Food Security in Drylands Under a Changing Climate

Working Group 1- Policy Brief

Figure 1: Livestock in dryland area (Photo: Malgorzata Suska-Malawska)

Key messages

1. By 2050, crop yields in dryland areas could decline by 10-25% due to climate change according to the IPCC.
2. A growing population projected to reach 10 billion by 2050 is increasing the global demand for food. In drylands, improving agricultural performance is key to addressing food insecurity and poverty.
3. Agricultural production systems and food systems must undergo climate-smart transformations to meet the interlinked challenges of achieving increasing food security, sustainability and responding to climate change.
4. Innovative climate-smart agriculture can help drylands communities become more resilient to the impacts of climate change.

Food insecurity and climate change pose defining challenges of our time. Improved food security for sustainable development is a key issue articulated at EU and international levels. Today, challenges around food security are numerous, diverse, and interrelated (fig. 1). Due to climate change, extreme climatic events such as floods, droughts and heatwaves are projected to increase in intensity and frequency, adversely affecting poor people already vulnerable to climate change impacts (Hallegatte et al. 2016) and exacerbating global food insecurity. In this policy brief, we outline six priority areas of urgent action for policy makers and private sector leaders in dryland areas to make the next harvests work for a sustainable future in the era of climate change.

Climate change impacts, environmental security and economic development in drylands. Agriculture represents the backbone of economies in dryland areas across the globe. Due to climate change, drylands have been experiencing lower agricultural productivity. These water scarce areas are considered to be climate change hotspots, where the majority of the food-insecure and poor people still depend on natural resources/the land for their livelihood (Puma et al. 2018). In 2017, circa 124 million people across 51 countries faced severe levels of food insecurity.

Figure 2: Food security and interconnected challenges under climate change

The UN estimates that drylands cover over 41% of the land surface with up to 44% of all the world's cultivated systems being in dryland areas. In drylands, the food balance is highly vulnerable to large-scale and regional climatic events affecting one or more of the main 'grain belts'. An examination of food security at the local level requires knowledge of food availability, which is based on food production and distribution, human population, conflicts, and environmental issues. With rising temperature, tropical pests will be transmitted to regions where they are currently absent, including drylands, thereby affecting food productivity. Similarly, climate-related hazards, such as floods, will facilitate the outbreak of waterborne diseases and new breading sites for agricultural pests.

Figure 3: Extremely degraded croplands in the northern valleys of Israel (Photo: Ilan Stavi)

Water security. In dryland areas, access to clean water sources is crucial for ensuring healthy livelihoods, but water quality and quantity are deteriorating. This influences food security by impacting primary productivity, i.e., crop yields and pasture production, and thus food availability for humans (Lall et al. 2017). In turn, agriculture affects water security due to the irrigation needs for food production (Gerbens-Leenes et al. 2013), as well as through the impact of agricultural sewage on quality of surface- and underground- water (Sharma & Bhattacharya 2016). Changes in water availability, due to natural variability or climate change, and prolonged water insecurity have long been factors in the decision to migrate. Traditionally, pastoralist populations have migrated to escape climate extremes such as droughts and floods (Thalheimer & Webersik 2019; van der Land et al. 2018). In particular in dryland areas, as the risk of irreversible change in the hydrological cycle increases with progressing climate change, so does the vulnerability of people relying primarily on the rainy season to obtain water for sustaining their wellbeing and livelihoods (Tignino & Mach 2018).

Health and Food Security. Resilient immune systems are dependent on nutritionally adequate diets, both in terms of quantity and quality (Ivers et al. 2009). Not only is a stable provision of food essential for human health and vitality, but those affected by insecure food provision commonly shift to less healthy diets and consume unsafe foods (WHO 2018). Under-nutrition and food insecurity is a token of a compromised health status, increasing and compounding the risk of chronic disease and poor mental health, particularly in children

and adolescents (Gundersen & Kreider 2009; Shankar et al. 2017). Ensuring access to and affordability of nutritionally adequate diets under climate change conditions is therefore an urgent matter to be addressed in public policy (Kanter et al. 2015). At the same time, bottom-up approaches have proven highly effective in improving the health status of communities through education and participatory engagement activities (Bentwich 2019; Wallerstein & Duran 2006).

Governance. Food insecurity can often be attributed not only to environmental degradation and climatic variability, but also to failures and breakdown in governance, particularly in socio-politically fragile environments. Furthermore, effective governance measures can determine the duration and intensity of food insecurity phases (Hoon & Hyden 2003). A lack of coherence and coordination across multiple sectoral, spatial, and temporal scales has been identified as a significant contributor to food insecurity (Candel 2015). For instance, the 2008 food crisis, partly influenced by the EU's stimulation of the biofuels industry, emphasizes the need for better-integrated food security governance, bridging global needs with human rights (Candel 2018). Therefore, multi-level governance regimes need to enshrine a systemic-perspective, embracing complexity and interconnectedness of resource governance into decision-making and policy-planning systems (Pahl-Wostl et al. 2010). However, there is a severe lack of appropriate, inclusive policy formulation which adequately integrates the systemic perspective necessary for efficient climate change adaptation, particularly to guard community rights in climate-vulnerable countries (Shakya et al. 2018).

Energy security. Energy security[1] refers to the themes of energy availability, affordability and efficiency, infrastructure, societal effects, environment and governance (Ang et al. 2015), interacts with food security as agricultural production largely relies on fossil fuels. Food prices are therefore dependent on the cost of energy, and highly vulnerable to market fluctuations induced by energy prices. In low-income countries, food processing relies on cheap fuel such as firewood. Both types of fuel dependency cause environmental degradation and rising emissions – all impacting food security. The shift towards renewable energy comes at a price; biofuels present a "food, energy and environment trilemma" (Tilman et al. 2009), whereby biofuel crops' use of land and water increases food prices, causes direct and indirect land use changes (e.g., deforestation on- and off- site) and displace people. Policies promoting alternative energy sources should ensure that biofuels increase energy gains and reduce emissions, while conserving biodiversity and food supply. Food security and energy security policies must sustain each other without compromising the global food balance and local rights to food.

Recommended Actions and Conclusion. Food security is a crosscutting policy area in which the EU's commitment to policy coherence for sustainable development applies.

1. Climate analytics and knowledge products
   Recognizing the EU's key partnering role in securing sustainable development of dryland areas, the EU should act as research and knowledge hub for national and regional dryland research institutes. Policies should support research projects with focus on climate smart engineering, technology, and environmental conservation through increased efforts in funding, efficiency and connectivity of research centres in the dryland landscape with those hosted across the EU.

2. Unlocking climate finance for food security
   Especially for dryland areas, policymakers should seek to shift from market price supports to direct producer payments that better target poverty in rural geographies, decoupling payments from production, and incentivizing sound,

[1] The International Energy Agency (IEA) defines energy security as the uninterrupted availability of energy sources at an affordable price.

environmentally-friendly agricultural and natural resource management practices. Effective policies will therefore have to include local communities in decision-making processes and international cooperation with the donors.

3. Climate-smart technology innovation
   The policy maker challenge is to agree on an appropriate combination for different food value chains and geo-political contexts across drylands. Investments in climate-smart technologies hold hopes for achieving food security in drylands. Climate resilient innovations range from precision agriculture, gene-editing and biological-based crop protection, and technologies that improve traceability. To scale their implementation, capacity building and trainings should be undertaken at local level to ensure affected populations are resilient to food stress under a changing climate.

4. Responsive mechanisms
   The EU should develop early warning systems and ensure timely responses to food security crises to ensure the sustainability of local food supplies even in times of crises, forced migration and internal displacement of people both in origin and EU host countries. In the context of economic security and governance, effective policies and coherent governance should act as a platform for coping alternatives to dryland populations, for example, through the promotion of gender balanced climate smart agriculture innovations. At the same time, dryland economies will need to plan for more diversified economic activities, absorbing labor into non-agricultural and less climate-sensitive sectors.

The EU should take a lead in leveraging key knowledge products from research and technology innovations to support drylands in becoming climate resilient and support inclusive growth.

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