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The Contested Discourse of Sustainable Agriculture[1]

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ABSTRACT

The article critically analyses how the transformative ambition of the SDGs may be threatened in the process of moving from vision, through goals and targets to indicators. This is exemplified by a case study concerning sustainable agriculture, and most specifically indicator 2.4.1, where two contrasting approaches – industrial agriculture and agro-ecology – stand in opposition, each with its associated discourse and interests. The process is analysed in great detail, noting the complex interplay of political and technical considerations. FAO has played a central role in establishing a compromise with regard to the wording of indicator 2.4.1 which papers over the disagreements and does not explicitly promote either of the two competing approaches. And the organisation has facilitated a technical process which, instead of one simple indicator, has led to a composite, multi-dimensional version with nine sub-indicators, as a result of which it has been relegated to 'Tier III' status, implying that it will not be used for global monitoring purposes. The article concludes that – owing to a combination of political and technical factors - the transformative potential of the SDGs may, in this instance, be lost.

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'The simplicity of the MDG indicator and monitoring framework is
one of the main reasons why the monitoring exercise was effective.' (UN 2015a)

1. Introduction

The primary tension, if not conflict, in seeking to achieve sustainable development is between maximising economic growth and protecting the environment. And one of the sectors in which this is most evident is agriculture, where the 'battle-lines' are rather clearly drawn. In brief, two major approaches may be distinguished - which I will, for simplicity, refer to as 'industrial agriculture' and 'agro-ecology'. The former, also known as 'productionist' (Lang and Barling, 2013), tends to promote large-scale farming and place emphasis on increasing productivity through, for example, greater use of fertilisers and pesticides. The latter argues that such methods have serious negative environmental consequences and are ultimately unsustainable. This article traces the fate of these competing approaches as manifested in the process of moving from the sustainable development goals and targets through to the selection of indicators; and more precisely indicator 2.4.1: 'Proportion of agricultural area under productive and sustainable agriculture'. At the time of writing, this indicator is classified as Tier III, implying that it will not be used for global monitoring purposes. A request to reclassify it as Tier II was submitted to the meeting of the Inter-agency and Expert Group on SDG Indicators (IAEG-SDGs) on 11 – 14th November 2017, in their capacity as Indicator Custodian Agency, but this was rejected. As a result – owing to a combination of political and technical factors - the transformative potential of the SDGs may, in this instance, be lost.

The ambition of those promoting agro-ecology is to replace the dominant productionist food regime promoted by industrial agriculture by one that is very different. In this, they confront not only vested interests but also certain taken-for-granted claims about the merits, even inevitability, of industrial agriculture. The 2030 Agenda for Sustainable Development sets out a vision for the future, in which concern for the environment occupies a central role. This vision then becomes translated into concrete terms: into goals, targets and indicators. And here the issue of how to define sustainable agriculture becomes crucial. The fact that the term is explicitly used might seem to indicate support for agroecology. But advocates of industrial agriculture claim that their approach is sustainable, so that conflict between the two approaches is simply papered over.

Industrial agriculture is currently the dominant international approach and, I suggest, the SDG process will not serve as an effective challenge so long as the relevant indicator can be interpreted to

support both competing approaches. And there is little evidence to suggest that this situation is changing; rather the reverse, as I shall seek to show. In this article I trace in some detail the SDG process from vision, through goals and targets, to indicators - drawing mainly on the huge volume of information available on UN websites, which include not only minutes of meetings, documents submitted, etc. but also the results of numerous consultations. This information is supplemented by meetings and email contact with a few well-informed individuals, some within FAO.

The situation in mid-2018 is that instead of only one, or maximum two, indicators, a multi-dimensional indicator has been proposed, as shown in Table 1. But this proposal has not been accepted by the international body with the authority to approve the indicators, the IAEG-SDGs. It remains in the category 'Tier III', meaning that it 'does not yet have an internationally recognized methodology nor time series of data', and hence cannot be used for global monitoring purposes. Thus, perhaps, the proponents of agro-ecology may find their efforts frustrated. Some of those who challenge proposed indicators may do so because of vested interests in industrial agriculture, but for others the explanation is 'innocent': they believe that the practical challenge of designing a suitable indicator for sustainable agriculture has not been resolved. The transformative ambition of the 2030 agenda may thus be frustrated not so much by resistance from powerful actors as by an apparently insoluble problem of a technical nature.

Insert Table 1 about here.

2. Contrasting perspectives on food and agriculture

Food and agriculture were not highly visible in the MDGs. Fukuda-Parr and Orr (2014, p.153) suggests that this was because the hunger target 'was incorporated into MDG 1 and was overshadowed by the income poverty component of the goal'. And they argue that the perspective adopted in the MDGs represented a retrograde step, shifting the narrative 'from the human-centered approach of the WFS (World Food Summit) that emphasized a broad multi-sectoral strategy to address the systemic social causes of food insecurity' to one that 'defines the objectives in terms of achieving measurable outcomes and promotes narrowly focused interventions for gains in production or nutrition'. (Fukuda-Parr and Orr, 2014, p.153).

By contrast, food and agriculture are very much in evidence in the SDGs: Sustainable development goal 2 is to 'End hunger, achieve food security and improved nutrition and promote sustainable

agriculture'. But this goal, as here stated, conceals substantial differences in perspective regarding what precisely is the challenge and how it can best be resolved.

The formulation of the goal and its associated targets arose against a background of differing, and largely competing, understandings and prescriptions regarding food production. (There are significant and interesting parallels between the sustainable agriculture debate and that regarding nutrition, where one approach seeks to improve nutrition directly through food supplements the other by addressing its underlying causes. There is no necessary link between the two 'technical' approaches – the one regarding food production, the other nutrition - but it does appear that we are here confronted by two contrasting mindsets, and groups of supporters. See below).

In brief, two major approaches may be distinguished - which I will, for simplicity, refer to as 'industrial agriculture' and 'agro-ecology'. In the 1970s 'population growth and insufficient productivity growth were threatening the ability of entire regions to feed themselves, and with rising prices, basic food commodities could be out of reach of the poor: the answer was to produce more. This was the mindset that shaped the choices made in the late 1960s and early 1970s, inaugurating a trend that lasted for 40 years almost without interruption.' (de Schutter, 2017). This vision shaped the Common Agricultural Policy of the European Union and farm subsidies in the US; and the Green Revolution in Asia – where the issue of hunger was framed as a quantitative problem, and the emphasis of governments was on boosting agricultural productivity. This productionist approach, based on the industrialization of food systems, did indeed result in massive increases in yield - a threefold increase in food production between 1945 and 2010 according to FAO (2011); but major problems also emerged. This approach was heavily criticised in a report by the High Level Panel of Experts on Food Security and Nutrition appointed by the Bureau of the Committee on World Food Security, which draws heavily on the work of the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD). According to this report, the productionist approach:

> 'brought significant impacts on the environment and pressures on natural resources, including soil degradation and the contamination and depletion of fresh water supplies. (Clough *et al*., 2011; Strzepek and Boehlert, 2010; Pretty, 1995). It relies on the high output of a relatively small set of genetically uniform, high-yielding crops, reducing biodiversity to alarming levels, particularly agricultural-biodiversity (Zimmerer, 2014). Greenhouse gas emissions of agriculture have increased and are now an important contribution to global climate change (HLPE, 2012b; IAASTD, 2009; Vermeulen, Campbell and Ingram, 2012; IPCC, 2014; Wheeler and von Braun, 2013). Approximately one-third of all food produced is lost or

> wasted (FAO, 2011; HLPE, 2014a). Globalized food systems tend to favour large-scale, increasingly consolidated, input-intensive industrial farms (often practising monocropping) and a concentration of industrial food processing, packaging and distribution businesses (Reardon, Timmer and Minten, 2012). It implies longer travel distances for food products. Unsustainable consumption patterns, such as those relying on a persistent demand for cheap food that does not reflect its full production cost, are significant drivers of the unsustainability of food systems (HLPE, 2011a; Foresight, 2011). (HLPE, 2014b)

This statement, from august 2014, can be read as a rather clear critique of industrial agriculture. And in their second statement, in April 2017, HLPE refer explicitly to agro-ecology: 'Though variously defined, agroecological approaches are gaining traction among scientific, agricultural and political communities (IAASTD, 2009; EU SCAR, 2012; IPES-Food, 2016; HLPE, 2016).' (HLPE, 2017) They note that FAO has promoted this approach through regional meetings as follow-up to the international symposium held in Rome in September 2014. This is indeed the case, but FAO at the same time promotes aspects of industrial agriculture such as biotechnology, thus keeping the door open for both approaches.

The industrial agriculture approach continues to maintain a very powerful position. It is associated especially with 'big food' - a small number of massive international conglomerates that dominate the markets for fertilisers, seeds and farm machinery (IPES-Food, 2017), some international agencies (notably the World Bank), some donor countries (e.g. the U.S) and the Bill and Melinda Gates Foundation. Non-governmental organisations are generally critical of the approach. As noted above, there are parallels here with the case of nutrition. Here the technical approach is associated especially with business, some multilateral actors (World Bank and UNICEF), bilateral donors (US, Canada) and the Bill and Melinda Gates Foundation. In the SDGs this divide is most clearly manifest in relation to indicator 2.2.2. 'Prevalence of malnutrition … among children under 5 years of age, by type (wasting *and overweight*).' (emphasis added). Adherents of the technical approach have generally underplayed the problem of 'over-nutrition', despite the fact that non-communicable diseases now account for a greater burden of disease than communicable diseases in all continents other than Africa.

The wording of SDG2 and associated targets might lead one to conclude that industrial agriculture has a rather weak position compared with its adversary. Goal 2 is 'End hunger, achieve food security and improved nutrition and promote *sustainable agriculture*.' (emphasis added). And the emphasis in the targets is not simply on maximising food production but also concerns of equity. For example

(emphases added in all cases), target 2.1 is 'By 2030, end hunger and ensure access by all people, *in particular the poor and people in vulnerable situations*, including infants, to safe, nutritious and sufficient food all year round.' Target 2.3 is 'By 2030, double the agricultural productivity and incomes of small-scale food producers, *in particular women, indigenous peoples, family farmers, pastoralists and fishers*,….' But the target (2.4) and the indicator (2.4.1) that refer explicitly to sustainable agriculture are phrased in a way that blurs the issue. Thus, indicator 2.4.1 is 'Proportion of agricultural area under *productive and sustainable* agriculture'. (emphasis added). The question is therefore how this will be interpreted in practice. This will depend on the extent to which the goals, and the more specific targets and indicators, have political support among powerful actors; and what happens during the process of moving from broad statements of intent to specific policies and priorities. And it is here that the indicators designed for guiding and monitoring the process may play a crucial role, for better or worse. The intended purpose of the indicators is to secure the implementation of the agreed goals, but they may – for reasons to be discussed in this article – fail to do so.

As I will show, in the detailed description that follows, the challenge of establishing acceptable indicators is proving excessively difficult. Agreement at each stage is reached only by a compromise which obscures the significant differences between two contrasting approaches in how to improve the conditions of food and agriculture in the world. Advocates of industrial agriculture assert, of course, that they are in favour of sustainable agriculture. The question is what this is taken to mean. Where disagreement is most explicit is regarding productivity, where advocates of industrial agriculture claim that their approach has the advantage.

It is here instructive to examine how an earlier attempt to establish a sustainable agriculture standard - in the United States - was contested by forces favouring industrial agriculture. (Hatanaka, Konefal and Douglas, 2012). The Leonardo Academy, a US non-governmental organisation, was invited by Scientific Certification Systems, a certifying body, to administer the development of a national sustainable agriculture standard for adoption by the American Standards Institution Initiative (ANSI). (Clapp, 2008). (The American National Standards Institute (ANSI) is a private, non-profit organization that administers and coordinates the U.S. voluntary standards and conformity Assessment system. It is the official US AO representative to the International Organization for Standardization - ISO). In 2007 Leonardo Academy posted a draft and 'invited all stakeholders … to help shape this standard'. The Biotechnology Industry Association and major commodity trade associations expressed concern about the draft. Later, the US Department of Agriculture (USDA) sent a letter stating that the draft standard represented 'a very narrow interpretation of sustainable

agriculture … that would not allow producers to use tools such as 'modern biotechnology, synthetic fertilisers, or other technologies' that 'are well within sustainable agriculture as defined by the law'' (Conner, 2008). The USDA letter stated that 'there is no scientific evidence that biotechnology and other agricultural technologies (e.g., synthetic fertilizers) are inherently unsustainable and that prohibiting the use of such modern technologies at a time when global food prices are at record levels 'can hardly be considered sustainable'' (Conner, 2008, p.2). This is a classic productionist argument. What is particularly notable is that industry was here given strong political support by government. The USDA followed up by formally requesting the ANSI to revoke the Leonardo Academy's accreditation as a Standards Developing Organization (SDO), claiming bias regarding organics, the exclusion of modern technologies such as biotechnologies, and the problems associated with enforcing Fair Labour Standards. Although the ANSI Executive Standards Committee came out in favour of the Leonardo Academy, the efforts of agribusiness and the USDA did have a significant impact, for example 'in opening up the framing of the standard to potentially include biotechnologies and other conventional agricultural technologies and practices' and 'creat(ed) opportunities for greater representation of agribusiness interests in the standard-development committee.' In this case, by contrast to the SDGs, sustainable agriculture was defined in rather specific terms: sufficient (apparently) to exclude 'modern biotechnology, synthetic fertilisers, or other technologies'. And for this reason actors representing industrial agriculture, including the US government itself, actively opposed this definition.

3. The Open Working Group (OWG): from visionary agenda to goals and targets

The origins of the SDGs - in the United Nations Conference on Environment and Development in Rio de Janeiro in 2012 and the post-MDG process - are described in the introductory paper in this Special Issue and in (Dodds, 2016). It is apparent that of these two parallel streams it was the former that proved the more influential, and it is generally considered that this is why the SDGs have such a strong emphasis on the issue of sustainability – certainly more than the MDGs. The issue emerges strongly in relation to SDG2, the focus of this paper, to 'End hunger, achieve food security and improved nutrition and promote sustainable agriculture'.

The OWG, mandated by the Rio+20 Outcome Document, was dominated by states, especially middle income countries. The 'competing' process – High Level Panel of Eminent Persons (HLPE), established by Ban Ki-Moon and co-chaired by Indonesian President Susilo Bambang Yudhoyono, Liberian President Ellen Johnson Sirleaf and United Kingdom Prime Minister David Cameron – was dominated by big donors with the MDG vision and followed a more standard UN process. The HLPE presented its

report on 30th May 2013, just as OWG was beginning its work. Regarding agriculture it adopted a rather middle-of-the road position, favouring neither industrial agriculture nor agro-ecology. (The report includes, as Target 5c: 'Increase agricultural productivity by x%, with a focus on sustainably increasing smallholder yields and access to irrigation'.) This reflects the background paper prepared for the panel, which proposes the adoption of *agro-ecological intensification*, and states: 'We need to move away from ideological or emotional battles over whether it is right or wrong to eat meat or whether agriculture should be 'conventional', 'GM', or 'organic'. All of those will be needed.' (Dobermann and Nelson, 2013)

The Open Working (OWG), established on 22nd January 2013 by decision 67/55 of the UN General Assembly (GA), met 13 times between January 2013 and July 2014, concluding with the submission of its proposal to the UNGA in September 2014, with 17 goals and 169 targets. (http://www.un.org/ga/search/view_doc.asp?symbol=A/68/L.61&Lang=E). During this process, national consultations took place online and offline in more than 60 countries. A set of 11 UN-agency-led global, multi-stakeholder thematic consultations were convened, complemented by close to 100 national-level consultations. FAO and World Food Programme (WFP) co-led the three global thematic consultations on Hunger, Food Security and Nutrition, supported by a third Rome-based agency, the International Fund for Agricultural Development (IFAD) and other UN agencies and programmes, including the Secretary-General's High Level Task Force (HLTF) on Global Food Security (established in 2008 in response to the global food crisis), Unicef and the World Bank and sponsored by the governments of Colombia and Spain. The Madrid High Level Consultation on 4 April 2013 was the third and final phase – ending in the 'Madrid Report'. This does not appear to favour either one of the competing approaches; it advocates both 'more resilient, knowledge-based and sustainable intensification of agricultural production' and 'more efficient use of water, energy, labour, land and stewardship of the global commons and ecosystems (e.g. soils, land, air, oceans, forests, biodiversity).'

The period April/May 2013 was a particularly active one with regard to SDG2. The UN Technical Support Team (TST), in which FAO played the leading role, published an Issues Brief: Sustainable Agriculture on 10th May, 2013. This set out what might be described as a cautious agro-ecological approach, exemplified by the following:

> '(Thus) agricultural intensification has been at the same time both a saviour and a threat, illustrating the importance of mainstreaming sustainability into a new intensification agenda.' (2)

> ‘Sustainable agricultural systems are likely to be associated with a more targeted use of external inputs, a more integrated approach to managing natural resources, and more analysis at the landscape/eco-system level together with better management of ecosystem services’.(3)

The third session of the OWG (22-24 May 2013) was the one most specifically focused on sustainable agriculture. Here, the co-Chair had three hour-long morning meetings with the ‘Major Groups and other stakeholders’ to hear their views. The record from this meeting states that ‘They (major Groups and other stakeholders) also point to the responsibilities of agribusiness to communities and to the protection of the natural resource base on which they depend. There was a call for the establishment of a legally binding framework for corporate social and environmental responsibility.’ That this hardly appears to be a reflection of the interests of big food may be explained by the fact that in this forum business is combined with civil society in one ‘major group’. This contrasts with the Committee on World Food Security, CFS, a body which reports to the UN General Assembly through the Economic and Social Council, ECOSOC, and to FAO Conference - where these constitute two separate groups, rendering disagreements more evident.

One further input of interest during the period of the OWG’s work is ‘Statistical Note 4: Sustainable Agriculture’ from March 2014. (UN 2014) This was prepared by United Nations Statistics Division, in collaboration with the Friends of the Chair group on broader measures of progress: France, Germany, United Kingdom, United States of America, Eurostat, FAO, OECD. The report notes the weakness of MDG7: ‘the lack of integration of the dimensions of sustainable development and the lack of inclusion of indicators addressing the necessary enabling conditions (including governance mechanisms, financing and capacity development)’ (23). However, ‘The data requirements needed to produce the indicators to truly measure the sustainability of agriculture are substantial and currently not possible for many developing countries.’ (25) The report concludes that ‘given the multi-dimensional and context-dependent nature of sustainability, it is difficult to conceive a single metric, other than troublesome composites, that expound the notion of sustainability in all its forms’ and recommend instead a ‘dash board’ approach’. (25) By way of example, a dashboard is presented comprising 16 indicators that are already available which ‘can be used to contrast increases agricultural production against sustainability trends, e.g. loss in forest area.’ (The report states that ‘existing indicators on social injustice, equality and governance can also be added’, perhaps implying that these were not the primary concern of the group). Thus the same point is reiterated: the need for a multi-dimensional indicator, despite this being ‘troublesome’.

The OWG's report was adopted by the UNGA in September 2014. The UN Secretary-General 'welcomed the outcome' (http://www.un.org/en/development/desa/publications/synthesis-report.html) and released a report synthesizing all inputs to the post-2015 process: 'The Road to Dignity by 2030: Ending Poverty, Transforming All Lives and Protecting the Planet'. The goal and targets with which this paper are primarily concerned (as submitted by the OWG) are as follows:

'Goal 2 End hunger, achieve food security and improved nutrition and promote sustainable agriculture.'

'Target 2.4. by 2030 ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters, and that progressively improve land and soil quality.'

The debates which led up to the formulation of SDG2 and its associated targets - the various recommendations made and compromises reached - involved many different actors and interests. Civil society and business, in addition to UN organisations, all played their part. But, in contrast to the MDG process, it was country representatives that played the leading role. This was an inclusive political process, where countries were in the driving seat: and not dominated by those from the North. The role of the UN agencies was clearly established as advisory, not determinant, in the process of setting priorities, although they did play a key role in facilitating consultations and providing technical inputs, as described above. The outcome, as far as agriculture was concerned, is ambitious. But the relevant goal and target do not imply clear support for either the industrial agriculture or agro-ecology approach. The next stage was to translate this target into indicators.

On 6 March 2015, at its forty-sixth session, the United Nations Statistical Commission (UNSC) composed of Member States and including regional and international agencies as observers, reviewed and discussed the technical report by the UN Statistical Commission, which presented an assessment of preliminary and indicative indicators. Member States expressed their support for the roadmap agreed by the Statistical Commission for the development of a global indicator framework and its timetable, which foresaw providing a proposal for a framework by March 2016. It was here that the UNSC established the IAEG-SDGs; it agreed that 'the development of a high-quality and robust indicator framework is a technical process that requires time, and supported the creation of the Inter-agency and Expert Group on SDG Indicators (IAEG-SDGs)'. (UN 2015b) Thus the baton was

passed from the OWG to the IAEG-SDGs; to a more technical arena, where national statisticians were predominant. Here, the agreed targets were to be translated into more specific indicators, allowing effective monitoring of performance. The IAEG-SDGs held their first meeting in June 2015.

But the process of developing indicators in fact began shortly before this, at a huge Expert Group Meeting in New York in February 2015. The meeting was attended by 110 participants from 22 countries, 28 agencies, funds and programmes, three United Nations Regional Commissions, as well as approximately 40 observers, which included civil society, academia and Permanent Missions to the United Nations. (UN 2015c) Here again the challenge of minimizing the number of indicators was addressed but not resolved:

> '6. It was also stressed that, based on the Millennium Development Goals (MDG) experience, the monitoring benefitted tremendously by having a small subset of key global indicators. Only a few indicators are generally used to indicate overall progress in each of the goals and those are the ones that are communicated easily and resonate with a wide audience, and that can easily inform the global political discussion.'

But:

> '9. … Also, in some cases, the complexity of the target makes it very difficult to choose only one or two indicators. These issues can be addressed by identifying appropriate (multipurpose) indicators.'

Also discussed were criteria for the selection of indicators: 'including being methodologically sound, measurable, accessible, relevant, timely, internationally comparable, and limited in number.' At this meeting, 'The discussion focused on the overall process, rather than on indicator proposals in specific areas. Yet, a few individual indicators were reviewed for illustration purposes, informing the discussion' and these included two indicators for Target 2.4. proposed by the Rome-based agencies:

Indicator 2.4.1 Emissions of greenhouse gases in agriculture (per hectare of land and per unit of output, separately for crop and livestock sectors).

Indicator 2.4.2 Absolute levels of emissions in relevant sectors and sub-sectors.

Immediately after, from 3-6 March 2015, the Statistical Commission at its 46th session endorsed the formation of the IAEG-SDGs, consisting of national statistical offices and, as observers, the regional and international organizations and agencies. Here again, the Commission emphasized that 'given

the possibility of measurement and capacity constraints of Member States, the global indicator framework should only contain a limited number of indicators' and 'strike a balance between reducing the number of indicators and policy relevance'. The Commission invited feedback from Member States at the intergovernmental negotiations 'that will provide broad political guidance for the future work of the Commission for the development of a proposal for a global indicator framework.' Their report included an initial assessment of proposed provisional indicators - based on the views of experts from national statistical offices and systems. In this survey, in which 70 countries participated, the two indicators proposed for Target 2.4 were assessed in terms of their feasibility, suitability and relevance.(UN 2015d) On an ABC scale, both were rated as B on all three criteria. (i.e. 'Feasible with strong effort', 'We need to discuss and/or consider other indicators', and 'Somewhat relevant').

4. From OWG to IAEG-SDGs: from targets to indicators

The first meeting of IAEG-SDGs, in June 2015, was held in New York; subsequent meetings were held elsewhere. They also held a number of open consultations: the first from 11 August to 14th September 2015. The membership of the IAEG-SDGs consisted (in 2017) of representatives from 27 countries. Table 2 provides a summary timeline of the work of OWG and IAEG-SDGs up until the seventh meeting of the latter in April 2018.

INSERT TABLE 2 ABOUT HERE

At the first meeting of IAEG-SDGs, in June 2015, FAO (and IFAD) proposed a wholly different ('improved alternative') indicator for target 2.4: '*Percentage of agricultural area under sustainable agricultural practices*'. Their submission stated that 'The indicator is more directly linked with the target, particularly to the aspects of sustainable production, adaptation to climate change and improvement of land and soil.' The area under sustainable agricultural practices was defined as 'identified and/or acknowledged by the government as being affected by agronomic activities and practices that contribute to environmental sustainability of agriculture.' They noted that 'At global level, currently there is no data available. However many if not most of the countries record areas which are the object of practices contributing to environmental sustainability under various schemes, either of a regulatory nature, like protected areas for instance, or as part of a subsidies scheme or in a payment for environmental services scheme or as part of voluntary standards, public or private.'

FAO noted that it was carrying out a consultation process to develop an indicator on 'Area under sustainable land management', to be developed by the end of 2015. Apart from minor comments from the World Bank, this was the only substantial input on indicator 2.4.1 at this stage. (In June 2015, the Sustainable Development Solutions Network (SDSN) proposed many indicators for Target 2.4 but it seems that none of them was used).

At the second IAEG-SDG meeting, in October/November 2015, three indicators were presented for review. The first was a slightly reworded version of that of the first meeting: *2.4.1 Proportion of agricultural area under productive and sustainable agriculture.* According to the report from the FAO Expert Meeting in 2017 the formulation of this proposed indicator 'moved away from practices because it would have been difficult to reach consensus, and focused on outcomes, covering the different dimensions of sustainability through a set of sub-indicators.' A subsequent FAO 'Methodological concept note', submitted to the IAEG-SDGs meeting in October 2017, states that 'it is considered that impact/outcome indicators should be the focus of measurement, noting that practice indicators may be useful in certain situations. The main reason for this choice is that impact/outcome indicators are more objective than indicators based on practices.' (FAO, 2017a)

The other two proposed indicators were entirely new:

2.4.2 Percentage of agricultural households using irrigation systems compared to all agricultural households

2.4.3 Percentage of agricultural households using eco-friendly fertilizers compared to all agricultural households using fertilizers.

All three were, at the end of the meeting, classified as 'green'. This refers to 'Indicators for which there is general agreement (or small modifications proposed), based on the fact that less than 25% of respondents have strong concerns/expressed need to discuss on priority basis; no strong opposing views by members; furthermore, some of these indicators are already well established'. But, as shown below, this conclusion was resisted and it proved not easy to avoid the classification 'grey' ('indicators where it appears that more in-depth discussion is still needed and/or methodological development needs to be undertaken').

5. Types and Sources of Criticism

In October/November 2015, open consultations on the green indicators were held. Regarding indicator 2.4.1 comments were received from a number of countries, UN agencies, NGOs and others. (Note: These comments were based on the original wording, of 'sustainable agricultural practices', not the revised version, 'sustainable agriculture'). A few countries (France, Portugal) welcomed the proposal. But very many others found it unsatisfactory and needing clarification. For example, 'Spain, There is no clear definition of what is 'sustainable agricultural practices' yet.'

Problems were also noted regarding indicator 2.4.2, by Spain, and more forcefully by the US: 'We recommend deleting this indicator as redundant. 2.4.2 is covered by 6.4.1, percentage change in water use efficiency. As written, 2.4.2 would encourage greater water use for irrigation without any efficiency gain. This would not be sustainable and thus directly contradicts the target.'

And the concept of 'eco-friendly' fertilizers under indicator 2.4.3 was criticised as being vague by Australia, Poland and Spain, as well as one of the few statements by commercial interests: the International Fertilizer Industry Association (IFA).

FAO's comments reveal that they recognised these problems, and wished to seek an acceptable solution: 'FAO stands ready to work together with all the partners to identify internationally agreed and universally relevant definitions of sustainable practices in food and agriculture, to be eventually endorsed by the UN Statistical Commission and used for global monitoring.'

Shortly after, another meeting was held, this time to discuss the grey indicators, where indicator 2.4.1 was one of those under scrutiny. (UN 2015e) Countries such as Poland and Japan again called for further clarification. (Statistics Denmark drew attention to a different issue, which seems to have been generally ignored: 'The indicator does not fully reflect the scope of the target. The indicator has to cover the economic, social and economic dimensions of sustainable agriculture.')

The United States took a very strong alternative position, suggesting that total factor productivity should be used as an indicator instead:

> 'US 2.4.1 The percentage of agricultural area under sustainable agricultural practices, where sustainable agriculture is measured by the ratio of total agricultural output to all inputs – where total agricultural output is an aggregation of crop and livestock products and total inputs (factors) is an aggregation of all of the land, labor, capital and materials used in production. (Total Factor Productivity)'.

The NGOs that commented, such as Worldwide Fund for Nature (WWF), were generally supportive. There were almost no inputs from industry representatives. (During the process of indicator development, the formal expression of views by the private sector was largely channeled through the FAO's Private Sector Mechanism (PSM)). This includes among its supporters a few major private firms: Monsanto, Syngenta, Yara. One major exception was a lengthy comment from the International Fertilizer Industry Association, from which the following excerpts are taken. (A very similar comment was made by Yara, one of the largest fertiliser companies):

> 'In our view, the term 'sustainable agricultural practices' should include all forms of sustainable agriculture, including sustainably intensive agriculture. … 2.4.2 as drafted should not be included in 2.4.1 as households using irrigation is not necessarily an indicator of sustainable agriculture and in many cases irrigation practices are unsustainable. Including indicator 2.4.3 in 2.4.1 is undesirable as agriculture using 'eco fertilizers' (understood as organic nutrient sources) alone is not sustainable on a global basis.'

LTO Nederland, the Dutch Federation of Agriculture and Horticulture, an entrepreneurial and employers' organisation, commented: 'This implies some sort of (group) certification. Best is if this is market-driven or we would only add costs to the system.'

According to the record, FAO 'acknowledge that an internationally agreed definition of sustainable farming practices is needed and provides detailed information on the proposed definition and methodology for the indicators.' At this November 2015 meeting, FAO was identified as 'Possible Compiling Entity'.

In their meeting in March 2016, only the first of the three indicators was endorsed by the IAEG-SDGs: '*2.4.1. Proportion of agricultural area under productive and sustainable agriculture*'. (It appears that the other two were dropped not only because they also were challenged, but because of continuing strong pressure – with respect to all SDGs – to reduce the total number of indicators). This conclusion was supported by FAO, which was confirmed as the 'custodian agency' and 'compiling entity', and summarized in a two-page metadata note. FAO thus consolidated their central position in the process of defining indicator 2.4.1, although the role of the organisation was nevertheless that of facilitator in a continuing process of consensus-building.

FAO's own comment on this modification is as follows: 'FAO proposes a revised indicator, described as: 'Percent of land under productive and sustainable agriculture' as appropriate to address both the

concerns that have been raised with respect to the possibility to define sustainable agricultural practices, and the need to take into consideration also productivity aspects related to water and fertilizer use.' (The table summarizing the comments includes a 'Discussion prompt' on 2.4.1: 'This might also include components currently addressed in indicators 2.4.2 and 2.4.3.' The origin and status of such a 'discussion prompt' are not stated).

FAO thus explicitly reaffirmed concern for productivity in the proposed definition; and was given the task of refining the indicator. The crucial issue was (and remains) whether it will be classified as Tier II or Tier III. Tier II status means 'Indicator conceptually clear, established methodology and standards available but data are not regularly produced by countries'. (As at September 2016, there were 81 Tier I indicators, 57 Tier II indicators and 88 Tier III indicators). Tier III means that 'it does not yet have an internationally recognized methodology nor time series of data'. If this indicator cannot be raised to Tier II its effective significance is very greatly reduced. It is thus very important to achieve Tier III status for the sustainable agriculture indicator.

In April 2017, FAO hosted an expert meeting to refine a methodology for measuring indicator 2.4.1. The hope was that this would lead to a proposal which could be submitted to the IAEG-SDGs, one that was sufficiently convincing that they would approve raising it to Tier II status. The meeting at FAO lasted two days and involved about 50 people, including statisticians and technical experts from countries, international organizations, national statistical offices, civil society and the private sector. It was based on a methodological note prepared by FAO. Before this, 'a Technical Meeting was convened in December 2016 involving a number of experts in sustainable agriculture to select a set of the most relevant sub-indicators to measure indicator. 2.4.1. The results of that meeting were drawn together to complete a first draft of the methodological paper. The draft was first presented to the February 2017 meeting of the Scientific Advisory Committee (SAC) of the GSARS.' It was on the basis of this feedback that the updated draft for the Expert Group Meeting (EGM) was prepared. (Source: Tier re-classification request to IAEG-SDGs Nov 2017). The meeting focused mainly on possible sub-indicators: economic, environmental and social. Criteria used for the selection of sub-indicators included: policy relevance, 'actionability', universality, comparability, cost effectiveness, and ensuring limited overlap between indicators. Discussion included the issue of thresholds (sustainable/ unsustainable), how to combine the proposed sub-indicators, and what farm typologies should be taken into account when developing the indicator. The potential complexity and cost implications of the construction of the indicators were recognised. Also: 'One of the main challenges of indicator 2.4.1 will be to ensure international comparability while offering countries an opportunity to establish their own targets and thresholds.' (FAO 2017b)

Five already existing methodologies/instruments were presented at the workshop, prepared by Agricultural Integrated Survey (AGRIS), CARE International SuPER food systems, the Global Bioenergy Partnership (GBEP), the International Agri-Food Network (IAFN), and Sustainability Assessment of Food and Agriculture Systems (SAFA).

It is not possible to summarise here all the many contributions, and discussions, in which participants drew on very considerable experience and knowledge of the issues. The proposal that emerged from the workshop was not for one single indicator, but rather a composite indicator with three dimensions - relating to the environmental, economic and social dimensions of sustainability – each consisting of three measures, albeit described as sub-indicators, to be combined by an as yet undecided weighting system. (Apparently an even larger number was proposed, but senior FAO staff indicated that nine was already many).

These are to be found in Table 1 above. The discussion at the workshop on 'the way forward' interestingly reflects the fine balance being continually sought between technical experts, member countries, and others:

> 'The group supported the idea of a body that would help advise on the next steps in the process. This could include participants in the expert meeting and should be kept informal. It will also be crucial to involve countries, especially because they are the ones who will have to implement this. It is also important to involve as many voices as possible – as has been done at the expert meeting – in order to continue making it a participatory process. Involving members of the IAEG-SDG was also considered important….'

Each of the participants was asked to give their take-home messages and recommendations for follow-up actions. Several of these referred to the difficulty of computing the indicator. For example:

'Complexity of measuring sustainability is very real, especially integrating the social dimension.' 'Difficulties to compute the indicator.' 'Difficulty in ensuring that the indicators are both measurable and feasible, and remain true to the definition of sustainable agriculture and the main themes identified.' 'Definition of sustainable agriculture is still an issue, maybe the biggest one in this process.'

In November 2017, the FAO submitted the proposal shown in Table 1 above, together with an associated methodology, to the IAEG-SDG for endorsement, with a so-called 'Tier re-classification request' - from Tier III to Tier II status ('Indicator conceptually clear, established methodology and standards available but data are not regularly produced by countries'). To quote the submission: 'The development of this indicator has been co-led by statisticians and technical experts. Both conceptual and measurement issues have been of upmost priority during this process.' And further:

> 'Following the general method for establishing the sustainability criteria listed in Table 1, it is expected that each country will assess the sustainability of its agriculture in an internationally comparable way. Some sub-indicators are relative so that they can capture variations in countries' economic, social and environmental conditions (i.e. relative efficiency to measure productivity). For other sub-indicators, the criteria are generic and not country specific (i.e. zero and above for net farm income; zero groundwater depletion for water use, etc.)'

The note proposed a ''one out – all out' approach in assessing agricultural sustainability at farm level.' In other words, falling below any one of the nine/ten specified sustainability criteria would be sufficient to classify a farm non-sustainable. This is clearly a very demanding requirement, but it has the merit of avoiding the challenging exercise of agreeing a weighting system for the sub-indicators. (The challenge of weighting is very evident in, for example, the Position Paper submitted to FAO by the International Agri-Food Network (IAFN) in September 2016. This paper proposes four dimensions of sustainable agriculture: productivity, ecosystem protection, adaptation as measured through farmer income variability, and land degradation, and discusses several alternative ways of combining these into a single indicator).

At their meeting on 11 – 14th November 2017, the IAEG-SDGs, in their capacity as Indicator Custodian Agency, considered a number of Tier III indicator re-classification requests including this one. Their decision was negative: 'Tier III - review of results of pilot studies necessary and more testing needed before indicator can be reclassified.' Thus this proposed indicator was not endorsed by IAEG-SDG as Tier II, but remains as Tier III: 'does not yet have an internationally recognized methodology nor time series of data'. This is still the situation as at mid-2018. And FAO has expressed its dissatisfaction. In a presentation at an Inter-agency Meeting on Preparation for the 2018 SDG Reports, 28 February - 1 March 2018, entitled 'Methodological development of SDG indicators: FAO's experience', FAO Chief Statistician Pietro Gennari makes some critical comments on the indicator process, referring to a 'lack of Transparency of the IAEG-SDG decisions', suggesting that decisions are sometimes 'arbitrary'

and that 'the IAEG-SDG has progressively tightened the criteria for the reclassification of Tier III indicators over time'. (UN 2018)

6. Analysis

The formulation of the sustainable development goals, targets and indicators has been a complex and fascinating process, involving both political and technical considerations – although the distinction between the two is far from clear-cut whether in empirical or theoretical terms. In empirical terms, the distinction might sometimes appear clear by virtue of the arena where issues are discussed. Thus the United Nations General Assembly, where votes are taken, may be contrasted with a meeting-room in the FAO full of national statisticians. But it is in practice more blurred, for diplomats may attend 'technical' meetings, especially if these are held in New York or Geneva. And observers at meetings of technical personnel may be able to exert some influence informally. (According to several sources, the IAEG-SDGs meeting held in New York was problematic because of the non-technical participants; the situation was much better when meetings were held elsewhere where they were 'shielded' to quote one interviewee).

And what would it mean to distinguish between controversy of a political or technical nature in theoretical terms? The former would be where actors promote particular interests; for example (referring to Target 2.2b), some countries might oppose, or favour, an indicator relating to agricultural export subsidies because this would serve their own national interest. An example of an indicator that is controversial in technical but not political terms might be that of measuring the prevalence of stunting among children under 5 years of age (Indicator 2.2.1). But between these extremes of the 'purely political' and the 'purely technical' is an intermediate situation, which is of more relevance in this paper. This is where there are justifiable technical grounds for questioning the appropriateness of an indicator which are used to support an outcome that serves one's own interest. As this paper shows, there are very real technical problems in defining and measuring sustainable agriculture (indicator 2.4.1); but these can be used by those who believe their interests are not served by such an indicator to seek to reject it on technical grounds.

The process of moving from goals, to targets to indicators involves – in principle – a transfer of power from policy-makers to technical experts (and ultimately, and more specifically, statisticians). The mechanism for doing so – from policy to implementation – depends crucially on quantification. Not just the goals but even the targets are, with few exceptions, bland and uncontroversial. Who could

not wish to 'end hunger'? (It is true, however, that there some who would not wish to 'Correct and prevent trade restrictions' – target 2b).

Some of the SDG2 targets include formulations which might be controversial. For example target 2.3 'By 2030, double the agricultural productivity and incomes of small-scale food producers, *in particular* women, indigenous peoples, family farmers, pastoralists and fishers, *including through* secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.' (Emphases added) But even here the wording is moderated to reduce the extent of commitment – as indicated by the italics which show where compromises appear to have been made.

In the specific case discussed in this article, indicator 2.4.1, three inter-related types of challenge arise: relating to definition, measurement, and threshold. The wording finally chosen may be described as blurred – since it emphasises equally the words 'productive' and 'sustainable'. The fact that the indicator has not been upgraded is because of the practical difficulty of measurement. (The issue of threshold has yet to be faced). The extent to which politics has played a part in this case is concealed by the fact that the objections that have been made to the indicator have been on (apparently valid) grounds of unfeasibility. Such objections may well, in some cases, be motivated by the self-interest of the actors concerned. But they are no less valid for that; and this is the problem. Indicator 2.4.1 is a case of what might best be called the overweening ambition of the quantifiers, reluctant to enter into pragmatic compromise; and this might, as it happens, prove to serve the interests of industrial agriculture. The best is here perhaps the enemy of the good. (Those promoting an agro-ecological approach could argue that the strategy is nevertheless a sound one, for even if indicator 2.4.1 is not granted Tier II status, the debate will continue - a process which can serve to keep up the pressure for a more sustainable agriculture in future).

7. A Transformative Indicator?

Everyone agrees that agriculture should be sustainable; that is not at issue. What is disputed is whether industrial agriculture is sustainable: an empirical question. And, given the need for increased food production, the corresponding (also empirical) question is whether agro-ecological methods can achieve sufficiently high levels of productivity. Perhaps the most important contribution indicator 2.4.1 could make to transforming agricultural policy is to focus attention very precisely on this issue.

The challenge is not to gain and sustain agreement that agriculture must be sustainable – to write this into goals, targets and indicators; those who promote industrial agriculture ('productivists' for short) have no problem with that, and can support the call for 'productive and sustainable agriculture'. The problem is rather to provide convincing evidence that industrial agriculture is not sustainable, while alternative methods (agroecology for short) can achieve similar yields; to change the conversation. How might this be achieved?

The disagreement between industrial agriculture and agro-ecology manifests itself in the discussions, and ensuing documents, that have been described above. It is expressed very clearly in the comment by the US suggesting that the appropriate measure of sustainable agriculture is total factor productivity. But the words 'productive and sustainable agriculture' paper over this disagreement. The proposals from the two-day workshop do not resolve this problem. Those who believe that industrial agriculture rather than ecological approaches can best feed the world need to be convinced. Who is right will become apparent only in the future, when the environmental effects of industrial agriculture are still more apparent than today. In order to transform the debate it is necessary, and should be sufficient, to show that – already today – agro-ecological approaches can achieve high yields. To serve this purpose, the indicator could, for example, be a measure of the percentage of agricultural area which satisfies specified criteria of sustainability regarding water, soil and biodiversity - while also achieving a specified level of productivity (in other words a modified version of the FAO proposal from June 2015). This would focus attention more precisely on the central issue, so that this indicator, instead of simply monitoring performance, could serve to transform the sustainable development debate as it relates to agriculture; to challenge established wisdom in a way that can promote the goals more effectively.

References

Clapp, S. (2008). 'USDA seeks to scuttle ANSI sustainable agriculture standard', *Food Chemical News* 50(43) pp22–23.

Clough, Y., Barkmann, J., Juhrbandt, J., Kesslerc, M., Wanger, T.C., Anshary, A., Buchori, D., Cicuzzac, D., Darrasi, K., Putra, D.D., Erasmi, S., Pitopang, R., Schmidt, C., Schulze, C.H., Seidel, D., Steffan-Dewenter, I., Stenchlya, K., Vidal, S., Weist, M. Wielgoss, A.C. & Tscharntke, T. (2011). 'Combining

high biodiversity with high yields in tropical agroforests', *Proc. National Academy of Sciences, USA*, 108(20) pp1–6.

Conner, C. (2008). Letter from Mr. Charles F. Conner, Deputy Secretary of Agriculture, to Mr. Michael Arny, President of the Leonardo Academy, expressing concerns over ANSI standards process, methodology, and contents. USDA. June 6. Cited in Hatanaka et al. (2012)

de Schutter, O. (2017) 'The political economy of food systems reform', *European Review of Agricultural Economics*, Volume 44, Issue 4, 1 September 2017, pp705–731, https://doi.org/10.1093/erae/jbx009

Dobermann, A and Nelson, R. (2013) *Opportunities and Solutions for Sustainable Food Production*. Background research paper submitted to the High Level Panel on the Post-2015 Development Agenda. May 2013.

Dodds, F., Donoghue, D. and Leiva-Roesch, J. (2016), *Negotiating the Sustainable Development Goals: A transformational agenda for an insecure world.* London: Routledge.

EU SCAR. (2012). *Agricultural knowledge and innovation systems in transition: a reflection paper.* Brussels, Standing Committee on Agricultural Research (SCAR) of the European Union (available at http://ec.europa.eu/research/agriculture/scar/pdf/akis_web.pdf). Faculty of Social Sciences, University of Oslo.

FAO. (2011). *The State of the World's Land and Water Resources for Food and Agriculture: managing systems at risk*. Rome (available at www.fao.org/docrep/017/i1688e/i1688e.pdf*).*

FAO (2017a). SDG indicator 2.4.1 proportion of agricultural area under productive and sustainable agriculture. Methodological concept note. 18 October 2017. http://www.fao.org/fileadmin/templates/es/SDG/SDG_2.4.1_Methodological_concept_note.pdf

FAO (2017b) Expert meeting. Rome, Italy, 3-5 April 2017. http://www.fao.org/3/a-br908e.pdf

Foresight. (2011) *The future of food and farming: challenges and choices for global sustainability*. Final Project Report. London, Government Office for Science.

Fukuda-Parr, S. and Orr, A. (2014) The MDG Hunger Target and the Competing Frameworks of Food Security. *Journal of Human Development and Capabilities*. Volume 15, 2014 - Issue 2-3. pp146-60

Hatanaka, M., Konefal, J. and Constance, D. (2012) 'A tripartite standards regime analysis of the contested development of a sustainable agriculture standard', ISSN: 0889-048X , 1572-8366; DOI: 10.1007/s10460-011-9329-7 ,, *Agriculture and human values* Vol.29(1), pp65-78

HLPE (High Level Panel of Experts on Food Security and Nutrition) (2011). *Price volatility and food security*. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security. Rome.

HLPE (2012). *Food security and climate change*. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security. Rome

HLPE, (2014a). *Food losses and waste in the context of sustainable food systems*. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security. Rome.

HLPE (2014b) Note on Critical and Emerging Issues for Food Security and Nutrition Prepared for the Committee on World Food Security. 6 August 2014

HLPE (2016). *Sustainable agricultural development for food security and nutrition: what roles for livestock?* A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome (available at http://www.fao.org/3/a-i5795e.pdf).

HLPE (2017). *2nd Note on Critical and Emerging Issues for Food Security and Nutrition*. 27 april 2017

IAASTD. (2009). *Agriculture at a crossroads*. International Assessment of Agricultural Knowledge, Science and Technology for Development Global Report. Washington, DC. Island Press.

IPES-Food (2016). *From uniformity to diversity. A paradigm shift from industrial agriculture to diversified agroecological systems.* International Panel of experts on sustainable food systems (available at http://www.ipes.food.org/images/Reports/UniformityToDiversity_FullReport.pdf).

IPES-Food (2017). *Too big to feed: Exploring the impacts of mega-mergers, consolidation and concentration of power in the agri-food sector.* International Panel of experts on sustainable food systems (available at: http://www.ipes-food.org/images/Reports/Concentration_FullReport.pdf)

IPCC (Intergovernmental Panel on Climate Change). (2014). *Climate change 2014: mitigation of climate change. Contribution to Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. O. Edenhofer, R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel & J.C. Minx, eds. Cambridge, UK, and New York, USA, Cambridge University Press.

Lang, T. and Barling, D. (2013). *Nutrition and sustainability: an emerging food policy discourse*. Conference on 'Future food and health', Symposium I: Sustainability and food security. 72, pp1–12.

Pretty, J.N. (1995) *Regenerating agriculture: policies and practices for sustainability and self-reliance.* London, Earthscan.

Reardon, T., Timmer, C.P. & Minten, B. (2012) 'Supermarket revolution in Asia and emerging development strategies to include small farmers', *Proc. Natl Acad. Sci. USA,* 109, pp12332–12337.

Strzepek K. & Boehlert B. (2010) 'Competition for water for the food system', *Phil. Trans. R. Soc. B*, 365, pp2927–2940.

UN (2014). Compendium of statistical notes for the Open Working Group on Sustainable Development Goals.

UN (2015a) Expert Group Meeting on the indicator framework for the post-2015 development agenda, New York, 25-26 February, 2015. Concept note.

UN (2015b) First meeting of the IAEG-SDGs . http://www.un.org/en/development/desa/usg/statements/mr-wu/2015/06/expert-group-on-sdgi.html

UN (2015c) Expert Group Meeting on the indicator framework. 25-26 February 2015. New York. ESA/STAT/441/2/58A/15.

UN (2015d) Technical report of the Bureau of the United Nations Statistical Commission. https://sustainabledevelopment.un.org/content/documents/6754Technical%20report%20of%20the%20UNSC%20Bureau%20(final).pdf

UN (2015e). 9-15 Dec 2015 IAEG-SDG. Open Consultation on Grey Indicators. https://unstats.un.org/sdgs/iaeg-sdgs/open-consultation-3/

UN (2018) https://unstats.un.org/sdgs/files/meetings/sdg-inter-agency-meeting-2018/8a1.Methodological%20Development_FAO.pdf

Vermeulen, S.J., Campbell, B.M. & Ingram, J.S.I. (2012) 'Climate change and food systems', *Annual Rev. Environ. Res.,* 37: pp195–222.

Wheeler, T. & von Braun, J. (2013) 'Climate change impacts on global food security', *Science*, 341, pp508–513.

Zimmerer, K.S. (2014). Conserving agrobiodiversity amid global change, migration, and nontraditional livelihood networks: the dynamic uses of cultural landscape knowledge. *Ecology and Society,* 19(2): 1.

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