UN/POP/EGM/2019/3
September 2019

UNITED NATIONS EXPERT GROUP MEETING ON POPULATION, FOOD SECURITY, NUTRITION AND SUSTAINABLE DEVELOPMENT FOR SUSTAINABLE DEVELOPMENT

Population Division
Department of Economic and Social Affairs
United Nations Secretariat
New York, 16-17 September 2019

1. Background

Food security is an outcome of food system (Mbow and others, 2019). According to the Food and Agricultural Organization (FAO) (2001), situation of food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Thus, food security consists of four pillars: availability, access, utilization and stability. Food system needs to provide desirable out-comes to all these four pillars to ensure food security.

Currently, food system is broken (Schmidt-Traub and others, 2019) and unable to ensure food security for all the population although more than enough food is produced. Additionally, the current food system is also contributing to climate change and other environmental problems. Globally, 821 million people are suffering from hunger and undernourishment and around 2 billion adults are facing overweight or obesity (FAO and others, 2018). The global food system is contributing to 21-37per cent of the total anthropogenic greenhouse gas (GHG) emissions when the emissions associated with pre- and post-production activities are considered (Mbow and others, 2019).

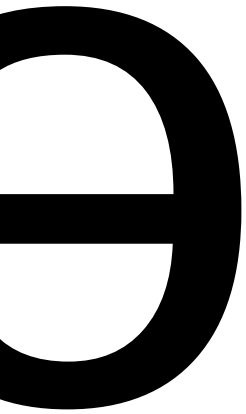
"The transformational vision of the *2030 Agenda for Sustainable Development* calls on all countries and stakeholders to work together to end hunger and prevent all forms of malnutrition by 2030" (FAO and others, 2017). Additionally, Sustainable Development Goal (SDG) 12 has a target (12.3) that aims to halve per capita global food waste and reduce food losses by 2030 (UNGA, 2015). Moreover, all SDGs are directly or indirectly linked to food system and food security (FAO and others, 2017; Mbow and others, 2019). Considering these inter-linkages are important because the 2030 Agenda is a system of interacting components that is more than a collection of goals, targets and indicators (Pradhan, 2019).

The recent International Plant Protection Convention (IPPC) Special Report on Climate Change and Land (SRCCL) highlights that the food system and all the four pillars of food security is under pressure from non-climate stressors (e.g., population and income growth, demand for animal-sourced foods), and from climate change (Mbow and others, 2019). This brief note presents interactions between climate change, food system and sustainability, highlighting urban food system and regional specificities, by summarizing the recent literature including the SRCCL. The main purpose of this brief note is to inform the United Nations expert group meeting held by the United Nations Department of Economic and Social Affairs, Population Division on the special theme of "Population, food security, nutrition and sustainable development". After this background, section 2 describes drivers of food system. Interactions between climate change and food system are discussed in section 3. Response options to ensure food security in a sustainable manner are presented in section 4. Sections 5 and 6 present urban food system and regional specificities, respectively. Section 7 highlights the key conclusions of this brief note.

2. Drivers of food system

According to the SRCCL, "the food system encompasses a

from a sustainable to fragmented world as depicted by storylines of the shared socioeconomic pathways (SSPs) (Kc and Lutz, 2014). Additionally, around two third of the global population (68 per cent) is projected to live in urban areas by 2050 (UN-DESA, 2019). For feeding this growing population, food demand has been projected to increase by 40-60per cent between 2010 and 2050 under different scenarios (FAO, 2018b; Bodirsky and o0a7 (r)6.9 en 11.04 -00770.9 (t)-Tj 0.022 TwTc 99473.6 (n 17.34o.9 (4(n)10.9 (i7 (hc6 (ne



In food system, animal source foods are the major contributor of the GHG emissions. Gerber and others (2013) has estimated the emission from livestock system of 7.1 Gt $CO_{2\text{-eq}}$ yr^{-1}. This makes the livestock emission share of 37–66per cent of the food system emissions. The SRCCL highlights that the main source of global livestock emissions is cattle production (Mbow and others, 2019) that is also a source of red meat. Recent studiesh (.)]soiitt.2 (0 Td [(of)-4 (t)g)8.3 (-0.013 ea217 0 Td [(t)-2.6 caj 0.002c[(t)-2.6n)ttg n.28 Tm [(.)2 (c

technical mitigation potential from improved crop and livestock management activities, including agroforestry, is estimated as 2.3-9.6 Gt $CO_{2\text{-eq}}$eqeqtechnfe 0 Td [(9(2)Tj (-)Tj 0.0081.5</M9-2.14(Tw)7.46 (3C5Tj4 (-0.)TJ14.6Td)-24(ba2-)125n)-20048j-0.8(f) Tw [((

For nourishing urban inhabitants, food needs to be transported over long distances (Weber and Matthews, 2008) beyond urban and peri-urban agriculture, resulting in GHG emissions. Under current business models, reducing the global transport emissions is a challenge because the demand to move people and goods around the world is growing. A comparison between *regionalized* food systems (where urban food and feed demands are fulfilled by the nearest possible surroundings) and *globalized* food systems (where the demands are randomly met form the global pool of producer areas) shows that *regionalized* food systems would halve the current emissions from food transport (Pradhan and others, forthcoming). Conversely, the emissions are four times higher (1.87 Gt CO_2 yr^{-1}) under *globalized* systems. By 2050, the food transport emission may increase to 0.25--0.92 Gt CO_2 yr^{-1} and 2.20--3.00 Gt CO_2 yr^{-1} under *regionalized* and *globalized* food systems, respectively (Pradhan and others, forthcoming). Thus, regionalization of

Acknowledgement

We acknowledge funding from the German Federal Ministry of Education and Research (BMBF) for the SUSFOOD project (grant agreement No 01DP17035), the German Federal Ministry for the Environment, Nature Conservation, Building, and Nuclear Safety for the I-CCC project (Contract No 81227263), and the European Union's Horizon 2020 research and innovation program under for the European calculator project (grant agreement No 730459). The funders had no role in study design, data collection, and analysis, decision to publish, or preparation of the brief note.

References

Bodirsky, B. L., and others (forthcoming). 6 W D U Y H G D Q G V W X I I H G × food demand and food waste under an advancing nutrition transition. *(Under Rev.,*.

Bouvard, V., and others (2015): Carcinogenicity of consumption of red and processed meat. *Lancet Oncology*, vol. 16, No. 16, doi:10.1016/S1470-2045(15)00444-1.

Food and Aagricultural Oorganization,World Health Organization and United Natiions University (2004). *Human energy requirements*. Rome. Italy, 103 pp.

Food and Agricultural Organization (FAO) (2001). *Food Insecurity in the World 2001*. Available from http://www.fao.org/3/a-y1500e.pdf (Accessed December 6, 2017).

—— (2018a). Food and Agriculture Organization Corporate Statistical Database (FAOSTAT). Available from http://www.fao.org/faostat/en/#home (Accessed December 3, 2017).

—— (2018b). *The future of food and agriculture: Alternative pathways to 2050*. Available from http://www.fao.org/publications/fofa/en/.

FAO, International Fund for Agricultural Development, United Nations Children Fund, World Food Programme and World Health Organization (2017). *The State of Food Security and Nutrition in the World 2017: Building resilience for peace and food security*. FAO, ed. Rome.

—— (2018). *The State of Food Security and Nutrition in the World 2018. Building climate resilience for food security and nutrition*. Rome. Available from www.fao.org/publications (Accessed October 1, 2018).

Gerber, P. J., H., and others (2013). *Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities.* Food and Agriculture Organization of the United Nations (FAO), Rome.

Hiç, C., and others (2016). Food surplus and its climate burdens. *Environmental Science & Technol*ogy, doi:10.1021/acs.est.5b05088. http://www.scopus.com/inward/record.url?eid=2-s2.0-84966326674&partnerID=MN8TOARS.

Intergovernmental Panel on Climate Change (2019). *Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial (Summary for Policymakers) ecosystems*

Landholm, D. M., and others (2019). Reducing deforestation and improving livestock productivity: GHG mitigation potential of silvopastoral systems in Caquetá. *Environmental Research Letters*,

Mbow, C., and others (2019). Food Security. *Climate Change and Land An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*, IPCC: Geneva.

Popp, A., H. Lotze-Campen and B. Bodirsky (2010). Food consumption, diet shifts and associated non-CO_2 greenhouse gases from agricultural production. *Global Environmental Change*, vol. 20, pp. 451–462, doi:10.1016/j.gloenvcha.2010.02.001. http://linkinghub.elsevier.com/retrieve/pii/S0959378010000075 (Accessed June 28, 2010).

Pradhan, P. (2019). Antagonists to meeting the 2030 Agenda. *Nature Sustainability*, vol. 2, pp.. 171–172, doi:10.1038/s41893-019-0248-8. http://dx.doi.org/10.1038/s41893-019-0248-8.

Pradhan, P. and others (forthcoming). 6.3 b abn E Â Äã 8 f°n40052>2.6 (nA>w [49>-4 8)Tj 67>6.2 <00941b>-4