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Sustainability of Youth Development in Drylands: A Systematic Approach

Aleksandra Figurek, Elena I. Semenova,
and Alkis Thrassou

1 Introduction

Dryland climate change persists to pose significant and developing threats to rural livelihoods and young people's chances of finding quality, climate-resilient employment (Wiggins et al., 2021; Levine et al., 2021; Gony et al., 2021). According to estimates, 798.8 million people in Africa

A. Figurek (✉)

GNOSIS Mediterranean Institute for Management Science,
University of Nicosia, Nicosia, Cyprus

School of Business, University of Nicosia, Nicosia, Cyprus
e-mail: figurek.a@live.unic.ac.cy

E. I. Semenova

Federal Research Center of Agrarian Economy and Social Development of
Rural Areas, All Russian Research Institute of Agricultural Economics,
Moscow, Russia

Russian State Correspondence Agricultural University, Moscow, Russia

(59.6% of the population) and 282 million people (21% of the population) had moderate to severe food insecurity in 2020. These numbers climbed by about 30% from 2015 to the present (FAO, 2021). Land degradation in drylands is being caused by human activities, including inappropriate land use and climate change, which has a severe negative impact on agricultural and livestock output (Stavi et al., 2021).

Due to the absence of educational and job prospects in their hometowns as a result of these developments, many rural young people must leave their homes in order to pursue their futures (Farrugia, 2016). Because of the devastating effects of climate change on drylands, human movement is significantly impacted in Africa (Šedová et al., 2021). As a result of a sudden or gradual shift in the climate, individuals or groups of individuals known as “climate migrants” are compelled to leave their usual residence for prolonged periods of time or permanently (IOM, 2021). If those who have been first displaced do not go back to where they were initially displaced, migration may also arise from that original displacement. This is certainly relevant in relation to how youth ambitions, involvement with the land, and employment in rural areas are influenced by education, migration, and technology; all of which are relevant to FTA (FAO, 2018).

About 27% of China’s population lives in the drylands of northern China (DNC), which make up 41% of China’s geographical area (Wu et al., 2014; Li et al., 2016). Due to its enormous size and numerous difficulties with water shortage, ecological deficit, and poverty, the DNC is one of the main regions in connection to sustainable development. The realisation of a harmonious cohabitation between man and environment, the application of the ecological construction idea of experience, and the building of a new structure of human civic society all depend greatly on sustainable development both theoretically and practically (Guo et al., 2022). In order to transform the society, restructure the markets, concentrate on information and technology breakthroughs, and enhance social systems, sustainable development became a part of several international

A. Thrassou

GNOSIS Mediterranean Institute for Management Science,
School of Business, University of Nicosia, Nicosia, Cyprus
e-mail: thrassou.a@unic.ac.cy

and regional programmes (Thrassou, Vrontis, et al., 2022). Sustainability is an effort to reconcile people's life quality with environmental, economic, and societal goals (Vasileiou & Morris, 2006). Sustainable development also entails deliberate initiatives to link science with realistic decision-making and execution.

The relative importance of agriculture in national economies, the current level of intensification in agricultural production, the limitations and opportunities posed by the availability of agricultural resources, as well as the needs of individuals in communities, are just a few of the many considerations that must be made when developing sustainable approaches. Across a range of situations, the configuration of agriculture and the tools for promoting sustainability processes will unavoidably alter. To assist the young people who work in agriculture, increase productivity and production, and reduce agriculture's environmental impact, sustainable agriculture will necessitate ongoing adjustment, innovation, and improvement in strategies, policies, and technology. The primary goals of sustainable agriculture are: (a) enhancing the health of farmers and consumers (through organic farming and food security); (b) preserving the stability of the environment (through biological pest control and fertilisation techniques); (c) working to ensure long-term advantages for farmers; and (d) taking into account the needs of both the present and future generations (Leyva et al., 2021).

The sustainability of this industry is essential since it produces the majority of the world's food, textiles, papers, and building materials (Pashaei Kamali et al., 2017). Young people need to continue living in rural regions and working in agriculture, especially in difficult terrain like drylands, for the sustainability of agriculture and food production (Reddy et al., 2021). Sustainability in agricultural development is defined by the FAO as "the management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations." This type of development protects genetic resources for plants, animals, and the environment while also being technically sound, commercially feasible, and socially acceptable (FAO, 2019). The term "drylands" refers to regions with a high degree of climatic unpredictability, poor soil fertility, sparse and transient

populations, geographic isolation from development infrastructure, weak institutions, low human capital, a wealth of indigenous knowledge, and ethnic and cultural diversity.

The purpose of the chapter is to provide a methodological approach for youth sustainability in dryland areas in order to achieve a balance between social, economic, and environmental objectives. In order to offer a thorough foundation for the sustainability of food and agricultural systems, participants and their involvement in the agri-food supply-chain in drylands are of utmost importance while respecting the objectives of sustainable development.

2 Methodology

The systematic approach will be used because of the chapter's methodological and applied character. The objective of the methodological concepts through a systematic approach is to discover crucial components for youth sustainability in drylands. The development of a conceptual framework, which is reflected in the analysis, improvement of current systems, and creation of an entirely novel one, requires systematic study (Cavallo, 1982). By using system analysis and methodological procedures, it is feasible to tear down the system into its component parts in order to investigate how they interact.

Decision-makers can be assisted by system analytical research to find solutions to their immediate, medium-term, and long-term problems. Anticipatory action and planning are required in the context of climate mobilities to allow forward-looking, solution-oriented approaches (Thalheimer et al., 2022). These can aid in promoting sustainability and resilience in communities in drylands that are impacted by climate change. With regard to both natural (such as atmospheric, biological, and hydrologic) and human systems (such as economic, social, and infrastructural), system thinking recognises the strong ties and interdependencies between various types of systems and their constituent elements (Berry et al., 2018).

System analytical methodologies, which are intrinsically interdisciplinary and multidisciplinary, are ideally suited to understanding climate mobility in many contexts, emphasising that the climate mobility nexus

is deeply anchored in larger challenges of sustainable development and other population dynamics (Hoffmann, 2022). Studying the effects of climate change in drylands on youth mobility, as well as its implications and associated difficulties for origin and destination communities, requires such a broad approach. For instance, the intricately intertwined social, economic, and political systems in a community that are impacted by environmental and nonenvironmental elements shape decisions about (non)migration. Translocal migration networks (Greiner & Saktapolrak, 2013) connect origin and destination regions and make up a separate social system that works closely with other systems.

To solve complex problems and interrelated difficulties, system analytical techniques prioritise integrative thinking (Hynes et al., 2020). Systems can react to inputs in unpredictable ways; this structure also holds true for the effects of climate change on living societies (Gaupp et al., 2021). These are referred to as social consequences (such as limitations of liability) above which the systems can no longer adjust to changes in environmental circumstances, potentially increasing migration (Bentley et al., 2014). It is vital to include players amongst varied partners—from research and policy—in order to produce a greater integration of different viewpoints in the system and its tighter cooperation.

Governmental assistance, international initiatives and finances, and the creation of youth groups can all help to slow the exodus of young

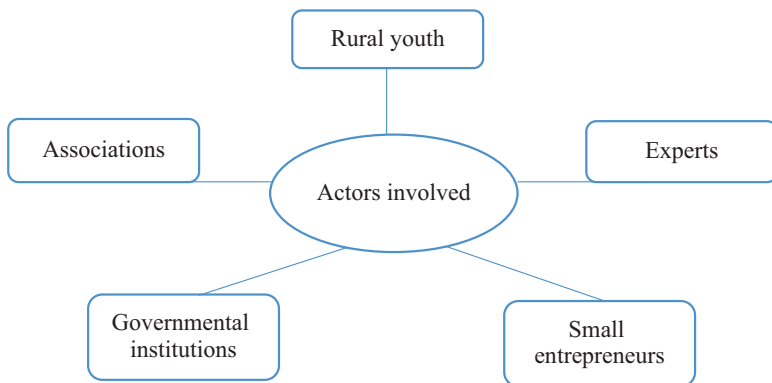


Fig. 3.1 Actors as system components

people from drylands (Fig. 3.1). Young farmers can obtain land, financing, and technical expertise through initiatives and projects for young people, according to Ghanem (2015). Youth cannot make use of the available funding if they are not provided with proper information. As they are undereducated and poorly organised into organisations or economic interest groups, they are frequently unable to participate in supporting programs (Bouzidi et al., 2015). The key players in any global scenario involving dryland investment were identified by United Nations Environment Management System (2011) as follows:

- Government: the sectoral ministries of the state, such as the Ministries of Agriculture, Transport, and Environment, parastatals, and governance at all levels;
- Private: commercial: large-scale farming enterprises, corporations, and companies;
- Family: family farms, herders and livelihoods, small-scale businesses, and the informal sector;
- Public: national and international organisations outside the state pursuing particular agendas, such as nongovernmental organisations;
- Donors: Bilateral and multilateral financial backers of programs and initiatives for international development.

The first step in encouraging young people in drylands to stay in rural regions might be for the state and other actors to provide capacity building for them. Youth education in agricultural drylands is necessary for sustainable dryland systems that enable youth to create respectable and long-lasting livelihoods in rural communities based on agriculture. In order to empower individuals and make them accountable for providing possibilities, research and development are being done on a mentorship model that might be used as the next step between public authorities and rural youth.

The institutions that control agricultural production—deciding what is produced, who produces it, with what kinds of technology and techniques, and to what degree—are crucial levers for controlling the kind and distribution of the goods and services that may be generated from agriculture. The advantages derived from such services range across many

geographical dimensions, from individual farmers to landscape/watershed or local levels, to national and global levels, and they may be immediate, near-term, or long-term in nature.

These must be founded on equitable, accessible, and inclusive knowledge creation, transfer, and implementation systems that engage a variety of stakeholders, including those from the communities most directly impacted by the effects of climate change (Piguet et al., 2018). The key to effectively integrating academics from other areas as well as from varied geographical and economic origins is to establish more equitable funding schemes and research collaborations as well as to invest in science and education. Additionally, multistakeholder collaborations and participatory methods may help enable evidence-based decision-making that is pertinent to local settings and involves participants from academics, the public, and commercial sectors (Lemos, 2015).

3 Sustainable Development Goals (SDG)

It is anticipated that climate change would have significant socio-economic repercussions and pose a significant challenge to achieving equitable and sustainable development in drylands. Climate change, unexpected severe weather, biodiversity loss, soil erosion, land degradation, and water pollution have all had an impact on agriculture and the food chain. All definitions of agricultural vulnerability, regardless of variations, essentially incorporate exposure, sensitivity, and adaptation capability (Rao et al., 2019). The type and extent of a system's vulnerability to climatic fluctuations are defined here as vulnerability. In the literature on rural distress, vulnerability is frequently mentioned (Gallai et al., 2009; Khan et al., 2021).

The ability to adapt is essential for adjusting risk exposure, risk absorption, and the capacity to recover from exposure-related losses. The tendency or predisposition to suffer damage is another definition of adaptive capability. Therefore, it is crucial to decrease sensitivity and increase the adaptive capability of local populations in order to reduce vulnerability stress. The capacity to adapt varies between settings and systems and is tightly correlated with aspects related to infrastructure, institutions,

communities, social, political, economic, educational, health, technological, and cognitive factors (Chauhan et al., 2020).

As part of the Sustainability Assessment of Food and Agriculture (SAFA) systems, organisations involved in the global agri-food supply chain will be assessed in order to provide a comprehensive framework for the sustainability of food and agricultural systems (FAO, 2014). For example, by limiting warming to 1.5 °C, various regions can significantly lower hazards, which would significantly lessen the pressure on impacted populations to migrate (Thalheimer et al., 2021).

The Sustainable Development Goals (SDGs) announced by the United Nations in 2015 and the difficulties encountered by rainfed agriculture are intertwined. SDGs 1 (no poverty), 2 (zero hunger), 13 (action on climate change), and 15 (life on land) are incorporated into this area (Raghavan et al., 2018). The SDGs and the potential contributions that citizen science can make to their fulfilment have drawn more and more attention in the last five years from the subject of scientific research (Parkinson et al., 2022).

CGIAR focuses on agricultural research for development, and its work helps the world struggle against issues including hunger, poverty, serious nutrient deficiencies, and environmental degradation. According to the CGIAR Strategy and Results Framework 2016–2030, it will directly contribute to the realisation of the Sustainable Development Goals (SDGs) set out by the United Nations: reducing and adjusting to the risks and shocks of climate change, enhancing the institutional and policy framework that promotes inclusion of youth, as well as developing the ability of national partners and beneficiaries (Fig. 3.2).

Achievements in many different fields might be threatened by climate change. These accomplishments include, among others, those related to the Sustainable Development Goals (SDGs) on ending poverty (SDG1), achieving food security (SDG2), promoting health (SDG3), promoting gender equality (SDG5), ensuring access to clean water and sanitation (SDG6), reducing inequality (SDG10), improving working conditions (SDG8), and promoting peace, justice, and strong institutions (16).

The identification and maintenance of a balance between the social, economic, and environmental goals of agriculture as well as between agriculture and other economic sectors is seen as an ongoing process toward

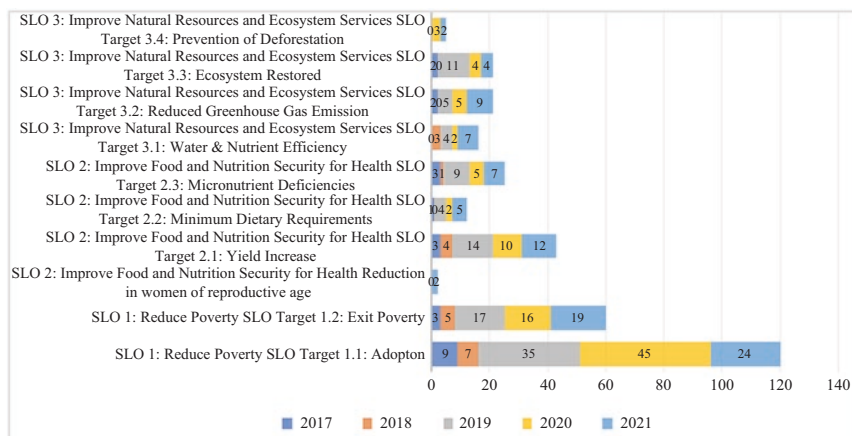


Fig. 3.2 Contribution to the SDG. (Source: CGIAR database access 30.01.2023)

promoting sustainability in food and agriculture (Diagram 3.1). The procedure is a reflection of how society's values and body of knowledge have changed over time, which has a significant influence on how sustainability objectives are actually created. This suggests a significant, complex, and dynamic system of interactions with several access points. There are hard and soft boundaries that human and natural systems must operate within for the process as a whole to be sustainable. Within this complex system, specific constraints and natural and socio-economic boundaries will define what falls into the sustainable operating space.

4 Agricultural Production by the Youth in Drylands

The majority of people who reside in rural regions of many developing nations, particularly those in Sub-Saharan Africa (SSA), struggle with poverty and food insecurity (AGRA, 2020; Bello et al., 2021; FAO, 2014). According to statistics, more than 34% of South Africa's workforce is jobless (Statistics South Africa, 2021). This is true despite the introduction and execution of a number of policies and programmes, including the Expanded Public Works Program, the Growth, Employment

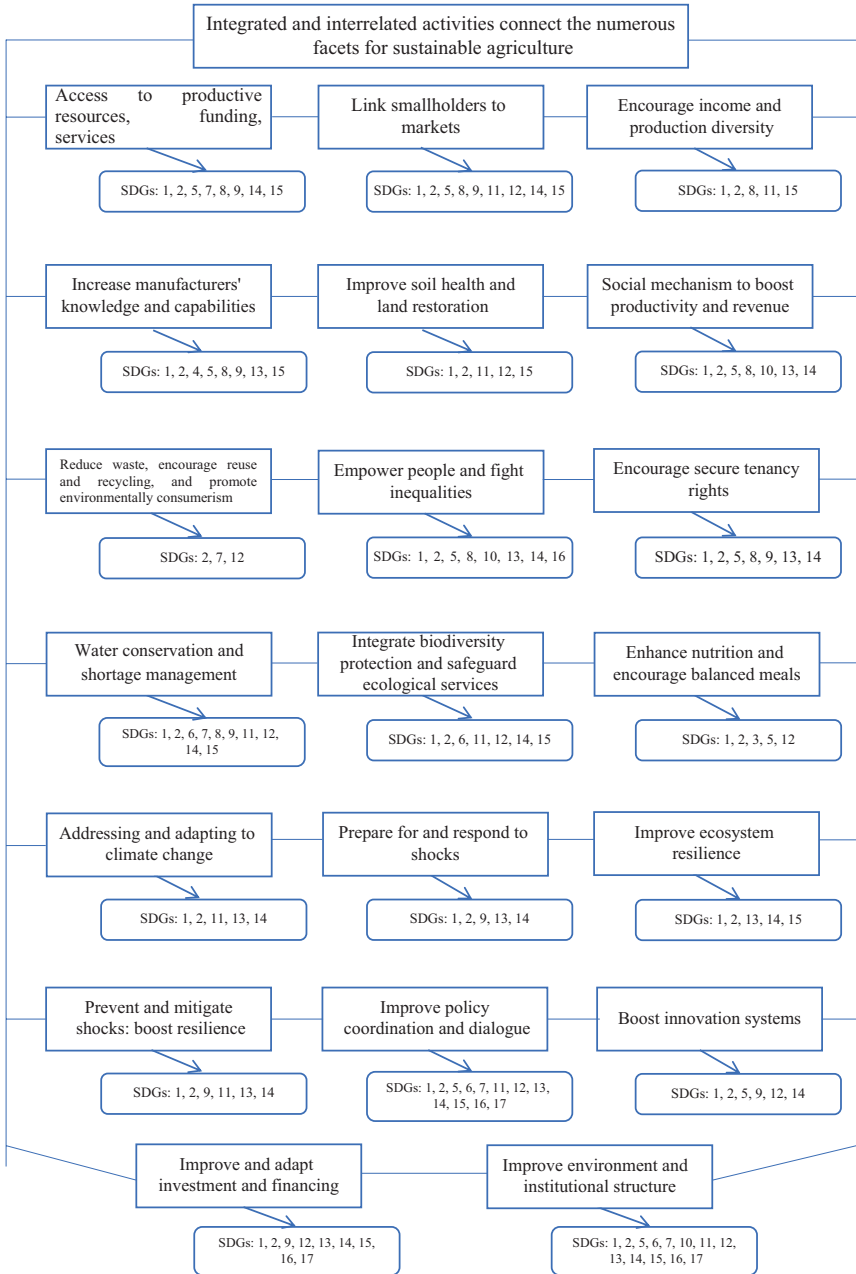


Diagram 3.1 Integrated activities related to sustainable agriculture, authors work according to FAO

and Redistribution Policy, the National Development Plan Vision 2030, and the Employment Tax Incentives Bill (also known as the Youth Wage Subsidy). These programmes were put in place to boost economic development and address a number of socioeconomic issues, such as unemployment, inequality, and poverty. However, these issues are still a constant, particularly for the underprivileged and young people.

There is a need for more disaggregated data regarding various youth—in terms of age, gender, and so on—in order to better understand the heterogeneity of young people and be able to build suitable and successful policies and programmes for promoting sustainable livelihoods (Bennell, 2017; Grant & Furstenberg, 2007; Senders et al., 2014). Even in the long run, it is uncertain that enough jobs will be created to accommodate all of the active job searchers due to the pandemic's effects and the economy's persistently weak growth rate. Due to this, government officials, academics, and politicians have recognised self-employment as a viable option to help reduce unemployment, particularly among young people.

According to the theory of bounded rationality (TRB), social validation (how people support or disapprove of a certain activity/choice) and perceptions (how people around you see a specific situation/activity/choice) influence the response to a choice/action (Fishbein & Ajzen, 2011; Montano & Kasprzyk, 2015). Youth are persons who primarily take their inspiration and goals from the accomplishments, views, and practical experiences of people around them, therefore how they view agricultural-related economic activities and what other people think about agriculture affects how they make decisions.

The principal economic activity in rural regions is agriculture, which has the ability to provide rural youth with employment opportunities. The youth, however, view agriculture as a part-time job rather than a career or means of support. Studies show that people view agriculture as a low status, labour-intensive, and undesirable occupation (Geza et al., 2021; Irungu et al., 2015). Because they view non-agricultural occupations and off-farm work as more stable, giving comparatively more pay, and demanding less physical effort, youth choose them (Bello et al., 2021; Rietveld et al., 2020)

Eight broad categories can be used to organise the youth's biggest problems (Endris et al., 2022): (1) regional norms and customs, (2) finances, (3) technical capacity and education, (4) market and infrastructure, (5) economic, (6) administration and policy-related issues, (7) environmental issues, and (8) others. For the growth of rural people as well as the regeneration of the sector, it is essential to create the conditions for young people in rural areas to actively engage in the agricultural value chain. This is due to the fact that participating in these activities might have benefits that go beyond just them. The backward and forward interconnections will have a variety of positive implications for the larger community, including the creation of job opportunities and the improvement of skills. The increasing demand for raw materials (farm products) and technical skills necessary for companies throughout the agricultural value chain are only a couple of the possible investment possibilities that might be sparked by backward linkages. Value-adding operations will make food more easily accessible to rural customers thanks to the forward connections. A favourable environment for agricultural operations will be created by these connections taken together.

Arslan et al. (2021) and Bello et al. (2021) also made note of the fact that youth inherently possess special cognitive abilities and admirable qualities (like creativity, innovative thinking, and adaptability) that are essential for the transformation, growth, and sustainability of the agricultural sector in drylands. In order to reduce rural youth unemployment and improve the inadequate succession plan in smallholder agriculture, it is crucial to identify the agricultural activities that rural youth would be interested in participating in as well as the variables that enable and restrict their involvement.

Dryland systems are diverse, and the development issues they provide differ. Mitigating vulnerability or risk and boosting resilience are the main challenges facing dryland livelihood systems. It is important to locate and seize possibilities for production intensification in situations where the environment drives output in response to market and human opportunities. The likelihood of such livelihood systems is centred on linking to economic growth, equality, and environmental sustainability as well as agricultural production.

There is a need for technical ad-hoc training on livestock (fodder, breeding, vaccinations), the sustainable use of crop production inputs (seeds, fertilisers, plant protection products), and so on to support livelihoods in drylands. Youth should also be educated on how to better organise their production in rural areas. On their family farms, young people are also not frequently involved in decision-making, which demotivates them from implementing their ideas in rural regions. Rural youth in drylands would be able to assess their production potential and make a better assessment of variables indicating the success or failure of production activities by obtaining more organisation in the fulfilment of production activities. Control over work processes and a database of previous company results need to serve as the foundation for good decision-making assistance.

In pastoral and agropastoral areas, general recommendations to increase youth involvement in agriculture may include: (1) developing infrastructure and regulatory interventions, as well as specific training in agricultural practises aimed at and engaging youth, (2) expanding access to youth-friendly credit and saving, (3) encouraging agripreneurship training and business startups, and (4) ensuring the availability of locally tailored and gender-responsive rural finance (Endris et al., 2022).

Controlling or managing the farm may be made easier by keeping track of production processes, specific farm operations, and costs associated with those activities. The subsequent decisions made in the field are crucial for the planning and control of production operations and should be treated with great care and in light of well-planned future actions. The financial statements' economic data, which portrays the farm's financial situation, is crucial for the farm's future management.

Depending on the type of farm, records on farms provide better projections of future activities. These reports have to highlight a genuine representation of the farm company, pinpoint key production phases and the requirement to implement specific changes through improved production activity organisation, which would have the impact of enhancing the financial outcome.

A barrier to the development of agriculture in drylands is the lack of accurate data on the production and operations of agricultural holdings and the undereducation of agricultural producers. In the future, it will be

necessary to work on the creation of a system that would gather the required data and create an information base for creating quality measures of agricultural policy in drylands, as well as educate the young agricultural producers.

5 Ensuring the Sustainability of Young People in Dryland Agriculture

Sustainability has been viewed as requiring innovation as a key component. However, because it creates a competitive edge in the agri-food industry and adds value to the food supply chain, innovation has turned into a financial opportunity for managers. With measurable benefits on profitability or sustainability, innovation may help food firms with a variety of problems or obstacles. Numerous innovations have been put into place along the agri-food supply chain to reduce costs, implement new technologies, improve food quality, develop new products, adhere to the best manufacturing or hygiene practices, guarantee cleaner production, optimise processes, implement lean manufacturing, highly valorise food by-products, recycle food waste, recover energy, and so on.

In another line of reasoning, Bigliardi and Galanakis (2020) analysed innovation classification in the food business. They identified a few food sector innovation models, focusing on food innovation examples motivated by sustainability (e.g., food waste recovery, packaging materials, or modern sanitation). Effective investment and gaining local and regional economic and environmental advantages will depend on involving young people in all their diversity—women, men, and individuals with different (dis)abilities and other qualities. Particularly, there are enormous unmet demands and potential to invest in more locally relevant, climate-smart education, technical and vocational training, and pathways for young people in the drylands into respectable employment. This is particularly true for young people from pastoralist communities, whose access to educational and training programmes has, up until now, been incredibly limited.

Young people themselves might be influenced to choose new career options, both inside and outside of agriculture and pastoralism, that is, their impression of the “opportunity spaces” available (Dupar & Lovel, 2021). Importantly, decision-makers and practitioners in the field of development may recognise and capitalise on the many opportunities that are present to promote economic growth in the drylands. This includes attracting investment for some of the priorities, like renewable energy production (including solar, geothermal, and wind power) and new and green technologies, which would all increase the actual “opportunity spaces” or job prospects for young people. It also includes the tourism, processing, and service industries, as well as new livelihood opportunities in urban centres.

To overcome the lack of experience, young farmers require access to the correct knowledge (Diagram 3.2). Advantages comprise integrated training techniques that meet their requirements rather than the number of technical education or extension services that may be insufficient. While contemporary information and communication technologies (ICTs) (such as mobile phones, laptops, and the Internet) are appealing to young people, there are numerous features to their usage, such as illiteracy, cost, and restricted Internet coverage. Initiatives or activities that aim to encourage youth interests and comparative advantages, such as farm fellowships for further agricultural education or business development and management combined with financing for young people are from big importance. Crises are often the driving force of change, be it technological, social, economic or other (Vrontis et al., 2022; Thrassou, Efthymiou, et al., 2022).

The development of rural groups may be beneficial to young people because they provide economies of scale for purchasing food production, access to land as well as other resources, a platform to sell products and share knowledge, and a stronger voice for policy engagement. Partnerships are integrated and structured in order to engage with young people entering agriculture. These collaborations must be open and consistent from the municipal to the regional planning agencies, organisations, private sector, and donor agencies.

Development organisations and actors operating in the drylands should consciously seek out young people, especially those with

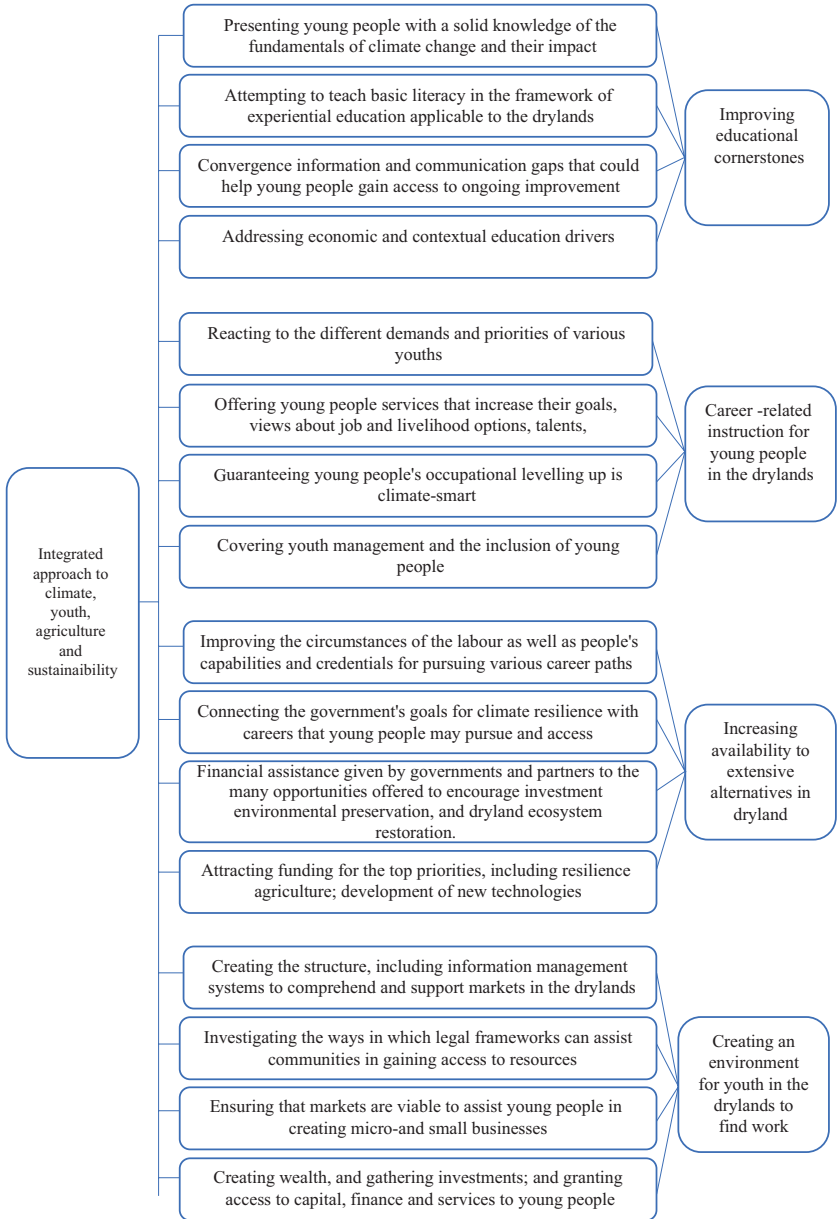


Diagram 3.2 Integrated approach towards sustainability, drylands and agricultural youth

pastoralist origins, to consult, collaborate with, and develop their leadership and decision-making abilities. Natural resources (such land and water) must be accessed or owned in order for rural youth to actively participate in a typical agricultural activity (Geza et al., 2021). Additionally, one has to have access to financial resources so they may buy the tools, services, and technology needed to successfully launch and oversee agricultural operations along the value chain. Additionally required are the abilities, education, and understanding required to manage and conduct such tasks. Due to their underrepresentation in policy-making processes, young people from rural, dryland backgrounds, particularly those with a pastoralist upbringing, do not have their needs, priorities, vulnerabilities, and talents taken into consideration.

The identification and maintenance of a balance between the social, economic, and environmental goals of agriculture as well as between agriculture and other economic sectors are seen as an ongoing process towards achieving sustainability in agriculture in drylands (Diagram 3.3).

6 Conclusion

Agriculture in drylands requires integrated strategies that link the social and environmental challenges that farmers there must overcome. In order to reduce rural youth unemployment and improve the inadequate succession plan in smallholder agriculture, it is crucial to identify the agricultural activities that rural youth would be interested in participating in as well as the variables that enable and restrict their involvement.

In the dryland regions, there are additional chances to help young people making the transition to an agroecological system. Cooperation and social support networks, natural resources, the potential of agroecology for livestock production, strategic livestock market locations, and the potential of natural resources can all be mobilised and tapped to promote successful agroecological transition and guarantee food security in the study locations. To accurately depict the difficulties of agricultural production in drylands and the impacts of climate change on agricultural productivity, all of this should be taken into consideration.

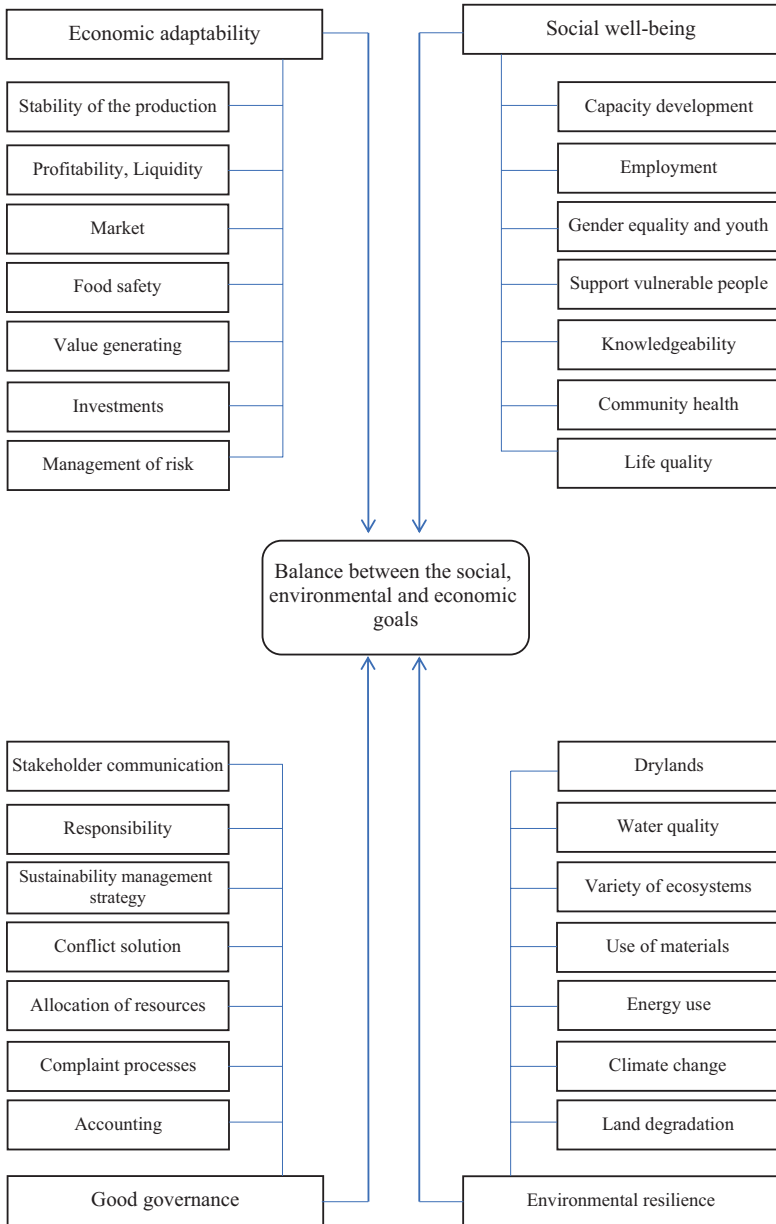


Diagram 3.3 Balance between the social, environmental, and economic goals

More comprehensive proposals for actions that contribute to the sustainability of young people in drylands include: enhancing the educational foundations for decent work by teaching fundamental literacy and numeracy in the context of applied learning that is relevant to the drylands; ensuring that young people have a solid understanding of the fundamentals of climate change and its implications; addressing the socioeconomic and culturally specific drivers of school absence; bridging information and communication barriers that might provide young people access to lifelong learning; modifying lesson plans to take pastoralist communities' unique needs into consideration.

Even in the long term, it is improbable that enough jobs will be created to accommodate all of the active job searchers due to the pandemic's effects and the economy's persistently weak growth rate. For this reason, self-employment has also been highlighted by policymakers, academics, and government officials as a viable way to help reduce unemployment, particularly among young people.

The corresponding importance of agriculture, the level of agricultural production intensification currently in place, the opportunities and constraints posed by the availability of agricultural resources in drylands, as well as the needs of individuals in communities, must all be considered when developing sustainable approaches. It is essential that the configuration of agriculture and the tools for promoting sustainable processes will change depending on the circumstances. In order to assist the youth who are involved in agriculture in drylands and to optimise productivity and production, sustainable agriculture will require ongoing adjustment, innovation, and development in strategies, policies, and technology.

For the growth of rural people as well as the rehabilitation of the drylands, it is essential to create the conditions for young people in rural areas to actively engage in the agricultural value chain. This is due to the fact that participating in these activities might have benefits that go beyond just them. Through the backward and forward links, there will be several advantages for the larger community, including multiple spill-over impacts including job creation chances and skill development.

A continuing process towards attaining sustainability in the agricultural sector in drylands is the identification and maintenance of a balance between the social, environmental, and economic goals as well as between

agriculture and other economic sectors in drylands. The integrated approach emphasises the need for a shift in public attitudes and knowledge base.

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