citizens need greater awareness on the importance of healthy food choices for affordable, local, seasonal, regenerative, organic, nutrient dense food (47). Developing education programs in agroecology has to be integrated with the local culture and ethos of the region (6). It's important to be inclusive of all ancient cultures for a large scale adoption of agroecology at national level (6).

**Innovation platforms** (including online collaborative platforms, communities of practices and farmer-to-farmer knowledge sharing mechanisms) are needed to support the dissemination of knowledge and innovation (109, 115, 120, 137, 139, 144). **New learning models** should be developed: including: citizen generated evidence (62, 111, 137); *núcleos de agroecología* (agroecology centers) (123, 129, 147); participatory research involving collaboration between scientists, farmers and local communities; farmer field schools, or peer to peer (farmer-to-farmer) learning approaches; social movement led educational experiences (28, 29, 46, 49, 59, 67, 72, 75, 76, 117, 137, 147). What are the actual tools and measures that citizens can implement/use to foster participatory processes such as co-designing policies (38)?

**Investing in human capital, building innovation capacities** of individual and organizations, and managing the emergence of innovation communities are central issues (86, 119) to be discussed in Chapter 4 (46). Appropriate capacity building of local farmers and learning from their experience is important to strengthen the knowledge base (6). Agroecology is knowledge and management

intensive, and this, along with lack of access to information and extension, can be a barrier to wider adoption (72). Without the support of social movements or states, building the farmers' knowledge required for a transition to agroecology can be expensive and time consuming (46). Once farmers are engaged in a transition to industrial methods, adopting agroecology becomes more difficult (46).

### **Acknowledge the specific role of women and youth for innovation**

It is surprising that the role of women and youth is only highlighted at the end of the document, in a single paragraph (131, 140). Gender equality and intergenerational issues are essential to the debate around FSN, sustainability and agroecology and should be addressed throughout the whole report (131, 136, 137, 140). Women are critical to influence the adoption of agroecological approaches as well as dietary diversification which would lead to SFSs for FSN (137). Youth are found to be the early innovators and effective for diffusion of messages (137).

The **gender dimension** in agriculture, agroecology, food systems and FSN should be recognized to a larger extent throughout the report: it depends on geographical contexts, cultures, economic systems and farming systems (31, 53, 106). Women play a critical role in SFSs for FSN (53, 55, 123, 137). The report should recognize the gender dimension of knowledge and innovation (126). The report should contain a separate chapter/section on gender issues (21). A better understanding of the gender dimension is key to eliminate poverty and hunger (SDG1 & 2) (21). A human rights-based approach and a clear focus on gender equality/equity (women's literacy and empowerment) are needed for the report to contribute to the SDGs (30, 82, 98, 123). The draft relies on a model of household that is unitary (acts as one actor), atomized (isolated from other social relations), and inadequately gendered (127).

The draft provides a few examples of current projects but makes no real reference to how the resulting policies and directions could be implemented, and in particular how to attract/engage the **youth** in agriculture and food systems (34, 57, 109, 147). Develop "local centres of excellence" could help to initiate this "new deal for the youth" (34). Rural exodus of youth and subsequent ageing of rural communities would merit mention when discussing the barriers to innovation (57). Labor intensive agroecological and small-scale systems can create viable positive employment opportunities in rural areas, contributing to attract youth in food systems (57, 118). Should the international community idealize and support low-paying strenuous physical labor over productivity and affordable food prices (132)? Agriculture and food systems are not likely to attract youth if they have the impression that innovation is largely limited to the adoption of historical practices (109, 120).

### **Other gaps in the report**

The report should (better) consider:

- **one health** (humans, animals and planet) should appear as a key objective for agroecology and SFSs (28, 39, 51, 106); a major gap in the document is a contextual discussion of the linkages between agroecology and health (37); **animal welfare** should feature more strongly in the report (51, 89, 115); antimicrobial resistance is a major challenge (51); **food safety** (aflatoxins) (56, 106, 120);
- **urban food systems** (38, 39); urban (ecological) agriculture (42, 53); nutrition impact of community urban garden development programs (19, 29, 64); importance of food sharing activities to transform urban food systems (38); strengthen urban-rural linkages (42, 57, 61, 75, 123) to create holistic territorial/local food systems (75, 129, 130, 131, 139); nutritious locally produced foods and short value chains strengthen the link between rural producers and urban consumers (29, 57, 74, 129, 130, 131, 140); community-supported agriculture (64, 75, 123, 147); connect consumers with farmers (143);
- the draft is mostly written from a crop production perspective (36, 139, 145): **livestock/animal production** – poultry for smallholders, grazing and pastoral systems, aquaculture -, strongly contributing to agrobiodiversity and landscape management, is underrepresented in the draft (20, 36, 127, 131, 139, 140, 145); extensive livestock systems, integrated crop-livestock systems and pastoralism (5); small-scale mixed farming systems (crop-livestock-fish) and community-led fisheries (10, 140). The report should consider: the role of livestock in circular bioeconomy – provision of manure, recycling of crop residues... (20) and in climate change

adaptation (89); the search for feed efficiency (139). Feeding human-edible crops to animals and overconsumption are forms of food loss (51).

- **trade** (89, 144): impacts of trade agreements (30, 89) and trade laws (18); **markets** needs to be prominent and highly visible in this report (71); economic valorization of agroecological products (70); **certification schemes** in supporting agroecological markets (71); payments for environmental services (71); food prices should reflect the true costs of (subsidized) unsustainable agriculture thus addressing market failures and internalizing externalities (46, 53, 59, 62, 82, 89, 127, 144). Trade is depicted in the draft in a negative light despite much evidence (e.g. SOCO) pointing to the benefits of trade (132). Standard-setting bodies (such as CODEX) are not discussed (132). Trade is outside the scope of this report (132).

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### Annex: Specific comments: chapter by chapter

Some contributions (e.g. 46, 56, 59, 70, 89, 120, 131, 132, 136, 137, 142, 144, 145) provide a number of specific chapter-by-chapter, and even line-by-line comments. Although they are not all reproduced in that short synthesis, they will be carefully considered by the HLPE.

### Recommendations

The set of recommendations is consistent (42), relevant and quite good (119) and comprehensive (61). It can form an appropriate basis for further elaboration (21). Specific suggestions for recommendations are made in contributions (59, 61, 64, 70, 74, 89, 117, 119, 124, 131, 132, 134, 139, 144, 145).

The proposed set of recommendations is not adequate to the mandate provided to the HLPE (140). There is a clear disconnect between the recommendations and the evidence in the document (119, 131, 134, 144). The draft recommendations are very idealistic but are they feasible (132)? They are rather general and much broader than the intended scope of this report: they should be more directly linked to the topic and to the evidence-base of this report (42, 43, 70, 131, 132, 139). They should be consistent with those presented in Chapter 4 (61). The current set of recommendations presents numerous redlines for the United States, including going beyond the mandate and expertise of both the HLPE and CFS (132). Some recommendations (e.g. on small farms) are not backed by evidence (132). A key recommendation for this report should be to reconcile the “diverging narratives” rather than recommending a set of actions which, as recognized in the report, do not have consensus (132). A critical issue is the lack of multi-stakeholder dialogue on agroecology at international level: this could be led by CFS and constitute a recommendation to FAO (145).

The report should be more strategic, show ways forward (42) and clearly target policy makers (131, 144). The report should serve a policy-making objective rather than a scientifically-descriptive objective (140). The report should provide concrete key options in term of public policies and investments to strengthen the transition towards agroecology and other valuable approaches, and expose the current policies and investments that undermine agroecology and other valuable approaches (131, 140, 144). Ultimately, the report needs to inspire and support a policy convergence process (131, 140, 144). The recommendations should be more specific on how innovative policies can-be co-designed and implemented (111). A “theory of change” identifying key levers/drivers and ways to influence them would be helpful (61). Macro- and micro-levels plan of action (and related indicators) need to be specified in the report (21, 22).

The HLPE needs to deliver policy recommendations that move us away from failed solutions and point the way forward a truly sustainable agroecological future (117). Blending all approaches into a mish-mash notion of SFS, the current draft leads to very broad and weak recommendations (140). The recommendations should be more clearly geared towards **agroecological transition**: it is striking that there is very little reference to agroecology in the recommendations (124, 131, 139, 144, 145). The report should provide clear and substantive proposals on how to strengthen agroecology, as well as those approaches that contribute to the realization of the right to adequate food and FSN (140). The

report should contain stronger recommendations to reverse perverse policies such as subsidies on chemical pesticides and fertilizers (128).

### **Introduction**

The introduction should: (i) present the context, including the main challenges faced by our food systems, and the objectives of the report; (iii) define the main concepts (approach, innovation, transition framework) (46, 106). A longer introduction could help to properly frame the whole report, while allowing to synthesize some elements in the main text (131, 144). The introduction should refer to ICN2 and the UN Decade of Action on Nutrition and stress the fact that all countries are affected by multiple forms of malnutrition simultaneously (92).

The draft refers to the **3 operational principles** developed in the HLPE (2016) report and suggests to add a 4<sup>th</sup> principle: "enhance the ecological footprint" (43, 120). The HLPE (2016) report in fact incorporated natural resources into the concept of resource efficiency (43). Rather than a 4<sup>th</sup> principle, "maintaining the **ecological base** on which agriculture depends" should be considered as the foundation of the first 3 principles (if first 3 principles formed a triangle, the 4<sup>th</sup> one would be at the centre) (43). "Enhance" ecological footprint is an unusual word choice: "reduce" or "minimize" are more commonly used (132, 134).

**Figure 1** and **Figure 6** show no coherence, just a superposition of concepts (142). They are very hard to interpret and should be entirely reworked (46). We suggest an "ecosystem" of SFSs framework based on 5 interrelated dimensions [(i) FSN in human health; (ii) ecological health; (iii) equity and justice; (iv) knowledge and cultural diversity; (v) democratic and rights-based governance (46, 52, 82, 111, 118)], as well as on economic well-being across a range of contexts (111).

### **Chapter 1: An agroecological approach to FSN**

Chapter 1 is comprehensive (134) and quite good: the framing around movement, science and practice is excellent (37, 123).

**Section 1.1.** The report needs a more integrated perception of agroecology (as a science, a set of practices and a social movements) where the technological, socio-cultural and societal aspects are intertwined rather than independently carried out (33, 131). The draft doesn't discuss how these three distinctive elements of agroecology combine in practice (38). The draft repeatedly confuses and mixes the scientific aspects of taking an ecological approach to agriculture with the political and social movements for food sovereignty, right to food, equity, etc. (132). **Figure 2** on timelines doesn't add much and doesn't seem necessary (59). Figure 2 is misleading in suggesting a linear evolution from science, practice, to social movement rather than stressing the co-evolution of these 3 elements (46, 140). In the title of **Box 1** the word "proliferation" is not the best choice (46). Clarify the expression "predominant so-called industrial model" in Box 1 because elsewhere in the draft small and medium farms are considered as the predominant agricultural model (132).

**Section 1.1.2** should acknowledge more the importance of traditional peasant knowledge systems as the basis for agroecological practices throughout the world (37). Agroecology has been the norm for most of the 10,000 years of agriculture and most of the world's farmers are fairly agroecological (40). Box 2 is appreciated: the push-pull method should be further developed and illustrated (121). The draft calls "agroecological" many practices that are "sustainable agricultural practices": this "re-branding" detracts from the credibility and value of the analysis (132). Agroecological practices should not be presented as an "alternative paradigm" to conventional agriculture because, in many instances, conventional agriculture incorporates these and many other sustainable practices (132).

**Section 1.1.3.** As a FAO initiative, GIAHS is not the best example to illustrate agroecology as a social movement (98). This section should give more recognition to the role of indigenous societies in developing the diverse agroecological systems (134). The description of agroecology as a "social movement" is not consensual (70, 132, 142). The report should clearly state that farmers don't need to be part of a political movement to practice sound agroecological principles (132).

**Section 1.2. Box 4** is really appreciated (112). In Box 4, "social equity/responsibility" could be changed for "social development and responsibility" (31). **Table 1** is unclear (64, 80, 131, 134, 144)

and highly subjective (64), too arbitrary to be insightful (40, 118, 125), is not convincing and inconsistent (61, 64, 70, 142), and seems unnecessary (46, 70, 125, 131). It reduces complex concepts to oversimplified scale categories (125). Hard for the reader to understand the difference between the 16 principles in Box 4 and table 1 and the 17 key aspects (rows) of table 3 (42). Box 5: the Zero Budget Natural Farming (ZBNF) is interesting as an illustration (70). ZBNF is not a good example of agroecological principles in action but rather illustrates the importance of integrating the social and political dimension in agroecology (64). Unless its constituent elements are better explored in the text, Figure 4 could be cut (46). **Section 1.2.3** should establish the actual and potential contribution of agroecology to each of the 17 SDGs (64). Investing in agroecology is investing in SDGs, in climate change mitigation and adaptation, and in water (clean water and watershed protection) (71).

**Section 1.3** on contested areas is well written (46) but should be further shortened (59). The part on indigenous knowledge is insufficient (46). Section 1.3 on knowledge gaps and section 3.2 on diverging narratives should be merged/better articulated to improve the flow of the report (111, 144).

### **Chapter 2: Innovation for SFSs**

**Section 2.1.1.** The **typology of innovations** suggested in the draft is very useful (110) and thorough, though possibly missing key fisheries and aquaculture approaches to SFSs (35, 145). However, this typology is not carried clearly into Chapter 3 & 4 (80). The typology is not particularly useful (111). The draft does not develop a workable typology to describe innovation processes and to show how agroecological innovations operate (98). Figure 5 is not clear and should be better explained (85).

**Section 2.1.2.** Revisions to Box 4, Box 7 and Table 3 are central to improve the coherence, utility and credibility of this report (46). The purpose of **Box 7** is not clear (70). Criteria suggested in Box 7 are confusing and not the most adequate (131). Box 7 contains no reference: to women's empowerment and gender equality (130); to risks (142). **Table 3** is unclear (134, 140, 144), questionable (129, 134, 144), complicated and not justified nor explained in the text and will certainly be difficult to interpret for policy-makers (42, 46, 59, 61, 70, 85, 131, 140). It appears as arbitrary opinions without a scientific basis (128, 131, 132). Reducing the number of approaches and of criteria (140), adopting a color code (106) or reducing the number of symbols (118) could help make the assessment framework more understandable and useful for policy making (140). Table 3 should be revised with the required rigor (120, 129), or suppressed (70). The criteria used in Table 3 are unhelpful and only add confusion (46). Among the criteria for table 3 are missing: care for soil fertility and soil health; fossil energy use and GHG emissions minimization; fair and sufficient employment (refining the criteria of "labor") (42). The criteria of sustainability is too general and not operational and should be replaced by the criteria proposed above (42). None of the approaches is really "comprehensive" (42). Table 3 could be clarified and simplified by: using the FAO 10 principles rather than the 17 current criteria (59); reducing the number of "other innovations" (59, 106). Among these innovative approaches, agroecology is the only one addressing all the criteria (59). Women's empowerment should be considered as a distinct principle/criteria (a row in table 3), rather than an approach to innovations (a column) (64).

**Section 2.2.** Figure 6 is disingenuous, giving the impression that all 9 approaches satisfy all principles and pillars contributing to SFSs for FSN (134).

The logic of **Section 2.3** needs clarification because it incorporates too many different things (139).

**Section 2.3.1.** doesn't have much to do with agroecology as part of a scientific framework (132) and should be suppressed (70). The discussion of food sovereignty is political, doesn't reflect any science or evidence-based analysis and should be removed from the report (132). The section on food sovereignty and the right to food is very good (37, 38) but states have great difficulties in operationalizing right to food commitments (38). The draft fails to recognize the intrinsic links between right to food, food sovereignty and agroecology (124, 129). This section should move into Chapter 1 as human-rights based approaches are profoundly interrelated with agroecology (119). Food sovereignty should be considered as a separate approach to innovation in SFSs and included in Table 3 (64). A contextual historical background of food sovereignty is required (113). The definition of the right to food should move to introduction, when FSN is defined (70). Paragraphs on CONSEA, women's empowerment and food justice should be suppressed: out of scope here (70). "Food

sovereignty” should be introduced in section 1.1.3 on agroecology as a social movement (70). According to the international normative, food sovereignty, food justice and women’s empowerment are not human rights (136).

**Section 2.3.2.** on sustainable intensification (SI) is robustly documented (66) but lacks a historical perspective as well as a few critical feature of the SI discourse according to which FSN is primarily a matter of availability and food production needs to increase to meet a growing demand (66, 89). Current mainstream literature on SI tends to focus on aggregate levels of food production rather than on food distribution and consumption patterns (66). This section should include a discussion on land sharing vs. land sparing (66). SI is a productivist and market oriented paradigm, integrated into global trade regimes (66). This section does not describe adequately rejections of SI, such as “ecological intensification” (66, 93, 112). The literature suggests strong antagonisms between SI and agroecology: see contribution (66). Is FAO “Save and Grow” considered part of the SI approach (145)?

**Section 2.3.3.** Organic farming systems (certified or not), by far the most widespread and well-known agroecological systems, are under-represented in this report (61). Organic agriculture cannot feed the world without adopting systemic and holistic approaches considering food waste and meat consumption (42). Detailed comments on health impacts of organic agriculture in contribution (39). The report should use the IFOAM definition of organic agriculture and should not reduce organic farming to certification: section 2.3.3 needs substantial revision and update (19, 53, 61, 128). The typical yield gap of organic crops is around 20 percent with some crops showing dramatically larger gaps (56, 120). Although organic yields are lower than conventional, organic systems, through intercropping, can produce more food per ha than conventional monoculture methods (19). Organic agriculture is only economically viable when the higher costs of production are met through higher prices and/or public subsidies (43). Organic farming is specified but limited to crop production (36, 145) and the draft mentions no other certification schemes (35, 145). The report should pay more attention to certification issues (125).

**Section 2.3.6.** The definition of permaculture as a movement is too limited (47). **Permaculture** is practiced by tens of millions of farming households and has been documented at least since 1945 (14). Permaculture is scalable from a balcony to a nation (95). The potential of permaculture could be further documented by additional case studies and empirical evidence (47). Permaculture comes in the draft as a form of agriculture rather than a design approach based on systems thinking and lessons from nature (47). Along with permaculture, the report could cover biodynamic agriculture (6, 29, 47, 53, 58), and ancient organic agriculture systems embedding regenerative concepts (6, 42, 47, 128). Permaculture is not scale dependent: permaculture systems can be designed at a landscape scale (47)

**Section 2.3.7.** This section is confusing (80). The report should provide clear examples of successful links between agroecological interventions and nutrition sensitive agriculture (NSA) –homestead gardens- and structural changes by government institutions to mainstream NSA (14). Why does the report assume that external inputs are essential (14)? The section on nutrition sensitive agriculture/value chains needs to be strengthened (14, 99) given the importance of market driven supply chains in providing nutritious foods (14). Nutrition should be a framing issue for this report (131, 140). It is problematic to address nutrition only in the context of nutrition sensitive agriculture which tends to apply a technical perspective focused on (micro-) nutrients and which includes bio-fortification (124, 129, 131, 140).

**Section 2.3.8.** A value chain approach can greatly help to identify sustainability and inequality issues in food systems (27). The text is very good and innovative but could be strengthened: detailed comments in contribution (27). Value chain approaches tend to relate to food commodification (98). Financialisation of food impacts the uptake of agroecological practices and limit food choices (115). Participatory guarantee systems (PGS) should be explained outside this section 2.3.8 (29, 58, 128) as they evolved with and emerged from the organic movement (53, 128). I was very pleased to see the significant recognition of PGS in a number of places in the draft (125).

**Section 2.4.** The focus on FLW is unclear (99) and misplaced (a previous HLPE report already covered this topic, very effectively) (59). Rather than another “innovative approach”, FLW should be

considered as an important aspect of SFSs and as a criteria for evaluating the different innovative approaches (59, 80, 106, 139, 144). Effective post-harvest storage technologies/facilities are crucial to improve agricultural incomes and FSN for smallholder farmers (120).

### **Chapter 3: Drivers and challenges to innovation for SFSs**

The current purpose and structure of **Chapter 3** are unclear (46). The chapter is truly misleading from its skewed definition of innovation, to the strange lists of drivers and barriers and then the diverging narratives (59). Chapter 3 should be reframed to address the potential challenges faced by agroecology, answering the following questions: what are the drivers of and barriers to agroecology “scaling up”, “scaling out” and “scaling deep”? What are the narratives that stifle needed innovation? (46, 59, 106, 129). This chapter should address the drivers, barriers and challenges not only to innovation but also to agroecological transition (131).

**Section 3.1.** The minimalist treatment of drivers and barriers in this chapter is extremely weak and perhaps was included merely as a placeholder (49). The draft is weak on the economic dimension, including the impact of a changing food demand on food production (43). This section needs to assess the role of economic incentives as drivers of or barriers to innovation for sustainable agriculture in order to develop better informed policy recommendations (42). Public procurement can drive innovation in desired directions (46, 59, 71, 82, 147). The report should also explore the role of civil society, social movements, women, youth and consumer organization in calling for agroecological transition (126) and as a driver of transformation of social, political and economic systems (82). The report should mention the role of agri-food industries either as a constraint or as a lever to support new forms of agriculture based on agroecology (139).

**Section 3.1.1.** The motives and drivers of innovations are not explicitly recognized (140). The drivers of innovation are not well captured: this is all the more important than food and agriculture sectors have dramatically changed over the past 40 years (42, 43, 128). The greatest driver of innovation is the producer with a problem and an idea of how to solve it; another important driver is the increasing scarcity of natural resources and the increasing health crises (128). How can we make recommendations without knowing the underlying forces and dynamics at play within society and economy? (42, 43).

**Section 3.1.2.** The barriers to innovation are poorly described: ideas, ideologies and power relations (power asymmetries, corporate control, corporate consolidation, mega-mergers, concentration of power) (42, 46, 52, 82, 89, 92, 98, 115, 126, 129, 140), as well as lack of access to education and information (120) are particularly important. The report should cover the issue of **conflicts of interest** in relation to innovation in agriculture and food systems (129). The report should examine policy and technological “lock-ins” and describe how agroecological practices have been “locked out” – see IPES-Food (2016) (30, 46, 49, 52, 106, 111, 125, 126). The lack of research on permaculture and other alternatives to the dominant industrial model is a key barrier to wider adoption (46, 47). Price volatility and low prices (HLPE, 2011) create an uncertain environment for investment (46, 49, 59, 89, 118) and can seriously disrupt local production (115, 118). Policies and public incentives, as well as public and private investments in research, extension, infrastructures, value chains, favour the dominant model of industrial agriculture (46, 59, 82). Contribution (120) reviews some factors influencing technology adoption.

**Section 3.2 on “Diverging narratives”** is very useful as divergence is a real barrier to wider adoption (145). While the draft recognizes the existence of “diverging narratives” and discusses them in some details, it falls short on a discussion of what to do about those (132). The main diverging narratives are well identified but could be more fairly presented (134). The diverging narratives are not consistently treated (64). There are inspiring narratives but sticking too closely to the agroecology paradigm, neglecting other probably even more promising approaches (110). This section is currently disjointed, underdeveloped and not clearly contributing to the overall objectives of the report (46). It doesn’t show what the current “narratives” are, nor who supports them (49, 52). Where controversies arise, the authors draft backs away from presenting an informed “weight-of-the-evidence” conclusion, reverting to an oversimplified and often inaccurate “he-said-she-said”/“unevaluative” reporting style, devoid of critical analysis (52, 82, 119). This section should be reframed entirely around the “common critiques

of agroecology” and based on stronger empirical evidence (46). It should identify **the political economy** and **power dynamics** behind those narratives (82). Given the varied interests in current food systems, how to best assess the validity of objections to agroecology and other sustainable innovations (46, 59)? Some narratives, related to agroecology, could move in Chapter 1 (58, 144).

**Section 3.2.1.** This section contains contradictory information, is not always backed by evidence and should be reviewed (70). Rather than being scale neutral, the draft favors small scale production approaches: the United States would appreciate a more balanced perspective on the benefits of high-yield systems (132). Agroecology is not scale dependent or limited to small farms as the current draft (Table 4) suggests (46, 59, 70, 73, 139). This section should provide a more comprehensive overview of the possible application of agroecology in large scale farming operations (132). Table 4, 5 and Figure 10 are misleading or of limited use (59). Table 4 is subjective (89), inaccurate and biased (131), does not address the issue (70, 80) and could be deleted (70, 80, 131). More investment is needed in small-scale sustainable agriculture (81). The contribution of smallholder systems to innovation for FSN and their advantage in terms of productivity, diversity, environmental sustainability and nutrition is well acknowledged but their wider benefits for FSN, in particular their role as local growth multipliers, should be better covered (57). What is the global/regional share of smallholders in total agricultural output (43)? Small scale producers are feeding the world while being the most vulnerable (58, 140). The UN Global Compact states that globally small-scale food producers produce 70 percent of the food, and 40 percent of the food traded but that peasants form the majority of the 800 million people starving (81). Small-scale/Family food producers provide around 80 percent of Africa’s food, using only 15 percent of the land (117) and 70 percent of the food consumed in Brazil (147). The assessment of the social and environmental implications of smallholdings vs. larger and more intensive farms should also consider economic efficiency and viability and the macro perspective (“land sharing” vs. “land sparing” debate) (43, 132). Larger scale do not necessarily mean land concentration, particularly in commons and cooperative land use arrangements – see case of cotton in Nicaragua or Australian Aborigines (46, 47). Small scale does not necessarily imply agroecology and diversification (46).

**Section 3.2.2.** The question is not how to feed the world but how to feed the hungry, covering the distributional issues (59). The question is not only “can agroecological or conventional systems feed the world?” but also “at what cost?” (43). The question is wrongly posed: the ultimate goal of farmers is not to feed the world but to earn a living: therefore the question is “which systems allow farmers to stay in business and continue cultivating their land in a productive and beneficial way?” (61). This narrative should be framed in the context of climate change (89).

**Section 3.2.3.** This section is too theoretical and of limited utility (70). It presents a false (and dangerous) dichotomy between science and traditional knowledge that are not opposed but complementary (129, 131). Table 6 should be deleted because it artificially opposes formal vs. informal, local vs. scientific knowledge (46, 54, 59, 70). Table 6 is inaccurate and discredits the whole report (131). FAO is not a social movement (46, 54, 70, 98, 131). The authors disregard the power relations through which leaders of globalized corporate agri-business monopolize the production of “legitimate knowledge”: additional references for this section are suggested (54). Different knowledge systems can be connected through the “Multiple Evidence Base approach” (68). Plenty of examples can show the complementarity between science and local knowledge (70). The sentence p70, lines 44-46 is very disturbing: the issue is not whether science is neutral but whether experiments can be replicated to deliver the same results – see Karl Popper (43, 132). The entire section 3.2.3 seems out of place in a document that intends to be science- and evidence-based: it should be deleted (132).

**Section 3.2.4.** Figure 11 is incomplete, misleading and should be revised or deleted (46, 90). Sen’s publications are useful to think about the different types of entitlements shaping food security and vulnerability (90). It is surprising not to see diseases, wars and social unrests as determinants of hunger (74). This section is poorly presented and should be reframed around economic valuation of agroecology (59, 70), quoting TEEB project (59, 61) or “economic biases against agroecology” (59). Agriculture and food systems need to serve multiple purposes and strive for healthy people, healthy planet, healthy communities (61). Figure 12 is difficult to understand (69, 85).

**Section 3.2.5.** This section is too general and should be expanded (64). The section about who/what benefits from technologies focuses on the technologies themselves and the need for technology assessment (3). It could also consider the different ways to access to technology (3). All the farmers and food producers do not have the same resources and capabilities to adopt a technology/an innovation (46), risks and vulnerabilities differ (46, 120, 127). There are important differences between different institutional and business models, even when the technologies are similar (3). Technology ownership (3, 115), intellectual property rights, pricing models, etc. determine access to technologies and benefits (3). A critical assessment is required of the extent to which farmers are effectively prepared to implement technologies or whether they lack a sound understanding of key ecological concepts and principles – such as biological control, soil health, nutrient cycling (4). Box 14 on planetary boundaries should be deleted, out of scope in this section (46). Why the long section on toxins in food is here? (59).

**Section 3.2.6** on GMOs: detailed comments on this section in contributions (8, 15, 17, 28, 66, 122, 132). The question “can GMOs be part of SFS” is very relevant and could help to clarify internal FAO debates (145). GMOs is a very tricky issue to be assessed case by case and region by region: this topic would deserve a specific report to avoid over-simplification (122). Given the focus of the report, this section on GM crops seems out of scope and over-represented (61, 64, 140). Authors should set out the issues that are relevant to this section first, making a clearer link with FSN, and then explain why certain facts have been selected to illustrate various points (15).

**Gene editing and GMOs should not be part of this report** (81, 82, 124, 129, 140, 141, 144). 3 boxes on GMOs seems disproportionate compared to the other “diverging narratives”: they could be replaced by one case study on herbicide (e.g. glyphosate) resistant GMO crops which are, with Bt crops, the most common GM cultivated crops (46, 66, 116, 118). Box 15 & 16 don't present adequately the devastating socio economic impacts of Bt cotton on smallholders in South Africa and Burkina Faso (116). The Burkinabe experience of Bt cotton demonstrates the economic and environmental fragility of this model (116, 122, 131). Bt cotton spectacularly failed in Burkina and is no longer produced since 2017 (124, 140).

Rather than the GM organisms themselves, the issue is **the larger system in which those GMOs are introduced**: pesticide-intensive monoculture and pest resistance to pesticides, intellectual property rights, corporate consolidation and corporate influence over public decisions (...) (49, 66, 114, 116, 118, 122, 123, 134, 140), risks to crop genetic diversity and indigenous/peasant seed systems (66), lack of GM labelling (55, 123). The section overlooks a fundamental issue: industrial agriculture, including GMOs, is based on the ownership of key elements of the system, usually by a dwindling number of large corporations (28). Investing in GM seed technology may represent a significant financial risk for smallholders in variable rainfall environment (66, 67). Genetically engineered products have not lead to measurable increases in crop yields nor produced readily identified economic benefits: as such they are unlikely to offer an advantage for FSN (NAS, 2016) (66). They have primarily benefited the better-resourced groups and transnational corporations, rather than the most vulnerable (IAASTD, 2009) (82).

This section seems in a very preliminary state, oversimplified and full of inaccuracies, quoting opposing positions but failing to assess them critically (8, 28, 82, 140). This section is unacceptable for an HLPE report (132). It contains so many errors (59) – including erroneous definition of important terms (66) - that it is difficult to believe it got the full attention of the team (59). It should rely on widely used and standard definitions (66). This section lacks authority and have been disproportionately influenced by a very small and extremely biased selection of the literature and often very dated reference (8, 15, 24, 28, 53, 66, 114, 124, 129, 132, 140, 144). Co-authors of this text shows ideological differences among them and don't seem to be well informed about agricultural biotechnology (8).

This section requires strong modifications (30) and further work (28). For example, it does not mention the new genetic engineering techniques such as genome editing and gene drives (28, 66, 93, 124). This section focuses on GMOs but contains little discussion on conventional genetic resistance (145). The section on health impacts of GMOs is very sketchy (24, 28, 134). The section should mention the issue of co-existence between GM and non-GM crops and of contamination by GM crops (28, 116,

123, 129, 134). This section fails to evaluate the larger impacts of GMOs (8, 116), including socio-economic, environmental and health impacts (55, 116, 118, 123, 129, 131, 144), whether direct or indirect (66). New techniques of gene editing, together with patents on native traits have enormous detrimental implications for FSN (124, 140).

The draft does not consider the more 20 years of demonstrated safe use and numerous scientific studies on the safety of biotechnology (132). Rather than “ongoing scientific debates” about potential health impacts, there is overwhelming consensus among scientists that genetically engineered food currently available commercially are safe and have had a positive impact on the environment (132). Séralini research, quoted in the draft, has not held up to the scrutiny of a scientific peer-review process (132). The draft quotes Pellegrini et al. (2018) and Kettenberg et al. (2018): however it fails to note that these studies found no evidence of adverse environmental and health impacts of genetically engineered crops (132).

The section on “objection to GM technology” should be deleted (132). It is underdeveloped and reinforces the stereotype that those concerned with genetic engineering are “anti-science” (66), motivated by fear and misunderstanding (82, 140). It ignores the vast body of scientific and empirical evidence behind the ecological, social, economic and political critiques of GMO-centered agricultural systems (82, 140). The discussion on GMOs in Chapter 3 appears to have an anti-technology bias and fails to consider unjust fears of technology and emotion-driven policy-making that is not based on science (120).

The brief section on relationship to agroecology is completely underdeveloped (15, 28, 49). This section should identify the systemic differences between agroecology and GM in order to show that GM approaches are incompatible with agroecology (28, 53, 59, 66, 67, 118, 129, 140). Agroecology and GMOs are incompatible because GMOs is a linear, top down approach, focusing on specific crop “enemies” and trying to eliminate them, when agroecology is a bottom-up system approach building upon the resources provided by the ecosystem to tackle a problem (28, 118). Agroecology is about ecologically informed, low cost innovations opened to all, not lab-based (often expensive) molecular innovations (67).

**Section 3.3.** This summary may be the most misleading and destructive section of the draft (59).

#### **Chapter 4: Enabling conditions for innovation in SFSs for FSN**

**Chapter 4** provides an excellent discussion of enabling conditions for agroecology and other innovations to advance transition towards SFSs (49), which should be expanded focusing on three main areas detailed in the contribution: (i) building local and national capacity in agroecology and complementary innovative approaches; (ii) revitalizing local and regional agri-food systems; (iii) reversing trends in and effects of corporate concentration in the agri-food sector (49). Systematic sustainable farming standards could help to enhance agroecological approaches and sustainable innovations (84).

**Chapter 4** is difficult to comment because it is largely incomplete (85, 109, 120). Tentative priorities for action in Chapter 4 should be linked with the 4 overarching principles of Chapter 2 (110). Chapter 4 is confusing, misguided, disconnected from the previous chapters and lacking concrete policy prescriptions (59). Chapter 4 should focus on the topic of the study (70). It should be reframed around policies for supporting transitions to SFSs (46). Chapter 4 should focus on policies, interventions and changes needed to shift current agriculture to a truly sustainable agriculture based on agroecological approaches (128).

Chapter 4 lists a small number of “enabling conditions” which contain valuable insights from social sciences but do not address the structural barriers and “lock-ins” that undermine transitions to SFSs (46). It should shift to an “enabling environment” concept, covering major barriers and drivers and giving a central place to the equitable distribution of benefits (46, 52). Chapter 4 should highlight the fact that there is no “silver-bullet” to support innovation in agriculture and that possible solutions/innovations must be adapted to local agronomic, climatic, socio-economic conditions (29, 40, 43, 46, 52, 59, 86, 87, 89, 93), in different agroecological zones (103, 115).

**Section 4.2.** Section 4.2.1. could be strengthened (62) and written more clearly (31). This section, among others, could emphasize the integration of different (agricultural) sectors (36). Section 4.2.2. should also refer to land use rights (36) and to the collective character of many customary rights (124). Box 20: the Malian law on Agricultural lands (loi foncière agricole) could be a good example here (124). Section 4.2.6. should refer to the analysis made by CSOs of “multi-stakeholderism”/“multi-stakeholder platforms” in order to clarify that such approach do not automatically lead to more equitable policy outcomes (124).

**Section 4.3.** Knowledge generation is fairly limited and deserves a deeper and broader treatment, recognizing the knowledge-making role of farmers and other food producers, as well as the contributions of social movements and civil society to agroecology “scaling up”, “out” and “across” (46, 52). The draft also fails to acknowledge the importance of intergenerational and gender-based knowledge of land and resources (46). Section 4.3.2. on knowledge sharing is not related to a theoretical framework, identified mechanisms and critical action points (30).

### **Conclusion**

A conclusion is missing in the V0 draft. Given the incomplete nature of the recommendations and conclusions in the draft, the HLPE should engage in a second round of public consultation (109, 120).