Accelerating progress towards the Zero Hunger Goal in cross-boundary climate change hotspots

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Abstract - The most recent 2017 United Nations' Sustainable Development Goals progress report highlighted the need to accelerate the pace of progress in order for the Sustainable Development Goals to be fully achieved. Responding to these concerns, the present commentary proposes four distinct, but interrelated approaches to accelerate the Zero Hunger Goal in transboundary climate change hotspots, regions which suffer from multiple stressors and vulnerabilities, and in which prevalence of food insecurity and malnutrition often remains disproportionately high. These conceptual, programmatic and policy approaches are discussed drawing from a newly developed conceptual framework and referring to specific examples from climate change hotspots around the world.

Nutrition and food security constitute a critical development challenge, and a *sine qua non* condition for human-wellbeing and macro-economic growth. According to the most recent estimates, 2 billion people suffer from micronutrient malnutrition, 155 million children under the age of five are stunted and 41 million are overweight.[1] Despite considerable progress towards the hunger related target 1.C under Millennium Development Goal 2, it was not reached, with Sub-Saharan Africa, the Caribbean, South Asia and Oceania all making insufficient progress.[2] Ending poverty and hunger is topmost on the 2030 Agenda for Sustainable Development. Sustainable Development Goal (SDG) 2 entitled "End hunger, achieve food security and improved nutrition and promote sustainable agriculture" has eight targets that must be achieved in the 2020-30-time horizon, including target 2.1 "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".[3]

The food security and nutrition challenges are particularly critical in regions, which are prone to multiple vulnerabilities and often cut across national boundaries, such as climate change hotspots (CCH).[4,5] These are areas characterised by both a "strong climate signal" and concentration of vulnerable populations[6] and can be defined as "geographic regions of compound risk that might be regarded as particularly susceptible to a changing climate".[7] In this commentary we provide specific approaches, which will help address nutrition and food insecurity challenges in these regions, and thus contribute significantly to accelerating the rate of progress towards the Zero Hunger Goal in the 2030 Agenda. In doing so, we respond directly to the concerns raised in the most recent SDG progress report[8], which warned that the current SDG rate of progress was too slow.

The four specific and complementary approaches, which we suggest here are: 1) Applying the concept of safe and just operating spaces (SJOP) in CCH social-ecological systems; 2) Capitalising on cross-boundary and cross-sectoral interdependencies; 3) Tapping the potential of rising food and nutrition security opportunities in CCHs; and 4) Setting up robust regional scale monitoring frameworks for greater accountability (Fig. 1). While these proposals are by no means a complete remedy to developmental problems in CCH, they complement existing approaches to eradicating

malnutrition and hunger. We claim that these strategies will contribute to fulfilling both global nutrition and food security relevant goals – such as SDG2, the World Health Assembly (WHA) 2025 nutrition targets and relevant priorities under at the Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework) – and regional, CCH-relevant targets included in the regional development plans and programmes. In order to work, these approaches would need to be tailored to specific geographic and socio-economic settings and ideally fit within the contextualised theory of change developed for each CCH.

- Figure 1 around here –

Figure 1 Conceptual framework for accelerating Zero Hunger goal in cross-boundary climate change hotspots

Applying the concept of safe and just operating spaces in regional CCH social-ecological systems

The concept of a SJOS provided through the so-called "doughnut framework" has delineated boundaries for ecological processes and thresholds for social wellbeing at global scale.[9] The operationalization of the SJOS concept therefore provides a basis for exploring the linkages between social and ecological systems and allows identification of minimum thresholds for social systems – and maximum thresholds for ecological systems. For example, the SJOS concept can be applied to understand how rapid resource exploitation, such as shrimp farming or agricultural intensification, is associated with food and nutrition security, which in turn may increase environmental degradation in CCH – with possible feedbacks on the social system and a reduction of resilience in both systems. The resulting evidence can be used during the design of the transboundary cooperation and development plans for CCH, such as the Sea-Red river delta master plan.[10] In semi-arid regions, for example in the Sahel, the SJOS concept can be applied to investigate the boundaries and thresholds

of the socioeconomic systems, which are home to often marginalised pastoral and transhumant communities.

Furthermore, the SJOS concept can serve as a powerful tool to quantify and compare regional differences. Dearing et al. (2014) showed the usefulness of this concept in mapping environmental degradation boundaries in Shucheng county in eastern China, which revealed unsustainable use of ecological services.[11] Operationalising the SJOS would also be useful in the context of the water resource management conflicts in the Ganges Brahmaputra hotspot between Bangladesh and India. The SJOS concept can also serve as a basis for exploring transformation pathways within which the Zero Hunger Goal can be achieved, and which could be jeopardised by moving beyond the SJOS. It is particularly important in the CCH across the world to investigate and influence the pathways and the drivers that may lead the social-ecological systems to move out of a SJOS, beyond which there is a high risk of hunger and food insecurity.[12]

Capitalising on cross-boundary and cross-sectoral interdependencies

While by definition, CCH suffer from multiple stressors and vulnerabilities, their cross-boundary nature offers scope for innovative approaches. To accelerate the progress towards SDG2 in CCH, *borders should be considered as meeting points to share knowledge and experiences, rather than divisions*".[13] Supporting these regions in scaling up the rate of progress towards the Zero Hunger Goal will require, among other measures, setting up innovative agricultural insurance schemes and other social security measures, beyond the provision of project-based cash transfers. Such schemes would need to allow a response to climate and climate-related market shocks and be operational at the regional level. In addition, regional organisations such as the Economic Community of West African States (ECOWAS) and West African Economic and Monetary Union (UEMOA) will need to develop coherent strategies that account for the interests of producers as well as populations made vulnerable by price volatility. This should be done by combining structural policy measures and cyclical policy measures aimed at stabilizing prices and reducing the effects of price volatility within a

125 comprehensive food and nutrition security policy framework across the West African semi-arid
126 regions. In addition, grassroots organisations and parliamentarians should work jointly to advance
127 the implementation of the nutrition and food security agendas (see Box 1).
128
129 **Box 1 around here**
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131 In the transboundary Hindu Kush-Himalaya (HKH) region, agriculture systems are highly sensitive to
132 climate change and mountain farmers experience prolonged droughts and flooding, which affects
133 food security.[14] In order to mitigate the impacts of climate and environmental change, farmers have
134 adopted a variety of locally developed techniques, one of which is to manage their cardamom
135 terraces using natural fertiliser. However, even where communities benefit directly from climate
136 funds, they are often just passive beneficiaries instead of actively participating in development
137 initiatives. Thus, in addition to the existing national and regional policies, such as National
138 Adaptation Plan of Action (NAPA) and Climate Resilient Planning Framework, local authorities and
139 populations will need to set up well-structured transboundary multi stakeholder platforms, which
140 would allow effective implementation of efforts as well as knowledge sharing.
141 Accelerating the Zero Hunger Goal across CCH should not only be a priority for developing countries.
142 For the European Union (EU), for instance, food insecurity should not only be seen as a threat
143 caused by climate change, but it should also serve as an opportunity to develop policies that can
144 enhance innovation, and reformulate health, trade and social cohesion. This will require strong
145 coordination both at the EU level and with the countries, which are part of the European
146 Neighbourhood Policy. Some examples of policies which go in the right direction include the
147 collective approach to the agri-environment-climate measure (AECM), a measure under pillar 2 of
148 the Common Agriculture Policy of the EU.[7] Under this instrument, farmers across regions are
149 encouraged to work together to deliver joint ecosystem services at a larger scale.

Importantly, as nutrition is a multi-sectoral issue, context-specific cross-boundary measures will need to be set up as part of the relevant policy and strategy documents, such as multi-sector nutrition and food security plans. Further, interlinkages between different SDGs, including between the Zero Hunger Goal and the goals addressing climate change (SDG 13) or coastal and marine resources (SDG 14) should be taken into consideration, as progress towards these goals will also contribute to reducing hunger and food and nutrition insecurity (see also Box 2).[15]

Box 2 around here

Tapping the potential of rising food and nutrition security opportunities in CCHs

Despite challenges in CCHs, opportunities are also rising that may be tapped to achieve sustainable food and nutrition security. For example, mountain ecosystems in the HKH region are rich in water sources, and are highly suitable for cultivation of traditional food crops, also known as 'neglected and underutilized species' (e.g. barley, sorghum, millets, buckwheat, pulses and beans) (see Box 1). These crops are rich in micronutrients, and are more resilient to climatic stresses.[17] In view of their higher benefits in terms of nutrition, climate change resilience and biodiversity, these crops are recently renamed as '*Future Smart Foods*'.[18] Native livestock and rangelands also offer an opportunity in the HKH, particularly in the high mountains (>2000masl). In Tibetan Plateau of China, support mechanism for yak including value chain development has played very important role in local people's food security and livelihoods.

The HKH region also has a potential for growing vegetables, fruits, nuts, tea, and NTFPs (e.g. honey and medicinal plants) (see Box 3). These sources have shown a rise in production and increased contribution to food security over time despite climatic challenges.[12] Similarly, area-specific opportunities for tapping the potential of rising food and nutrition security, including where relevant indigenous and cash crops, should be explored in CCH in other regions.

Box 3 around here

Setting up robust CCH SDG monitoring frameworks for greater accountability

As the UN Secretary-General's synthesis report noted, there exist four levels of monitoring for the SDGs: national, regional, global, and thematic.[19] While national reporting will be the most significant level of reporting and will rely heavily on the work of national statistical offices, complementary regional level monitoring frameworks and indicators should be generated for socio-economic systems, such as CCH. As stipulated in the Sendai Framework, monitoring should involve developing and sharing risk modelling, assessment and mapping tools and providing comprehensive surveys on multi-hazard risks.[20] An example of good practice to note in the Bengal delta is the Food Security and Nutritional Surveillance Project. As part of this project, for the first time in Bangladesh, seasonal surveys of food security generated a large amount of data which aided policy formulation with respect to nutrition and food security in Bangladesh.

In November 2017, the Government of Nepal, with the support of the United Nations World Food Programme and the SERVIR Hindu Kush Himalaya (SERVIR-HKH) Initiative of International Centre for Integrated Mountain Development (ICIMOD), launched a new online Food Security Information System (OFSIS) to map and visualize patterns of food security, poverty and malnutrition in the country. OFSIS enables the user to view and generate visual information on the various "estimation types" and "measures" for food security as well as information about food prices, at district and sub-district levels[21]. Such initiatives, should be expanded to neighbouring countries in the HKH region and applied in other CCH. Regional OFSIS would allow regular monitoring on the progress of important indicators within and across countries. Only with sufficient disaggregated data, and effective monitoring systems and tools at the CCH level, will we be able to ensure that progress towards the Zero Hunger Goal will keep on track.

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Conflict of interest statement

The authors declared that they have no conflict of interest.

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