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Examining the Impact of Drought on Farmer Rights in South-Central Mindanao, Philippines.

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ABSTRACT

This study investigated the impacts of the 2015-2016 drought on farmers' rights in the Cities of Koronadal and Kidapawan, South-Central Mindanao, Philippines. The research design utilized a combination of methods, including a literature review, surveys, and focus group discussions with farmers in the study areas from July 2017 to February 2018. The study found that the drought significantly impacted the environment, economy, and society. The drought in 2015-2016 resulted in reduced crop yields, income loss, and food shortages for farmers. Moreover, a significant association was found between water shortages and crop damage due to diseases and insect infestations, which caused a decline in the market value of farm produce, thereby undermining farmers' fundamental rights. This study highlighted the significant cascading effects of drought on farmers' rights, including their rights to water, livelihood, food, health, information, peace, security, property, the ability to save and sell farm produce,

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and life. Effective policy interventions leading to sustainable livelihood programs, including strategies such as water resource management, livelihood diversification, and promotion of drought-tolerant farming systems, are needed to help farmers cope with drought and build resilience against future water scarcity. In conclusion, the study underscores the urgent need for effective policy interventions to address the risks and vulnerabilities associated with drought and to protect farmers' rights to water and their ability to sustain their livelihoods.

Introduction

Drought can severely impact the environment, economy, and society, particularly in areas where water scarcity is already a concern. The United States Geological Survey (USGS, n.d) refers to drought as a period of dry conditions that surpass normal levels and results in water-related challenges. Drought is characterized by a prolonged span of abnormally arid weather that leads to a significant hydrological imbalance (IPCC, 2012).

In agricultural communities, drought can cause crop failure, loss of livestock, and economic hardship for farmers (Kogan et al., 2019). Furthermore, water shortages resulting from drought can impact public health by limiting access to safe drinking water and increasing the risk of water-borne diseases (UN, 2021). Kanyama-Phiri (2021) stated that droughts can cause food shortages, water scarcity, and economic losses, affecting people's overall well-being. This calamity can lead to malnutrition, poor health, and increased poverty, resulting in social and political unrest. In their study, Ahmad et al. (2022) reported that frequent droughts negatively impact agronomic production and livestock-based livelihoods for smallholders in drought-prone areas.

SEARICE 2018 (the Southeast Asia Regional Initiatives for Community Empowerment) highlighted the significance of farmers' rights as fundamental human rights. As per Article 3 of the Universal Declaration of Human Rights, every individual is entitled to the right to life, liberty, and security of person. This right implies that people have an inherent right to live without fear of violence, coercion, or arbitrary deprivation of their freedom. They also have the right to be safeguarded by the law and the state against threats to their physical safety and well-being. Beitz (2009) emphasized that human rights are crucial because when a government fails to fulfill its obligations, it becomes necessary to take remedial or preventive

action. This action primarily addresses issues within individual societies but may also extend to other societies. Therefore, the practical significance of human rights lies in their ability to ensure that governments are held accountable for protecting their citizens' fundamental rights and promoting greater respect for these rights both domestically and internationally.

In the 1980s, concerns were raised regarding farmers' intellectual property rights, which were disregarded and violated, leading to the concept of farmers' rights. According to the Food and Agriculture Organization of the United Nations (FAO), in 2009, the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGR) was developed to address farmers' rights concerns. The treaty outlines the following rights of farmers: the right to save, use, exchange, and sell farm-saved seeds and other propagating materials; the right to participate in decision-making processes related to the conservation and sustainable use of plant genetic resources; the right to fair and equitable sharing of benefits arising from the use of plant genetic resources; and the right to protection of traditional knowledge (ITPGRFA, 2004). The FAO defines farmers' rights as "the rights arising from the past, present, and future contributions of farmers in conserving, improving, and making available plant genetic resources, particularly those in the centers of origin/diversity" (FAO, 2010).

In the 2018 SEARICE report, farmers' rights in the Philippines have long been associated with the farmer's "right to seeds." However, SEARICE, an organization that advocates for farmers' rights and sustainable agriculture in Southeast Asia, has recognized that this right can only be effectively realized if other farmers' entitlements are secured. During a forum with farmers, SEARICE identified several other rights that constitute farmers' rights besides the "right to seeds." These rights include access to land and water, recognition of the rights of women farmers, marketing opportunities for and information on organic products, appropriate technology, a healthy environment (including clean air, land, and water), participation in governance processes, access to support services (such as information, irrigation facilities, post-harvest facilities, credit, social security services, and healthcare), and the right to life (including protection against human rights violations).

The abovementioned definition and concepts of farmers' rights do not fully account for the impacts of climate change, including droughts or extreme weather events. Given that droughts continue to affect farmers' livelihoods in the Philippines, it is crucial to acknowledge

the significant role of farmers' rights in addressing these challenges and protecting their well-being. Santilli (2012) highlighted the vital role of farmers' rights in promoting agrobiodiversity conservation and sustainable utilization. These rights encompass various aspects, including access to land, water, natural resources, energy, appropriate technology, education and healthcare, agrarian reform, political participation, and freedom of association.

Even though there is a growing body of literature on the impacts of drought on farming livelihoods, several research gaps still need to be addressed, including the cascading impacts of drought on farmers' rights and policies that govern farmers' rights during droughts. Ruwanza et al. (2022) argued that smallholder farmers, as one of the most vulnerable groups, require more scientific information on the impacts of drought and appropriate response measures. El Niño is a significant contributing factor to drought conditions in the country (Jaranilla-Sanchez et al., 2011), which can lead to increased dryness (Hilario et al., 2010). Wilhite and Glantz (1985) emphasized that drought is a multifaceted phenomenon that involves a prolonged period with little or no precipitation, which can result in significant societal consequences. On the other hand, the Intergovernmental Panel on Climate Change (IPCC) (2014) defined drought "as a period of abnormally dry weather that persists long enough to cause a water shortage." The impacts of drought on different regions and sectors vary depending on factors such as frequency, severity, degree, and vulnerability of the affected area, as Dellal and McCarl (2010) noted. Drought can have widespread socio-economic and environmental impacts on farming communities (Udmale et al., 2014; Ruwanza et al., 2022). The effects of drought are particularly prevalent in communities that rely on agriculture and can extend to different sectors (Wilhite and Glantz, 1985). Drought can impede the agronomic production of smallholders, resulting in significant reductions in crop yields and severe economic impacts that lead to prolonged distress in livelihood and finances (Ahmad et al., 2022; Ray et al., 2018). Drought events increase farmers' vulnerability, especially for those whose livelihood sources mainly depend on weather conditions. Lack of water availability for agriculture and food production affects farmers' livelihoods. Moreover, as mentioned by Algur et al. (2021), drought exacerbates the burden of work on women and children, compelling them to adopt various strategies to cope with the challenges posed by such events, including education, nutrition, health, sanitation, and safety issues.

Due to the El Niño phenomenon, the Philippines experienced a severe drought from 2015 to 2016, which lasted for several months and significantly impacted Mindanao and Visayas. According to the International Federation of Red Cross and Red Crescent Societies (2016), 42 percent of the country was affected, with 39 provinces, cities, and municipalities declaring a state of calamity. The drought affected approximately 181,687 farmers and 224,834 hectares of agricultural land (UN OCHA, 2016, cited in IFRC, 2016), with South-Central Mindanao's provinces of North Cotabato, South Cotabato, and Sultan Kudarat among the worst-hit areas. The situation in the cities of Koronadal and Kidapawan was calamitous, with significant losses and crop damage reported. In Koronadal, losses reached more than Php 32 million, affecting 3,278 hectares of land, of which 2,168 hectares were planted with rice (Fernandez, 2016). In Kidapawan, crop damage amounted to Php 30 million, and over 11,000 families were affected, equaling 25 percent of the city's total residents (Drought-hit South Cotabato declares state of calamity, 2016).

Recurring episodes of drought disrupt farmers' livelihoods, disrupting farmers' rights. Effective management of drought requires a multidisciplinary approach that considers the ecological, social, and economic dimensions of the problem. Therefore, this study examined how the 2015-2016 drought impacted farmers' livelihoods and rights in Koronadal and Kidapawan, located in South-Central Mindanao. It examined the interplay between the impacts of the drought, farmers' rights, and livelihoods. The findings provide valuable insights into the difficulties confronted by farmers in drought-prone regions in Mindanao and underscore the importance of protecting their rights and livelihoods. In numerous instances, farmers, particularly those in developing nations, are the most susceptible to the effects of drought since they depend on rain-fed agriculture and have restricted access to resources and technology.

Objective(s)

The study aimed to achieve the following objectives:

- examine the historical trends of drought in the study area;
- investigate the environmental, economic, and social impacts of drought on farmers; and
- assess the extent to which the cascading impacts of drought have resulted in the

violation of farmers' rights in the study area, as well as identify the adaptation strategies, both current and potential, to protect their rights and livelihoods.

Methodologies

Study location and a brief description

The study was conducted in 2017-2018 in Koronadal and Kidapawan, two cities in South-Central Mindanao, Philippines (Figure 1). These sites were selected due to the significant impact of the 2015-2016 drought and the lack of research that links drought impacts with farmers' rights in the area. Farming is the primary source of livelihood in both cities, and the primary crops produced in Koronadal City are rice, corn, and coconuts. In contrast, the City of Kidapawan produces rice, corn, fruit, and rubber.

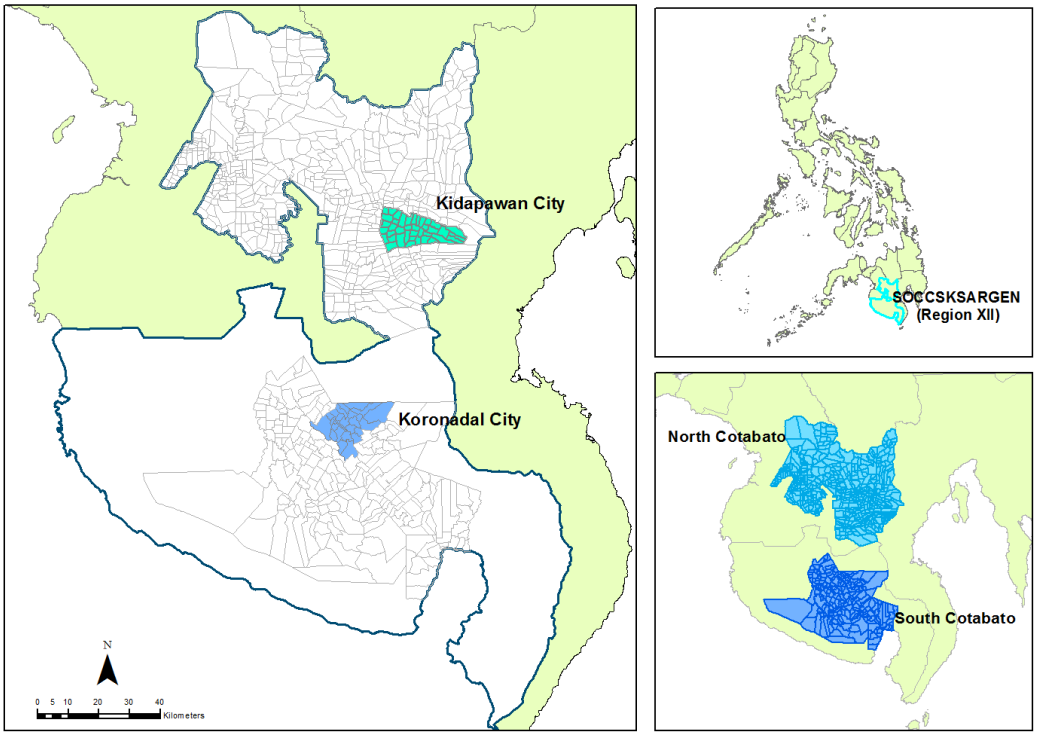

Figure 1. Location map of the study sites in South-Central Mindanao, Philippines

City of Koronadal, Province of South Cotabato

Koronadal City is the administrative regional center of Cotabato Region 12 in Southcentral Mindanao and the capital of the province of South Cotabato (Philippine Statistics Authority, 2017). It is located in the northeastern part of South Cotabato Province. It is bounded by Tantangan, Banga, Tupi and Tampakan municipalities in South Cotabato and Lutayan in Sultan Kudarat. Its latitude ranges from 6 degrees 24 minutes to 6 degrees 34

minutes north, and its longitude ranges from 124 degrees and 47 minutes to 124 degrees and 58 minutes east. The city is landlocked, covering 27,700 hectares, which accounts for about 8.41 percent of South Cotabato's total land area (City Government of Koronadal, 2009). As of May 2020, the city comprises 27 barangays and has a population of 195,398 (Philippine Statistics Authority, 2020). The city is approximately 58 kilometers from General Santos City, which can be reached in about one hour.

The City of Koronadal has a Type IV climate classification, characterized by an even distribution of rainfall throughout the year, with no pronounced maximum rain period (City Government of Koronadal, 2023). This climate condition is favorable for agriculture, where the city's economy is primarily based. Common crops grown in the area include rice, corn, high-value crops, root crops, and ornamentals. Rice, corn, and coconuts are the major crops in land area production. However, the city is susceptible to various climate hazards, including drought, intense heat, heavy rainfall, landslides, and flash floods. These hazards significantly affect the farmers' commodity products, making it challenging to sustain their livelihoods.

City of Kidapawan, Province of Cotabato

The City of Kidapawan is located in the southeastern part of Cotabato province and lies at the base of Mt. Apo, the highest mountain in the Philippines. The city covers a total land area of 34,007.20 hectares. Of this area, approximately 5,036.4 hectares are classified as timberland according to cadastral surveys. Kidapawan generally has a Type III climate, characterized by a relatively even distribution of rainfall throughout the year and a short dry season lasting only one to three months between December and February or from March to May, and there is no distinct maximum rain period in the area. However, three barangays - Balabag, Perez, and Ilomavis - are classified as Type IV, with a more evenly distributed yearly rainfall. The city is predominantly agricultural, with approximately 79 percent of the total land area dedicated to agricultural use. Agriculture plays a significant role in the city's economic progress. The city's climate is ideal for growing a variety of crops, including cereals (rice and corn), vegetables, fruit (such asent lanzones, durian, mangosteen, and rambutan), coconuts, root crops, and legumes (City of Kidapawan Comprehensive Landuse Plan, 2016). As of 1 May 2020, the population of the City of Kidapawan was 160,791, according to the 2020 Census of Population and Housing conducted by the Philippine Statistics Authority (PSA, 2020).

According to news reports, both Koronadal and Kidapawan were declared under a state of calamity due to the 2015-2016 drought (Drought-hit South Cotabato declares state of calamity, 2016; Fernandez, 2019). In Kidapawan, the drought resulted in a rally from 29 March to 1 April 2016, where around 6,000 farmers gathered on the highways to demand rice rations (Lacorte et al., 2016). However, the rally turned violent, resulting in the deaths of two protesters, according to the Commission on Human Rights of the Philippines (2016).

Research design and data gathering

Before the research, courtesy visits were made to the local government units of both study sites on April 18-19, 2017. Study permits were secured after submitting letters requesting permission from appropriate government offices. The research used a mixed approach, combining quantitative and qualitative methods for primary data collection from July 2017 to February 2018. Stratified random sampling methods were used in the survey to select 101 (53 percent) farmer respondents from the City of Koronadal and 90 (47 percent) from the City of Kidapawan for a total of 191 respondents within upland, midland, and lowland communities. Quantitative data were collected through a structured and semi-structured household survey, and information on the impacts of the 2015-2016 drought events was gathered from the respondents, including how these impacts affected the farmers' rights. Drought impact variables were categorized into environmental, social, and economic impacts, and the study assessed how these impacts affected farmers' rights. In complementing the survey data, qualitative data were collected through focus group discussions (FGDs) with farmers and local government personnel. An impact chain diagram was utilized as a participatory tool during the FGDs.

The study investigated how drought impacts farmers' livelihoods and their rights rooted in the concept of "farmers' rights" promoted by the SEARICE and the FAO.

Four questions were raised during the FGD, including the effects of drought on farming livelihood sources, the meaning of farmers' rights, the needed resources to satisfy farmers' rights, rights violations, and the policies required to protect farmers' rights. The research study developed and tested a multidimensional framework called VICA (Vulnerability-Impacts-Capacities-Adaptation) to capture inherently multiple dimensions, including their intersection

with human rights and policymaking. The VICA framework is a comprehensive approach that integrates quantitative and qualitative methods to assist in formulating adaptation plans. Its purpose is to address the challenges of inadequate preparedness, management issues during the disaster, and recovery measures after the disaster. This framework has been used in this paper specifically on the impacts of the 2015-2016 El Niño and identifying potential adaptation strategies in South-Central Mindanao, particularly in Kidapawan and Koronadal.

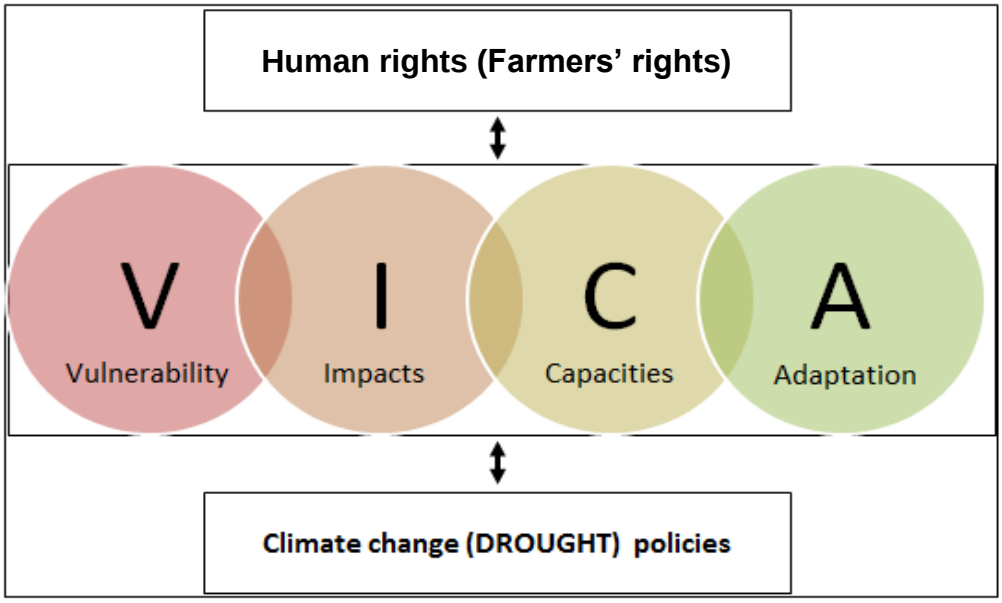

Figure 2. A VICA multidimensional framework (Vulnerability-Impacts-Capacities-Adaptation) with the intersection of human rights/farmer rights.

Data analysis

The study utilized both quantitative and qualitative methods to analyze the collected data. Qualitative analysis was employed to examine the effects of drought on farmers and their coping mechanisms, investigate the socio-demographic characteristics of the participants, and the implications of drought on farmers' rights and livelihood security. The study utilized the Extended Mantel-Haenszel (Cochran-Mantel-Haenszel) test to examine potential linear associations between the impacts of drought on the right to livelihood variables. If a significant association was found between a particular pair of variables, further analysis was conducted to determine the strength and direction of the association. The strength and direction of the association were then

Results and Discussion

1. Trends in Drought Occurrence in the Philippines: A Historical Analysis

During the survey, the respondents in both cities were asked about the frequency of drought in their areas from 1950 to 2016. Many respondents had difficulty tracing drought occurrence in their area since 1950, but most respondents reported experiencing drought every decade from 1950 to 2016, usually lasting from 3 to 9 months. In 2015-2016, farmers in both cities experienced a particularly severe drought that lasted about seven months. This drought resulted in significant crop losses and financial hardships for many farmers at the study sites. Secondary information was collected from the National Oceanic and Atmospheric Administration website (http://www.cpc.noaa.gov) to validate the survey results. The website indicated that 19 episodes of drought were reported in the Philippines from 1951 to 2016. As shown in Table 1, eight (8) were categorized as weak, three (3) as weak to moderate, six (6) as weak to strong, and two (2) as moderate to strong. In the Philippines, the Mindanao region has experienced the most severe droughts recently, including in 1997-1998, 2009-2010, and 2014-2016. In 2019, Mindanao was again hit by severe drought for seven months, according to Gotinga (2019).

Table 1. Decadal Trends in Drought Episodes in the Philippines from 1951 to 2016, along with the corresponding duration, severity, and affected areas.

Decades	Specific year*	Severity	Duration (months)*	Affected areas in the Philippines
1950s	1951/1952	Weak	7	
	1953/1954	Weak	13	
	1957/1959	Weak to strong	21	
1960s	1963/1964	Weak to moderate	8	
	1965/1966	Weak to strong	11	Nationwide, with the Bicol region as most severely affected**
	1968-1969	Weak	14	

Decades	**Specific year***	**Severity**	**Duration (months)***	**Affected areas in the Philippines**
1970s	1972-1973	Moderate to strong	11	Central Luzon, Palawan, Visayas, and Mindanao**
	1976-1978	Weak	11	All areas in Mindanao except Davao areas**
	1979-1980	Weak	5	
1980s	1982-1983:	Weak to strong	15	Western and Central Luzon, provinces in Southern Tagalog, Northern Visayas, Negros Occidental, Iloilo, Bohol, and Western Mindanao
	1986-1988	Weak to strong	18	Bicol Region, Southern Negros, Cebu, Western Mindanao, Mainland Luzon, and Central Visayas**
1990s	1991-1992	Weak to strong	14	Manila, as well as the regions of Central and Western Visayas and Cagayan Valley, including Mindanao**
	1994-1995	Weak	6	
	1997-1998	Moderate to strong	13	Approximately 70 percent of the Philippines was affected by severe drought,** leading to crop losses and water

Decades	**Specific year***	**Severity**	**Duration (months)***	**Affected areas in the Philippines**
				shortages in many areas.
2000s	2002-2003	Weak to moderate	9	
	2004-2005	Weak	10	
	2006-2007	Weak	5	
2010-2016	2009-2010	Weak to moderate	10	
	2014	Severe	6	Mindanao
	2015-2016	Weak to strong	14	The following provinces were affected by severe drought: Palawan, Negros Oriental, Siquijor, Zamboanga Del Norte, Zamboanga del Sur, Zamboanga Sibugay, Bukidnon, Camiguin, Lanao del Norte, Lanao del Sur, Misamis Occidental, Misamis Oriental, Davao del Norte, Davao del Sur, South Cotabato, North Cotabato, Saranggani, Sultan Kudarat, Surigao del Norte, Basilan, Maguindanao, Sulu, and Tawi-tawi***

Sources: www.cpc.noaa.gov*, Hilario et al., 2010**, and International Federation of Red Cross and Red Crescent Societies (IFRC), 2016***.

2. Impacts of Drought on the Environment, Economy, and Society

The country has experienced devastating impacts on water resources, agricultural production, and food security due to drought episodes, placing the country's socio-economic prosperity at risk.

According to Hilario et al. (2010), the 1991-1992 drought caused damage estimated to be PHP 4.09 billion, with 71 percent of the total estimated damage in agricultural production, including rice, corn, vegetables, and fruit. Mindanao was severely affected by this drought. In the 1997-1998 episode, around 74,000 hectares of agricultural land across 18 provinces were devastated, leading to 74 deaths and millions of people suffering from hunger (Inter-agency Regional Analysts Network, 2015). In the most recent drought in 2015-2016, 181,687 farmers and 224,834 hectares of agricultural land planted with rice, corn, and high-value crops were severely affected, resulting in an agricultural production loss of 81 million (International Federation of Red Cross and Red Crescent Societies, 2016). These drought events have significant economic and social impacts, which can have long-lasting effects on the affected communities.

Drought poses significant environmental, social, and economic challenges by limiting water availability for human and agricultural purposes. Participants in the focus group discussions highlighted the following impacts of the 2015-2016 drought on their farming livelihood:

Environmental impacts

In the study areas, drought has led to a range of environmental impacts, including reduced water supply for irrigation and domestic use, decreased soil moisture, increased pest and disease infestations, bushfires/grassland fires, and cracked soil that stunts crop growth or causes crop mortality, ultimately affecting all aspects of farmers' livelihoods. Grassland and bushfires and low water supply led to livestock mortality and the drying up of fish ponds. The IPCC (2018) warned that these effects could result in a decline in agricultural productivity and an increased risk of wildfires. Furthermore, water scarcity caused by drought affected the

availability of drinking water and the health of ecosystems (Gleick, 2014). The social, economic, and cultural consequences of these environmental impacts varied depending on the severity and location of the drought in the study areas.

Economic impacts

The economic burden on the farmers was significant due to the consequences of drought on their crops and income. Small-scale farmers, the most vulnerable to these effects, were particularly affected by the decreased income caused by low or zero crop yields. The rising cost of farm inputs during droughts further strained farmers' financial stability, forcing them to take out loans and increase their debts. In Koronadal City, some farmers turned to charcoal making as an alternative income source, which proved inadequate and unsustainable. In Kidapawan City, farmers suffered from food poisoning after eating cassava, a substitute food source. According to the FAO (2016), drought can increase food prices for consumers and have a significant economic impact on agriculture and livestock production. Drought can also lead to the loss of jobs and income in other sectors, such as tourism and manufacturing, further impacting the economy (IPCC, 2018). The long-lasting economic impacts of drought can hinder the affected communities' ability to recover from the event.

Social impacts

The impacts of drought extend beyond environmental and economic consequences to the social aspects of affected communities. The impact of extreme drought was felt by farmers in both cities, leading to hunger and migration to seek alternative sources of income, such as working as domestic helpers or construction workers. For some families, the lack of income from farming resulted in the inability to pay for their children's schooling, causing them to abandon their education.

Drought leads to increased theft of farm produce and livestock and trespassing of livestock onto other farms. According to the FAO (2016), drought can lead to food insecurity and malnutrition, as well as displacement of people from their homes and livelihoods, exacerbating social inequalities and disproportionately affecting vulnerable populations such as women and children. The social impact of drought can have long-term effects on affected communities, including increased poverty, reduced access to education and healthcare, and

further displacement. Moreover, the psychosocial challenges posed by extreme drought also impacted the farmers' livelihoods and survival. In particular, farmers faced the challenge of keeping their livelihoods and ensuring their families' survival amidst the effects of the drought. These challenges were compounded by violations of farmers' rights, which threatened their ability to secure a sustainable livelihood. During the focus group discussions, impact diagrams were generated to visualize the effects of the 2015-2016 extreme drought on farmers' rights (Figures 3 and 4). These diagrams depict a cascade of impacts, beginning with the direct effect of drought on the environment. Economic, social, and cultural repercussions followed, undermining farmers' rights.

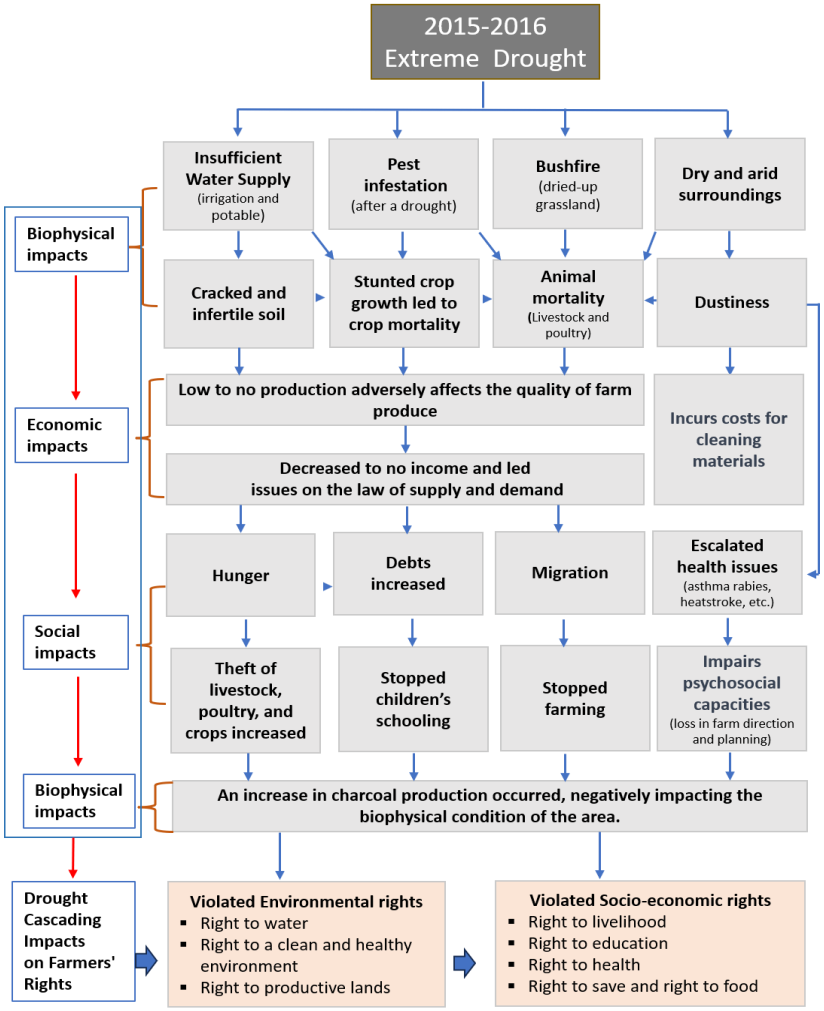

Figure 3. The Impact of Extreme Drought (2015-2016) on Farmers' Rights in the City of Koronadal

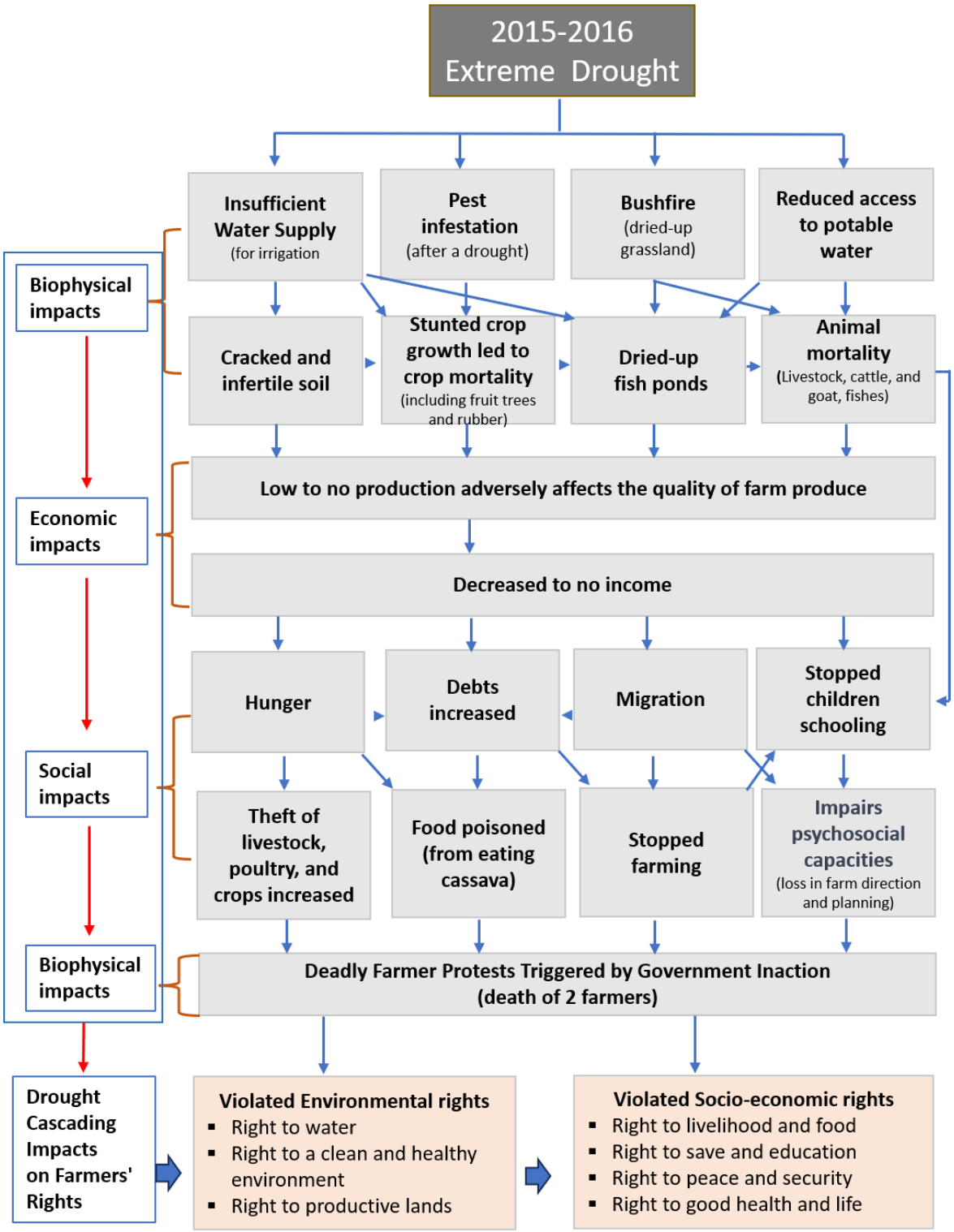

Figure 4. The Impact of Extreme Drought (2015-2016) on Farmers' Rights in Kidapawan City

3. The Cascading Impact of Drought on Farmers' Rights

Drought has compounded effects on farmers, leading to violations of farming communities' biophysical, environmental, and socio-economic rights. The biophysical impacts of drought, such as water scarcity, increased pest infestations, soil infertility, and the risk of bushfires and grassfires, can impede farmers' environmental rights, including the right to water, a clean and healthy environment, and the right to productive lands. These impacts can then cascade into the socio-economic sphere, causing crop losses, damage, and, in some cases, the loss of livelihoods. This loss can affect farmers' socio-economic rights, including the right to livelihood, education, food, peace, security, health, and the right to life. In this study, the right to livelihood refers to the entitlement of individuals to productive resources and activities necessary for sustaining their lives and those of their families. Farmers' ability to exercise this right depends on various factors, including favorable weather conditions, access to productive lands, adequate water supplies, appropriate technology, fair pricing of farm inputs and produce farm-to-market roads, and government support in capacity development and policy implementation. However, the changing climate, which exacerbates drought, has put this right at risk, jeopardizing farmers' sources of livelihood and their families.

In Kidapawan City, a protest rally was organized by farmers from nearby municipalities in response to the extreme impacts of drought, which resulted in violence and the deaths of three farmer protesters, with a total of 99 people reported injured. As the primary duty bearers of human rights, the state had the responsibility to promptly disburse calamity funds to alleviate the impacts of drought in Southern Mindanao. The local government's delayed response was critical to the farmers' protest and social unrest. These consequences are considered violations of smallholder farmers' rights, including the right to food, peace, security, livelihood, the ability to save and sell their produce, and education for their children. The impact of drought on farmers is not limited to hunger but can also cause the loss of productive land as farmers may be forced to sell or abandon it due to the inability to maintain it. Furthermore, the 2015-2016 drought had several health impacts on the study sites. Due to the lack of water, many people could not maintain proper hygiene, leading to increased water-borne diseases such as diarrhea and typhoid fever.

The violation of right to livelihood due to drought caused by climate change challenges our perception of vulnerability and what it means to be human. In the cities of Koronadal and Kidapawan, farmers have personally experienced the impacts of climate change through

drought despite the government's prior announcement of the impending risks. During a focus group discussion in Kidapawan City, a farmer who is also a local government employee shared that "Farmers do not believe the [drought] forecast until they experience it." This disbelief may be due to farmers' lack of information and trust in the government and their doubts about the reliability of the forecast information. It may also be because the expected risks are not part of the farmers' or government's experiences or perceptions of reality. As a result, the potential extent of the damage caused by drought was not fully understood by either the risk communicators or the recipients.

Results of the extended Mantel-Haenszel (Cochran-Mantel-Haenszel) statistical analysis (Table 2) revealed that in the City of Koronadal, only the increased occurrence of diseases and pest infestations had a significant association with a decrease in the quality and quantity of farm produce, as well as low market value. These findings suggest that crop infestation by pests and diseases can lead to declining farm produce quality and quantity.

Table 2. Correlation between drought impacts and right to livelihood variables in the City of Koronadal, South Cotabato, Philippines

	Right to livelihood variables:											
A. Environmental Impacts	**Production**				**Market**			**Price of farm inputs**			**Farm Management**	
	1. Reduced quantity of farm produce		2. Reduced quality of farm produce		3. Reduced livestock/poultry production	4. Reduced farm market value		5. Increase in farm inputs			6. Disruption in farm planning	
	P-value	Gamma	P-value	Gamma	P-value	Gamma	P-value	Gamma	P-value	Gamma	P-value	Gamma
1. Reduction and shortage in water supply	P = 0.1145	0.3367	P = 0.0478	0.3383	P = 0.4501	0.2015	P = 0.6162	0.1592	P = 0.9382	-0.0491	P = 0.3943	0.137
2. Unproductive soils (degraded/cracked)	P = 0.1030	-0.3406	P = 0.0719	-0.3604	P = 0.0033	-0.4097	P = 0.0029	-0.4499	P = 0.4446	0.0855	P = 0.0002	0.5639
3. Increased	P =	0.18	P =	0.22	P =	0.04	P =	-	P =	0.20	P =	0.25

	Right to livelihood variables:											
A. Environmental Impacts	**Production**				**Market**			**Price of farm inputs**			**Farm Management**	
pests	0.1467	53	0.0464	63	0.7686	29	0.8818	0.0146	0.4672	49	0.0929	73
4. Increased diseases	P = 0.0011	0.5116	P = 0.0004	0.5325	P = 0.0000	0.7075	P = 0.0000	0.5884	P = 0.2943	-0.1339	P = 0.0004	-0.5579
B. Socio-economic Impacts												
1. Crop damage	P = 0.0112	0.2727	P = 0.0126	0.2419	P = 0.9779	-0.041	P = 0.9713	-0.0769	P = 0.1309	0.1303	P = 0.8174	0.023
2. Low crop yields	P = 0.0015	0.5047	P = 0.0059	0.3569	P = 0.1409	0.2344	P = 0.0606	0.225	P = 0.8053	0.0397	P = 0.5396	0.1278
3. Stealing of farm produce/livestock or poultry	P = 0.0051	0.4173	P = 0.0010	0.5234	P = 0.0000	0.6065	P = 0.0000	0.5839	na	na	P = 0.0001	-0.5775
4. Trespassing of livestock	P = 0.0271	0.4331	P = 0.0004	0.5879	P = 0.0101	0.4451	P = 0.0112	0.4083	na	na	P = 0.4742	-0.1125

In the City of Kidapawan, the majority of environmental impact variables, including reduced water supply, unproductive land, and increased pest infestation (Table 3), were associated with variables related to the right to livelihood, including quality and quantity of farm produce, market value, and on farm-off farm inputs. The right-to-livelihood variables were associated with crop damage and low harvest/crop yield. The study showed that drought episodes negatively affect the production system and market. Moreover, as drought episodes continue to recur in the study sites, farmers' rights, including access to water, livelihood, a clean environment, education, food, peace, and security, are increasingly at risk. The sustainability of farming practices is compromised, rendering farmers more susceptible to various hazards and uncertainties. Consequently, it is imperative to implement adaptation

strategies to address these challenges, make necessary adjustments, and safeguard farmers' rights.

Table 3. Correlation between drought impacts and right to livelihood variables in the City of Kidapawan, North Cotabato, Philippines

A. Environmental Impacts	**Right to livelihood variables:**											
	Production						**Market**		**Price of farm inputs**		**Farm management**	
	1. Reduced quantity of farm produce		2. Reduced quality of farm produce		3. Reduced livestock production		4. Reduced farm market value		5. Increase in farm inputs		6. Disruption in farm planning	
	P-value	Gamma	P-value	Gamma	P-value	Gamma	P-value	Gamma	P-value	Gamma	P-value	Gamma
1. Reduced water supply	P = 0.0000	0.6209	P = 0.0000	0.5622	P = 0.0398	0.2487	P = 0.0000	0.5687	P = 0.0090	0.3444	P = 0.0036	0.3974
2. Unproductive soils/land (degraded/cracked)	P = 0.0000	0.5079	P = 0.0019	0.3167	P = 0.0006	0.4384	P = 0.0005	0.4457	P = 0.0010	0.4076	P = 0.2180	0.1563
3. Increased pests	P = 0.0024	0.3846	P = 0.0169	0.2876	P = 0.0094	0.3145	P = 0.0021	0.4158	P = 0.0007	0.4443	P = 0.0453	0.2759
4. Increased diseases	P = 0.0710	0.1625	P = 0.0225	0.2954	P = 0.0079	0.3567	P = 0.0855	0.2156	P = 0.0149	0.3241	P = 0.1199	0.238
B. Socio-economic Impacts												
1. Crop damage	P = 0.0001	0.4837	P = 0.0007	0.4179	P = 0.0070	0.3429	P = 0.0042	0.3837	P = 0.0017	0.4473	P = 0.0204	0.3364
2. Low	P =	0.52	P =	0.28	P =	0.21	P =	0.39	P =	0.31	P =	0.29

A. Environmental Impacts	**Right to livelihood variables:**											
	Production						**Market**		**Price of farm inputs**		**Farm management**	
harvest/yield	0.0000	73	0.0132	59	0.0742	99	0.0023	25	0.0204	93	0.0506	62
3. Stealing of farm produce/livestock/poultry	P = 0.5598	0.076	P = 0.8863	-0.0044	P = 0.4957	0.0808	P = 0.2294	0.114	na	na	P = 0.0035	0.3827
4. Trespassing of livestock	P = 0.6905	-0.0845	P = 0.7299	-0.0976	P = 0.4790	0.078	P = 0.3534	0.0875	na	na	P = 0.0005	0.4449

The United Nations Human Rights Commission (2015) has recognized that the negative impacts of climate change, such as drought, can hinder the full enjoyment of human rights. Human rights are inherent freedoms to which every individual is entitled, regardless of status or background, as stated in Article 2 of the Universal Declaration of Human Rights. However, the impacts of drought can significantly impede people's ability to exercise fully their fundamental right to livelihood. It affects their access to water and reduces soil quality regarding moisture and fertility. As a result, drought can adversely impact local communities' food security and agricultural income.

In summary, the recurring drought problem in South-Central Mindanao, Philippines, profoundly impacts farmers' rights in the region. Drought affects farmers' rights in various ways, including:

Right to Water: Drought resulted in water shortages in both Korondal and Kidapawan, which affected the quality and quantity of water available for farmers to use in their agricultural activities. This shortage impacts their right to access water.

Right to Livelihood: Agriculture is the primary income source for many South-Central Mindanao farmers. Drought leads to reduced crop yields, affecting their livelihoods and right to work and earn a living.

Right to Food: Drought affects agricultural productivity and reduces crop yields, which leads to food insecurity. Farmers cannot grow sufficient crops, resulting in a lack of food for themselves and their families. Their right to food is at risk.

Right to Health: Drought also leads to health problems and mental stress for farmers. The lack of water results in poor sanitation, poor hygiene, and diseases. This trouble impacts their right to health.

Right to Education: Drought also impacts the education of farmers' children. The reduced income from agriculture leads to financial difficulties, resulting in children being unable to attend school and losing the right to education.

Right to Property: Drought also results in property loss, such as farmland. Some farmers were forced to sell their land and lose their right to own and use the property.

Right to peace and security: The right to peace and security was affected by the 2015-2016 drought in several ways. The drought caused conflicts over scarce resources such as water and food, leading to social unrest and violence. Furthermore, the stress and uncertainty caused by drought can have negative impacts on mental health and well-being, leading to increased anxiety and stress levels. All these factors can undermine the right to peace and security and make it difficult for individuals and communities to lead safe, secure, and fulfilling lives.

Right to save and sell farm produce: The 2015-2016 drought in South-Central Mindanao, Philippines, violated the rights of smallholder farmers to save and sell their farm produce. Due to the drought's adverse effects on agricultural productivity, farmers' ability to maintain crops and sell harvests was significantly impacted. This inability resulted in decreased income and financial instability for farmers, hindering their ability to save and invest in their farming livelihood. Additionally, the limited access to water during the drought made it difficult for farmers to preserve their crops and prevented them from having surplus produce to sell in the market. Ultimately, violating the right to save and sell farm produce can exacerbate the

already difficult circumstances farmers face and hinder their ability to secure a decent standard of living for themselves and their families.

Right to life: The right to life was violated as a result of the protest rally organized by farmers in response to the extreme impacts of drought, particularly in Kidapawan City. Protests in Kidapawan City during the 2015-2016 drought escalated into a violent confrontation, resulting in tragic violence and fatalities. The drought severely affected the agricultural sector, causing significant crop failures and scarcity of food and water resources. Frustrated by the lack of government relief and calamity funds to address the emergency, farmers took to the streets to demand assistance and support. The clash between the two sides resulted in the unfortunate loss of two lives, adding a tragic dimension to the already dire consequences of the drought. This incident highlighted the desperate conditions faced by the farmers and the urgency for adequate measures to mitigate the impacts of drought. The violence and fatalities during the protests in Kidapawan City underscored the critical need for effective governance, timely response, and proactive measures to address the far-reaching consequences of drought on the livelihoods and rights of farmers. It serves as a poignant reminder of the complexities and challenges faced by communities grappling with the adverse effects of extreme weather events and the importance of prioritizing the well-being and rights of vulnerable groups in times of crisis.

3.1 Adaptation Strategies for the Impact of Drought

Drought is a severe environmental challenge affecting millions worldwide, especially in regions where water scarcity and agriculture are prevalent. To cope with the issue, local government units (LGUs) and farmers must adapt. Adaptation involves the process of adjusting to the actual or anticipated climate and its impacts. Adaptation aims to mitigate or prevent harm and exploit advantageous opportunities in human systems. In some natural systems, human intervention may aid in adjusting to the expected climate and its effects (IPCC 2014).

In addition to identifying current adaptation practices, a scenario adaptation assessment was given priority by presenting future climate scenarios to the participants, including temperature and rainfall changes and the frequency of extreme events, particularly by 2050. The assessment of adaptation practices was identified using the following guides: 1) preparedness before drought, 2) managing and coping during drought, and 3) recovering after

drought. Respondents in both cities demonstrated adaptive mechanisms when confronted with drought-related events (see Tables 2 and 3).

Table 4. Identified current and potential adaptations of the City of Koronadal, South Cotabato.

	Current Adaptation	**Actors**	**Potential impacts**	**Potential adaptation**
Before the drought	Some farmers did not take any action, but some opted to avail themselves of insurance offered by the Philippine Crop Insurance Corporation (PCIC).	Farmers	The predicted impacts of drought, if no action is taken, would include an increase in crime rate, higher underemployment rates, increased cases of malnutrition, and lower agricultural production.	The LGU and communities are considering potential adaptation measures such as continuous tree planting, promotion of insect-repellent species like the neem tree, and use of resilient and endemic species, as well as fruit trees such as *inyam*, *bugnay/bignai*, and breadfruit (*rimas*). Diversified farming practices should also be widely promoted. There is a need to improve agricultural technology, including harnessing hydropower and increasing awareness among farmers. A more

	Current Adaptation	Actors	Potential impacts	Potential adaptation
				proactive approach is necessary to effectively address the impact of drought.
	The City Agriculture Office conducts information drives through radio programs and farm visits to conduct farm inventories.	LGUs		LGUs should continue to promote what is good for the communities and the people. They also recommend planting short gestation crops and allocating funds for Community-Based Disaster Risk Management (CDRM) for mitigation purposes.
During the drought	Current adaptation strategies include shifting to other crops, such as watermelon and summer crops. The LGU has provided farmers cash assistance and encouraged off-farm work such as laundry,	Farmers	If left unaddressed, drought can lead to a rise in malnutrition rates and a decline in agricultural productivity.	Shifting from cash crops to permanent crops

	Current Adaptation	Actors	Potential impacts	Potential adaptation
	housekeeping, construction, and motorcycle taxi services (habal-habal) to help farmers cope.			
After the drought	After a drought, the LGU provides assistance such as tube wells (11 units from LGUs), cash assistance, and farm inputs like seeds/seedlings and equipment.	LGU	Water shortage	
	Farmers are encouraged to plant indigenous species, such as the bamboo-*kawayan tinik*, which provides raw materials for handicrafts involving People With Disablities. The LGU also informs farmers to prepare for a La Niña scenario following a drought.	Farmers	If measures are not taken, there will be unproductive lands.	Planting permanent crops and indigenous trees are effective measures to combat drought.

Table 5. Identified current and potential adaptations of the City of Kidapawan, Cotabato Province.

	Current Adaptations	**Actors**	**Potential Impacts**	**Potential adaptations**
Before the drought	Before the drought, farmers and Local Government Units engaged in the stocking of rice as a preparatory measure. It is also a part of the farmers' culture in Kidapawan City to plant root crops and permanent crops such as fruit trees, which are more resilient to water scarcity.	Farmers	Farming practices may be affected or no longer be practiced due to the changing climate.	To sustain the cultivation of high-value crops and promote sustainable agriculture, farmers can adopt organic farming practices and explore the production of biofuels. In addition, they can prepare mitigation measures such as adjusting their diets to adapt to changing environmental conditions.
	The LGU regularly conducts meetings with farmers' federations and information drives through radio programs. In addition, the LGU provides farmers with planting materials such as sweet potatoes and cassava.	LGU		
During the drought	During a drought, farmers take measures to	Farmers		The promotion of organic farming

	Current Adaptations	**Actors**	**Potential Impacts**	**Potential adaptations**
	conserve water, such as limiting their water usage and boiling water to make it potable for drinking. Some farmers also seek out alternative sources of income, such as engaging in construction work. Others may borrow money from traders or apply for emergency loans to make ends meet during this challenging time.			systems on a large scale is a potential and viable adaptation strategy for areas prone to drought areas to continue promoting sustainable agricultural practices.
	Local Government Units delivered water to affected families and provided cash-for-work/food-for-work programs. They also distributed rice, with 10 kilograms per household. However, despite these initiatives, social unrest occurred.	LGU		Proactive planning, education and awareness-raising campaigns can also effectively prevent social unrest during drought periods. Developing effective adaptation plans is essential to prevent social unrest during

	Current Adaptations	**Actors**	**Potential Impacts**	**Potential adaptations**
				drought periods.
After the drought	Developing effective water management strategies and encouraging farmers to engage in alternative sources of income (piggery) could be potential adaptations.	Farmers/ LGUs	Water scarcity	Continued planting of permanent crops and sustainable agricultural practices

Conclusion

This study aims to investigate the cascading impacts of drought on farmers' rights, addressing the gap in existing literature regarding the intersection between farmers' rights, climate change, and specific events like droughts. The conceptual framework for this study was based on the notion of "farmers' rights" advocated by SEARICE and the FAO. By exploring this framework, the study aimed to shed light on the complex dynamics and implications of infringing farmers' rights on drought-induced challenges.

Drought severely impacts the livelihoods and rights of farmers in South-Central Mindanao, Philippines, particularly in areas where rain-fed agriculture is the primary income source and water is scarce due to prolonged dry spells. The study areas experienced two to three drought episodes every decade over the last 70 years (1951-2016), lasting from 5 to 21 months. The impacts of the 2015-2016 drought were widespread and varied across the study sites, with farmers experiencing different effects depending on their crop type, location, and drought severity. The environment, economy, and society were all significantly affected. The reduction of water due to drought negatively affected the farming production system and market, leading to decreased crop yields, income loss, and food shortages for farmers. The

combined impacts of drought on farmers' biophysical, environmental, and socio-economic aspects resulted in violating their rights, including the rights to water, livelihood, a clean environment, the right to save, the right to education, food, peace and security, and the right to life. These impacts may progressively threaten farmers' rights as their farming livelihoods are undermined, and they become more vulnerable to risks. Effective adaptation strategies (policies and programs supporting farmers in coping with drought and its impacts) are crucial to combat the impacts of drought. In order to safeguard the rights of farmers, it is crucial to comprehend the potential threats and susceptibilities to drought. Enhancing water resources management, providing alternative livelihood sources, promoting crop insurance, improving farming systems tolerant to drought, and strengthening linkages to markets and local government support are all essential considerations that require technical and financial resources. Moreover, improving adaptation and preparedness strategies and implementing monitoring systems before, during, and after droughts are necessary. The government should improve its programs for on-farm and off-farm livelihood opportunities, promote and provide crop insurance to farmers, and enhance their rights. Protecting and enhancing farmers' rights is crucial to mitigate the negative impacts of drought on individuals and communities.

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