Understanding Drought Related Risks

EVALUTING ADOPTED COPING STRATEGIES BY THE LOCALS OF AL HAMDANIYA DISTRICT, NINAWA, IRAQ

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from relief to recovery

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Abbreviations

FGD	Focus Group Discussions
KII	Key informant interviews
VRCA	Vulnerability, Risk and Capacity Assessment
PPE	Personal Protection Equipment
IDP	Internally Displaced People
ISIS	Islamic State of Iraq and Syria
FMD	Food and Mouth Diseases
PPR	Render Pest of small Ruminants
DRM	Disaster Risk Management

Acknowledgments

This report was prepared by a team consisting of ZOA project management team members including, Solomon Cornelius Programme Manager, Dr. Nawzat A. Issa Consultant, Dr. Wisam Yako Aziz – Project Manager and Ms. Viona Yalda – Community Officer. The report was written and finalized by Dr. Nawzat A. Issa. ZOA reviewers include Ms. Inge Vos and Mr. Solomon Cornelius.

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1 Executive summary

Water scarcity and related disasters; climate change; and conflicts are considered as key factors in exacerbating intensity and frequency of weather induced disasters on livelihood, food security and income streams. Accordingly, this assessment was conducted to determine the vulnerabilities related to agriculture and food security sectors along with current risks, future risks expected from climate change and conflict situation prevalent in Iraq. The ZOA assessment team conducted a Vulnerability, Risk and Capacity Assessment (VRCA) at community level in the Al Hamdaniya District of the Ninawa province in Iraq over a three-month period from the 1st of April – 30th of June 2021.

The main objectives of the assessment are to analyse and understand the hazards and vulnerabilities associated with agricultural production challenges, climatic trends, and biophysical characteristics and cropping calendars and to identify coping strategies, support mechanisms and capacity gaps to enable better preparedness, risk reduction and mitigation at the community level.

Firstly, a pre-assessment was conducted to determine the most appropriate villages (3) for conducting Community Consultations on Agriculture Hazards and to do a Vulnerability and Capacity Assessment. The selection was based on criteria designed to fit within the scope and objectives of the assessment. Accordingly, three villages; Ali Rash Village, Bazgrtan Village and Shahrazad Village were selected. The assessment depended on a questionnaire made by FAO and the field research was carried out by a team of a consultants and two skilled data collectors/ facilitators. The following data collection methods were utilized: Focus Group Discussions (FGD) with men and women/ stakeholders/ related directorates, Key Informant Interviews (KII) with Mukhtars/related directorates and stakeholders, and a literature review. The drought risks and their associated hazards at the community level of the targeted area were found to be most prominent. The collected data indicated that the area is at high risks of drought and from time to time exposed to draught; the residents living in the area under research, are highly vulnerable to climate variability and drought implications.

MAIN FINDINGS

The impacts of the drought are various and are ranging from decreasing potable clean water for human and animal consumption, crop failure, animal mortality and partial to total loss of source of livelihood. Locals are using various coping strategies to cope with above listed effects of drought, but all are short-lived solutions. There is no early warning system related to the drought. The government's interventions and way of dealing with drought are not considered ambitious by the local residents within the researched villages; the capacity of the government is very limited or rather absent, in part due to Islamic State of Iraq and the Levant (ISIL) occupation and its aftermath. Therefore, actions need to be taken to move the local communities of the area under research, as well as the society in general, from re-active state to pro-active; meaning they are resilient and adapted to the drought risk. Proactive risk management strategies should be adopted at the national level through the development of drought policies and drought management plans.

2 Introduction

2.1 Purpose of the study

This VRCA was conducted at the community level of the Al Hamdaniya District of the Ninawa province in Iraq to analyse and understand the hazards and vulnerabilities associated with agricultural production challenges, climatic trends, and biophysical characteristics and cropping calendars; besides, to identify coping strategies, support mechanisms and capacity gaps to enable better preparedness, risk reduction and mitigation at the community level. This assessment was conducted for three-months through comprehensive desk review which included meteorological and agricultural data and FAO DRR Country Profile, focus group discussions (FGD) and key informant interviews (KII) with key actors, village leaders and stakeholders (men and women) and triangulation and synthesis. The collected data were done through pre-formed questionnaire designed by FAO fits with the scope and objectives of the assessment.

2.2 Background

The Arab region is one of the most disaster-prone regions of the world, where water related hazards contribute to the majority of disasters and are key factors for most of the damage and economic losses[1]. In the study countries i.e., Syria, Yemen and Iraq, three main driving forces i.e. water scarcity and related disasters; climate change; and conflicts have developed an inextricably linked nexus, exacerbating intensity and frequency of weather induced disasters, such as flood, drought, cyclone, trans-boundary pest and disease infection, extreme weather conditions, land and environmental degradation making direct impact on livelihood, food security and income streams. The situation in conflict-stricken areas, especially in rural parts is further worsened and worst affected by food insecurity and malnutrition, mainly because of difficulty in food availability, access, utilization and also stability. The vulnerable groups of the society, both in rural and urban areas such as old persons, women, children, destitute and people with special needs are the worst sufferers of the crisis, which in extreme conditions may lead to starvation.

The climate change in the region may result in an increase in temperature of up to 2°C in the next 15-20 years, and over 4°C by the end of the century; resulting in decrease in agricultural output by 21% in terms of value by 2008. In addition to disasters and climate change, conflicts and fragility are increasing the impact of natural disasters in Iraq, mainly by displacing people into areas with more exposure to hazards and thus increasing their vulnerability to physical and psychological health, basic service provision and the livelihood. Conflict and protracted crises are forcing more and more people into conditions of poverty, food insecurity and displacement.

The disasters, climate change and conflict nexus generated risk, characterised by a stochastic relationship between causes and effects, complex in nature and showing its presence in other Arab nations too, has emerged as a systemic risk, which if not managed in time may trigger more instability in the region. The first and the foremost requirement to manage the situation in an effective and efficient manner is to understand the risks in all dimensions of vulnerability, capacity, exposure, hazards characteristics and environment.

The assessment outlined the socio- economic conditions of the Al-Hamdaniya locals likely to be affected by hazards and capacity to risk reduction and management at community level. The assessment also outlined the negative effects of hazards on the ability of populations to meet basic needs, including

[1] https://blogs.worldbank.org/arabvoices/threat-natural-disasters-arab-region-how-weather-storm

health care, water and sanitation, food and basic education. Special attention to the vulnerabilities related to agriculture and food security sectors. Along with current risks, future risks expected from climate change and conflict situation prevalent in the area are also being paid.

3 Methodology

To determine the most appropriate village for conducting this assessment, initially, a pre-assessment was conducted and the project team and consultant met with following to provide project orientation:

- Director Bartella sub-district/ District Hamdaniya
- Manager Agriculture Department/ Bartella sub-district/ Hamdaniya
- Manager Water Resources Department Hamdaniya
- Manager of Environment Department Hamdaniya
- Local Mukhtars,

Based on the collected and analysed data from the pre-assessment, three villages were selected: i) Ali Rash; ii) Bazgrtan; and iii) Shahrazad.; the selected villages are the most appropriate villages that are in line with the scope and objective of VRCA. Following, the project team oriented the stakeholders, as per discussions and agreement of the local leaders and relevant department – three (3) villages were selected for the data collection and roll out of community level assessment.

According to the community consultation schedule shown below, ZOA assessment team undertook VRCA at community level in Hamdaniya district Iraq from the 1st April–30th June, 2021; the assessment was following a preformed questionnaire made by FAO, the questionnaire was designed to meet the scope and the objectives of the assessment. The following data collection methods were utilised by the assessment team:

- Key Informant Interviews (KII)/ Mukhtars/ related directorates and stakeholders
- Focus Group Discussions (FGD) with men and women/ stakeholders/ related directorates
- Literature review
- Triangulation and Synthesis

A total of 11 KIIs were carried out with key actors within the target areas/ selected villages as listed below, the project team selected 3-4 key informants from each village together with Local Mukhtars and local leaders. KIIs included community elders, local leaders, women, youth members etc.

Table 1: Key information interview time schedules

	Key Informant name	Position	Date	Time	Village name	Responsible and Lead
1	Yasin Najaf Mohammad	Community Elder	25th May 2021	09:00 am	Ali Rash	Interview lead Dr.Nawzat A. Issa Note taker: Viona Yalda
2	Abasa Mekael Akram	Community activist	25th May 2021	10:00 am		
3	Saraj Ali Najaf	Female community member	25th May 2021	11:00 am		
4	Hassan Askar Khalil	Community Elder	28th May 2021	09:00 am	Bazgrtan	Interview lead: Dr.Nawzat A. Issa
5	Daham Mohammad Rashed	Community activist	28th May 2021	10:00 am		

6	Saadea Abas Hasan	Female community member	28th May 2021	11:00 am		Note taker: Dr.Wisam
7	Ali Taha Younis	Farmer	28th May 2021	12:00 am		
8	Ghazi Jasm Shukry	Community elder	31st May 2021	09:30 am	Shaherazad	Interview Lead: Dr. Dr.Nawzat A. Issa Note taker: Dr.Wisam
9	Sefalden Aqel Jasm	Female community	31st May 2021	10:30 am		
10	Nura Mohammad Jasm	Female community member	31st May 2021	11:30 am		
11	Khalid Taha Younis	Farmer	31st May 2021	12:15 am		

During the mission FGD's were held within the three selected villages, groups of locals (8-12 members/ group) were involved within the conducted exercises/ male and female groups, the females groups was led separately by a lady/ ZOA community officer. The exercises were conducted with strict adherence and follow-up of the COVID19 instruction through using PPE (Figure 1).

Figure 1: Photos from FGD and KII conducted exercises in visited villages; (A) KIIs - Shahrazad Village, (B) FGD- men group- Bazgrtan Village, (C) FGD-women group/ Bazgrtan Village.

Table 2: Community Consultation schedule – Community Mapping, Seasonal Hazards and group analysis

	Name of village	**Date**	**Time**	**Community Contact person**	**Responsible and Lead**
1	Ali Rash	26th May 2021	10:00 till 12:00 pm.	1. Ali Mekael Akram 2. Fouad Qasm Hussin 3. Ahmad Wali Khethr	-Consultation lead : Dr.Nawzat A. Issa -Note taker: Dr. Wisam Yakho -Administrative Support: Viona Yalda
1.A	Ali Rash (FGD with Female)	26th May 2021	1:30 pm till 3:30 pm	1. Ali Mekael Akram 2. Fouad Qasm Hussin 3. Ahmad Wali Khethr	-Consultation lead : Dr.Nawzat A. Issa -Note taker: Dr. Wisam Yakho -Administrative Support: Viona Yalda
2.	Bazgrtan	27th May 2021	10:00 till 12:00 pm.	1. Fesal Amen Hamd 2. Naamat Abas Hassan 3. Mzhr Hasan Mustafa	-Consultation lead : Dr.Nawzat A. Issa -Note taker: Dr. Wisam Yakho -Administrative Support: Viona Yalda
2.A	Bazgrtan (FGD with Female)	27th May 2021	1:30 pm till 3:30 pm	1. Fesal Amen Hamd 2. Naamat Abas Hassan 3. Mzhr Hasan Mustafa	-Consultation lead : Dr.Nawzat A. Issa -Note taker: Dr. Wisam Yakho

					-Administrative Support: Viona Yalda
3.	Shahrezad	30th May 2021	10:00 till 12:00 pm.	1. Abas Shukry Eleas 2. Abad Fathl Yousef 3. Salm Jasm Shukry	-Consultation lead : Dr.Nawzat A. Issa -Note taker: Dr. Wisam Yakho -Administrative Support: Viona Yalda
3.A	Shahrezad(FGD with Female)	30th May 2021	1:30 pm till 3:30 pm	1. Abas Shukry Eleas 2. Abad Fathl Yousef 3. Salm Jasm Shukry	-Consultation lead : Dr.Nawzat A. Issa -Note taker: Dr. Wisam Yakho -Administrative Support: Viona Yalda

3.1 Assessment limitations

Obtaining the required data from the local/ regional related directorates (agriculture, meteorological and Bartella sub district) namely the date that are back to period before ISIS with regards to the drought, fires and flooding were the main limitation of this assessment because all of their records were either burned or destroyed during the crises. However, collected data by the assessment team from alternative sources such as Meteorological, and agricultural general directorate of Mosul province were sufficient and aligned with designed goals of the assessment to understand the relationship between hazards and vulnerabilities and their association with agricultural production challenges, climatic trends, and biophysical characteristics and cropping calendars. Besides, identification most successful adaptation practice options being practised by community to overcome various risks and limitation of such practices

3.2 Assessment challenges

Gathering of people and convincing them to take part in FGD and community consultations during the COVID19 was challenge; however, distribution of Person Protection Equipment and conducting field activities in smaller groups made it possible to collect data. Besides, meeting with the stakeholder/ directors of the related directorates on due time was another challenge especially after a long distances of transportation and passes through so many security check points of the team to meet the directors based on the pre made appointments, on the arrival, the directors were either out of their offices for having another duties and their deputies were not authorised or were not willing to respond to the assessment team to provide them with the required data.

3.3 Study area

Al-Hamdaniya also known as Qaraqosh or Bakhdida, is in northern Iraq within the Nineveh Governorate, located about 32 km (20 mi) southeast of the city of Mosul and 60 km west of Erbil (Figure 2). All of its citizens fled to Kurdistan Region after the ISIS invasion on August 6, 2014. The town was under control of ISIS until October 19, 2016 when it was liberated as part of the Battle of Mosul after which residents have begun to return[2]. Agriculture was the main source of living for the people of the city. It also known by its handicrafts such as weaving and producing leather coats which are locally known as Farawee made of sheepskin. Agriculture and farming are the main sources of living as since the 1980s many people own and run chicken farms with modern facilities. For more details on the location of the target area, please see the below link

https://reliefweb.int/sites/reliefweb.int/files/resources/reach_irq_map_hamdaniya_reference_24jul2017_2.pdf

[2] Talat, Mahdi (30 October 2016). "In charred church near Mosul, Iraqi Christians pray once more". Reuters. Retrieved 31 October 2016.

Al-Hamdaniya District is divided between four sub-districts[3]: Aski Kalak (Khabat) Sub-District, mostly Kurdish, some Assyrians and Yazidis, al-Namrud (al-Khidhr) Sub-District, mostly Arab and Turkmen, some Kaka'is, Shabak and Assyrian, Bartullah (Baritleh) Sub-District, mostly Assyrian, some Shabak, Arab and Turkmen, Qaraqosh (Bakhdida) Sub-District, mostly Assyrians, some Arabs, Shabak, Turkmen and Kaka'is.

Figure 2: Map of the targeted area (Al-Hamdaniya District) in bright green colour

3.3.1 Average temperatures and precipitation/ Cloudy, sunny, and precipitation days

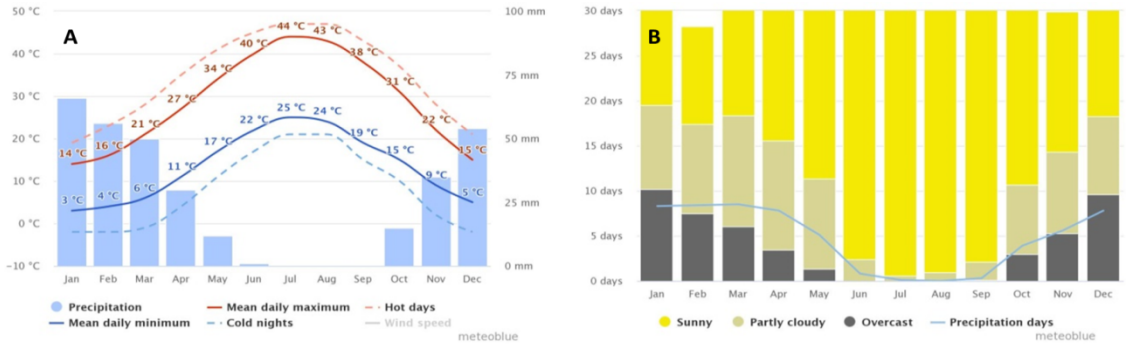

Figure 3: Average temperatures and precipitation/ Cloudy, sunny, and precipitation days in Al Hamdaniya District/ Mosul governorate/ Iraq

The "mean daily maximum" (solid red line) shows the maximum temperature of an average day for every month for Al-Hamdaniya District. Likewise, "mean daily minimum" (solid blue line) shows the average minimum temperature. Hot days and cold nights (dashed red and blue lines) show the average of the hottest day and coldest night of each month of the last 30 years [4](Figure 3A). Monthly precipitations above 150mm are mostly wet, below 30mm mostly dry. The monthly number of sunny, partly cloudy, overcast and precipitation days. Days with less than 20% cloud cover are considered as sunny, with 20-80% cloud cover as partly cloudy and with more than 80% as overcast (Figure 3B).

[3] The Struggle to Exist, Part II: Violence against Assyrian Communities in Nineveh Province's Disputed Territories" (PDF). Assyria Council of Europe, Hammurabi Human Rights Organization. February 2010. Retrieved 15 December 2016.
[4] https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/al-hamdaniya-district_iraq_92430

3.3.2 Maximum temperatures and Precipitation amounts

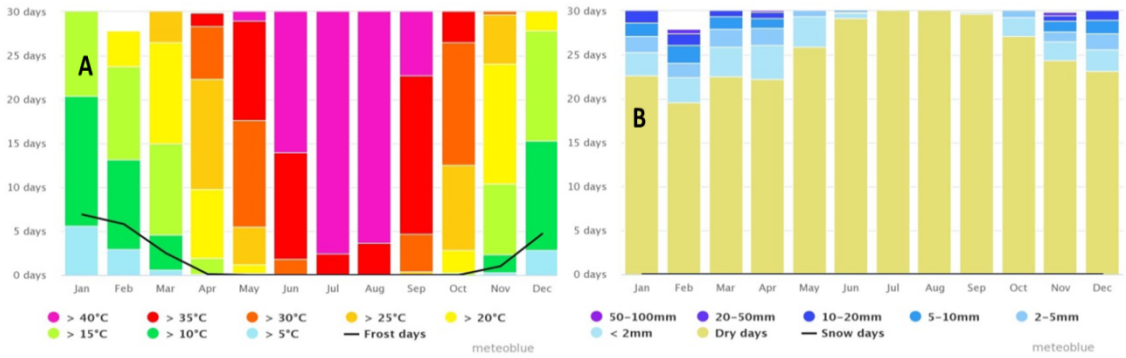

Figure 4: The maximum temperature diagram (A) for Al-Hamdaniya District displays how many days per month reach certain temperatures. The precipitation diagrams (B) for Al-Hamdaniya District shows on how many days per month, certain precipitation amounts are reached.

Table 3: Average precipitation in Al-Hamdaniya District/ Mosul governorate/ Iraq

Month	Rain
January	79mm (3")
February	57mm (2")
March	63mm (2")
April	44mm (2")
May	11mm (0")
June	0mm (0")
July	0mm (0")
August	0mm (0")
September	0mm (0")
October	30mm (1")
November	60mm (2")
December	78mm (3")

The wettest months in Al-Hamdaniya are January and December. The average annual rainfall for Al-Hamdaniya is 423mm (17").

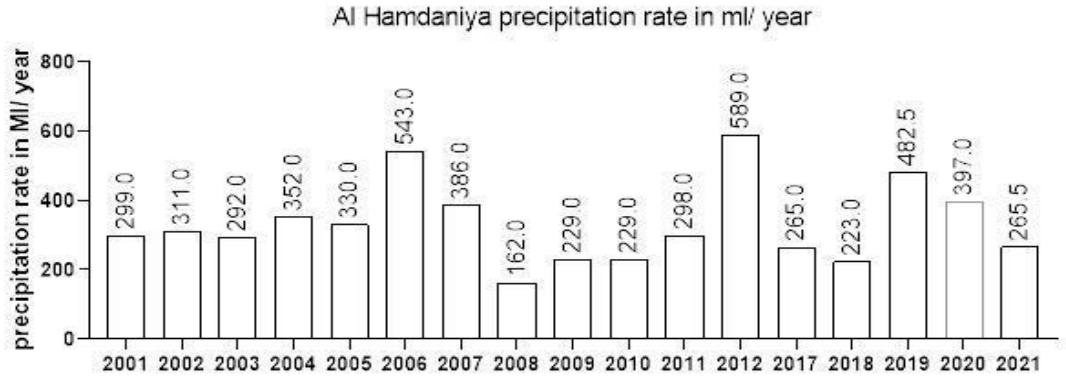

Figure 5: The amount of the precipitation within the area (Al Hamdaniya district/ 2001-2021)

Table 4: The amount of the precipitation/ month within the area (Al Hamdaniya district/ 2001-2021)

Year	October	November	December	January	February	March	April	May	Total
2000	5	3	28	43	13	13	54	0	159
2001	7	7	109	41	37	65	25	8	299
2002	0	5	74	59	27	103	43	0	311
2003	2	0	115	53	96	26	0	0	292
2004	25	88	65	62	42	7	63	0	352
2005	0	59	20	79	72	23	65	12	330
2006	5	28	142	184	27	162		0	548
2007	63	23	30	37	142	40	51	0	386
2008	0	2	5	48	60	47	0	0	162
2009	50	47	21	6	22	42	41	0	229
2010	16	18	60	25	29	51	22	8	229
2011	5	0	71	85	59	7	71	0	298
2013	30	69	113	191	96	25	22	43	589
2017	0	0	0	43	84	15	50.5	73	265.5
2018		8	8	8.5	103.5	20.5	58	16.5	223
2019	28.5	92.5	183	77	41.5	232	107	13	774.5
2020	16	5	102	74	144	28	28	20	417
2021		41	42	67.5	31.5	20	0	0	202

4 Results and findings

4.1 Pre assessment findings

The data collected by the project team and consultant from the related stockholders/ key actors included district director, sub district directors, relevant line departments i.e. Agriculture and Livestock, Water Resources, Health and Environment, local leaders (Mukhtars) and village elders were analysed and were triangulated with what have been suggested and recommended by the interviewees. Three villages (Shahrazad, Ali rash and Bazgrtan) were selected to do the required assessment (VRCA). The selection of the theses villages were based on their criteria in terms of the livelihoods sources, their previous exposure to natural hazards like drought and also were affected by the conflict during the ISIS crisis; besides, the selected villages are accessible for possible pilot of DRR interventions.

4.2 Village, community and livelihood Profile; Agriculture and Allied Sectors:

The collected data through the conducted FGD and KII with the interviewees of the three villages regarding to their village, community, and livelihood and agriculture profile are listed in below table (Annex-2, P19). The data revealed that wheat and barley are main crops produced within the area; the locals are almost totally relying on agricultural based livelihood (crops production and livestock industry) for their living. The crops production system is open system, about 95% of the crops production is rainfed, making the production susceptible to rainfall variations. The rainfed arable land is estimated to be more than 100000 acres and located within the villages' boundaries. The winter growing season starts from October/November-April/May. Across the targeted villages, in general, the locals are vulnerable and sensitive (fragile) to the risks of the environmental disaster (drought) affected rainfed winter cereals.

4.3 Hazard Vulnerability & Risk Assessment

Among the weather-related natural disasters, drought is likely the most complex and severe due to its intrinsic nature and wide-ranging and cascading impacts that affect, among others, agricultural production, public water supply, human health, biodiversity and natural ecosystems[5]. Droughts are recurrent and affect large areas and populations of the area every 4-5 years. The related impacts develop fast, and indirect effects can linger for long times after the end of the drought itself. The impacts result in severe economic losses, environmental damage and human suffering. The drought risk for the locals; therefore, is often underestimated. The locals realized that there is a dire need for a pro-active drought risk management and its implementation is still lagging behind. However, the whole community is at the risk of drought, but most, the small farmers who are owning small arable land and totally relied on the crops production are more severely affected.

4.3.1 The reasons for this increased vulnerability & increased risk

The farmers/ crops producers are spending a lot of resources for preparing their land (tillage), buying seeds, fertilizers and labour wages. Some farmers are poor and are sometimes urged them to take loans from private companies to fill the shortfall and prepare their land for crop production. The drought in general could result in great economic losses; the drought season in 2017 resulted in great losses of farmers' crops products, where both of quality and quantities of produces were affected. The locals'

> Ali Najaf Mohamed, local farmer from Ali Rash Village, described his situation by sharing that "during the drought season, the crops production is greatly affected. He continued, we are spending a lot on preparing our lands, buying seeds, fertilizers and the required pesticides. However, we do not know anything about the amount of precipitation and the upcoming drought. We all depend only on Allah (God). Ali also mentioned" in such case, we lose our capacity to prepare our land for the next season. Therefore, we are forced to look for other job opportunities such as low paid labour or a driver or working outside of village - sometimes, we take debts from agri-input companies for preparing our land for the next season".

produces were reduced to less than 50% in quantities with inferior qualities products, which were rejected and did not receive by the government/ Silo of wheat and barley. As a result, the small farmers were put in debts and urged them to seek for various job activities such as labour for daily wages, taxi drivers and cash for work even with low paid sectors.

4.3.2 How much damage did (drought 2017) it cause? Crop loss? How much area did it affect?

The quality and quantity of the produces were greatly affected/ production season. The whole area that belongs to the Bartulla-sub district administration units was affected and even the nearby areas as all share the same environmental conditions.

[5] Global assessment report on Disaster risk reduction.2019. Chapter 6: Special section on drought/ https://gar.undrr.org/chapters/chapter-6-special-section-drought

Cultivated plants and crops were found to be affected by a group of diseases and pests due to drought, which have great impacts on plants and animals. In the event of drought, it may lead to spread out of some plants pests like Cereal Leaf Miner.

The associated damages and losses could be summarized as follow:

4.3.2.1Loss of incomes

Al most all of the locals/ farmers depend on crops sales as their main source of income. The expected loss of income due to the reduced crops production/ sales might lead to the adoption of negative coping strategies by the farmers such as taking loans from companies. Besides, feed prices for livestock will be hiked and increased; livestock depends on harvested cereal grains, straw as well as grazing cereal stubbles. Some of locals (animal breeders) likely adopt negative coping like reducing the size of their herds, selling some animals even with lower prices in order to improve the cash flow and be able to feed the remaining livestock. A large number of livestock keepers started moving to Duhok province looking after pastures and grazing areas.

The farmers claimed that the drought caused wide spread of various livestock diseases and the animals' diseases which are of two groups; non-infectious diseases that are originated from the feeding such diseases are indigestion, bloating, and impaction; these diseases are mostly deadly, during the drought, the incidence of these diseases among the local livestock increase. The other groups are known as infectious diseases and most commonly viral infection such as FMD, PPR and ectoparasite (external parasites), piroplasmosis which also increase during drought and dry seasons.

The most common pests of plants are cereal rust or black rust, Cereal Leaf Miner (Syrungopais temperatella); plants pests and livestock diseases cause great economic losses through decreasing the crops productions in terms of the quality and quantities which consequently found to effect on animals' husbandry and their produces and finally on households' vulnerability and food security. It was estimated that the drought of 2017 caused 70-80% reduction in main crops productions and 50-60% of livestock industries within the area. The reduction of the main crops produces (wheat and barley) and their straws strictly hiked and doubled the prices of animals' fodders and adversely effected on the animal industry within the area.

Spreading of such diseases within the area put another burden on farmers and animals' breeder as they have to look for private sectors for medications in amid of lack of the state subsidies namely after 2017. In such condition, the poor and vulnerable households/ small farmers- crops producers are unable to maintain their business or to prepare their lands for next seasons as they do not have enough financial and logistic facilities in hand, as a consequence, large areas (Acres) will be left unprepared.

Currently, the capacities of the state related directorates are very limited; previously (before the ISIS crisis), the government was managed to cover the area at least with 75% of the required pesticides and required veterinary medicines. At this stage, nothing has been done from the side of the government to combat the infectious diseases or mitigate the effect of the non-infectious diseases of the animals or plant pests. However, the required extension services are provided on the regular bases mainly during the drought. Therefore, the local farmers'/ crop producers/ and livestock owners are totally self-dependent in terms of the required pesticides and veterinary medicine for controlling plants and animals diseases, seeds, fertilizer with good qualities in-kind supports such as animals fodders.

4.3.3 How often does drought occur?

Per the meteorological data, the records of the related locals' directorates (agricultural directorate) and the collected data from the locals during the conducted FGD and KII exercises, the area is usually faced a drought every 4-5 years. The impacts of the occurred drought usually exist for a year, but its impact may exist beyond a year. The shortage within the precipitation usually notices within the March; however, the early drought developing is emerging from January-December, but it becomes clear and prominent in March per the locals' information.

Under a changing climate, drought is likely to become more frequent and severe in the 21st century in many regions of the world[6]. A better understanding of the drought phenomenon, especially the societal and environmental vulnerability to drought and its wide-ranging impacts are more important than ever. Works need to be done to move from a re-active society fighting impacts to a pro-active society that is resilient and adapted to the drought risk, i.e. adoption of proactive risk management strategies[7]. Drought can be managed by developing drought policies and drought management plans that are adapted to the regional, national band local context[8].

4.3.4 Other forms of disasters:

In addition to the drought, the targeted areas of this assessment from time to time mainly during the harvesting seasons faced different forms of fires which originate accidentally/ negligence or electric trips. The effect of the fire on locals' produces depends on how much the crops landed area affected which common during the summer seasons/ crop harvesting seasons, May-July. At the government level, operating rooms were made (from the Mukhtars - director of the district - the firefighter - and the director of the Agriculture Division) to combat fires and any unexpected hazards. Besides, the locals, private sectors and farmers who having tractors are participating in such events by making lines of plowing/ tillage (protection lines) in front of the fires to avoid its distribution. The fire-fighter directorate has provided the farmers, locals, and the related directorates with the hot line for emergency for 24/7.

4.4 Conflicts:

The whole area (Ninawa province) including the study area was affected by the ISIS crisis which was continued from 2014-2017(three years), the crisis resulted in:

- Mass displacement of the locals,
- Losses of the locals' assets
- Losses of livestock
- Fire and damage of orchards, where nearly 4000 olives trees within the area were burned and destroyed
- Agriculturally based livelihood assets (machines, wells) were looted/ destroyed.
- Household potable water wells were destroyed or blocked through filling the well with dirt and stones

[6] Spinoni, J., Vogt, J.V., Barbosa, P., McCormick, N., Naumann, G., and Dosio, A., 2018b. World drought projections based on CORDEX data. Geophysical Research Abstracts. Vol. 20, EGU 2018-9515, EGU General Assembly 2018.

[7] Wilhite, D.A., Sivakumar, M.V.K., Pulwarty, R., 2014. Managing drought risk in a changing climate: The role of national drought policy. Weather and Climate Extremes 3, 4-13.

[8] WMO and GWP, World Meteorological Organization and Global Water Partnership, 2014. National Drought Policy Guidelines: A template for action (D.A. Wilhite). Integrated Drought Management Programme (IDMP) Tools and Guidelines Series 1. WMO, Geneva,Switzerland and GWP, Stockholm, Sweden

Destroyed and demolishing of the building and houses within the area; 93 houses were destroyed in the village of Bazgrtan, 30 houses were destroyed in the village of Shahrazad and55 houses were destroyed in the village of Ali Rash

During the crisis, the whole agricultural activities within the area were under the control of the ISIS which were stopped, and the livestock were robbed

To date, most of the farmers are suffering from the consequences of the crisis, where most of the agricultural assets, livestock were looted and destroyed. To replace them, the farmers need financial support and the government intervention which are not available at this stage or non-government intervention (NGOs support) to restore their agriculturally based livelihood and reactivate them to be active and productive communities.

4.5 Capacity assessment and Coping capacity

Hussain Fadhil is another livestock breeder also from Shahrazad village, he said" during the drought season, I used to feed my animals (sheep and cattle) with clover, he continued, I have two acres of land and I am using it for growing clover for feeding animals, but this process is very costly, because I am using generator for pumping water (heavy water) from the nearby river for irrigation. Pumping water by generator is expensive and needs great costs for maintenance of generator and fuel, continued Hussain".

Stakeholders believe that coping capacity and knowledge of the locals on drought are weak and their adopted capacities are short termed solutions with a low drought resistance management level e.g. reduce the size of cultivation of irrigated crops. The conducted exercises also revealed that all of the interviewees were not aware of a drought incidence before its onset, which made them more vulnerable to its impact. Some of the respondents mentioned that they are predicting the upcoming drought based on depth of the ground humidity (locally referred as'' Al Pala''= humidity in English) which is usually achieved following three-four days of continuous raining. While some other, mentioned that when the raining is started in early raining season (October and November) there will be a blessing year; whereas some other believed that extension of the raining to the end of March will be indicative signs for a good year.

To a great extend if not all, the locals of the targeted areas of the study are based on agricultural livelihood and mainly crops production and livestock breeding and raising projects. The current adopted coping capacities can hardly satisfy the practical requirements for coping with drought comprehensively due to the fact that the drought events are occurring frequently especially in absence of external influence in terms of drought relief packages from the government and non-governmental organizations. Therefore, there is a consensus on a need for conducting a tailored training courses to build the locals capacity and increase the locals knowledge and information on the natural disasters namely drought to enable them to put proactive measurements to combat the upcoming natural/manmade disasters.

4.6 Disaster risk management

4.6.1 DRM at District and Institutional Level

> Salim Jasim a livestock breeder and crops producer from Shahrazad Village mentioned, "in drought season we are really facing great plights and we are in suffer; the crops and the animals' fodders decrease in both of quality and quantities but their prices double. Now (this year/2021), the price of barley is 450000ID, while normally, the usual price is up to 250000ID/ tonne. He continued, the incidence and the prevalence of livestock diseases FMD, Piroplasmosis (Jaundice), mange, indigestion, etc. also are increased. In amid of the absence of the government subsidies and as a coping strategy, we are enforced to sell a part of livestock in low prices to feed the rest and cover our daily living basic need, such compensation process is not affordable by the all farmers", Salim ended his talk.

DRM at district level is limited and only deal with accidentally fires; however, at this stage, there is no DRM mechanism for slow or fast onset of natural disasters is available. Whereas, fully functional operating room exist in the district which comprise of local mukhtars, District Director, Firefighter team and Director Agriculture Division, to combat fires and any unexpected hazards. The Operating room is established on the directives and allocations of the Iraqi government.

To minimize the risk of any disaster namely fires, the operating room is partially equipped however the DRM teams at Hamdaniya operates in cooperation of local leaders to face the surfaced hazard.

At times of accidental fires, the farmers who having tractors are working together with district firefighting team by ploughing/ tillage lines in front of the fire to avoid its widespread and more destruction. The fire-fighter directorate has provided the farmers, locals, and the related directorates with the hotline number for emergency for 24/7.

4.6.2 DRM at Community-level

The collected data from the respondents revealed that Disaster Risk Management (DRM) at the community level is not easy to be adopted. However, different practices were implemented individually by the local when they are facing natural disaster such as drought. At the community level, it is difficult to practice Disaster Risk Management namely by poor/vulnerable households. The main reason is that there no formal DRM structure available at community level – during FGDs community members expressed they lack tools and equipment to take DRM measures at times of disaster. A majority of the vulnerable households/ locals are relying on humanitarian aid provided either from government, UN or NGOs. Furthermore, the perceived lack of an overarching Disaster Risk Management structure at the central government level needs to be addressed so a response/ mitigation system can be activated in areas that are prone to frequent drought, such as the study area.

5 Conclusions and Recommendations

5.1 Conclusions

Based on the collected data from the key actors/ local institutions, and the feedback obtained during the structured interviews and the community consultation, the following key conclusions can be made:

1. Among the water scarcity, climate change, drought risks and associated hazards at the community level of the targeted area are found to be most prominent especially as these impact required potable and irrigation water. Drought effects on farmers/locals in the study area

include: lack of clean water for human and animal consumption, crop failure, animal mortality and partial or total loss of source of livelihood.

2. Various coping strategies are adopted by the locals in trying to cope with above listed effects of drought; the coping mechanisms were identified are ranged from selling of the assets, purchase of supplementary feeds for livestock, travelling long distance in search of grazing and seeking alternative sources of incomes for their living. However, the adopted and followed by the locals is various but are short-lived solutions.
3. The locals within the study area are highly vulnerable to climate variability and drought conditions and most farmers claimed that they are not prepared for drought because of lack of information and the insufficient coping capacities. Therefore, there is an urgent need for early warning systems that can send warnings early on so farmers can take action by reducing planted area, change crop type to be planted, etc. Climate smart agricultural training and capacity building are needed to enable agriculture-dependent communities to deal with the drought and its associated risks on a long-term basis.
4. There is a consensus amongst the stakeholders that drought risks and their hazards are high in the region due to a number of reasons the most notable of which is the climate change.
5. The local government capacities to deal with drought are insufficient and very limited and in most of the cases are absent in the field except for DRR extension activities services which provided when needed. One of the main reason lack of availability of machinery required for tracking and forecasting drought, the other reason is training of staff to operate and maintain those machines. However, increasing of the level of education and the required information through conducting of the required training courses without external help or financial assistance from governments/ NGOs at all levels may not be enough. Further, the drought awareness raising through media and cell phones is not present at community level.

5.1 Recommendations

1. Initiating DRR and climate smart agriculture capacity building programme or activities together with drought affected and farming communities of Hamdaniya/ Ninawa. The involvement of the local line departments in such capacity building programme will build linkages between community and departments. Further it will contribute to frequent information flow which will result in effective drought mitigation measure in field.
2. Enhancing and improving present agricultural infrastructures e.g.

- Water efficient Irrigation systems i.e. drip and sprinklers
- Introducing drought resilient seeds, fodder crops and less water dependent agri-practices
- As gender focused activity, it's better to include backyard poultry farms for poultry production keeping in mind bio-security and efficient use of water for poultry production
- Restoring olive orchids and provision of subsidies to farmers to repair wells and irrigation networks in participatory manner
- Establishing advanced and innovative approaches for herders to contribute to their productivity e.g. artificial insemination, seasonal grazing areas and mobile vet services
- Encouraging farmers to adopt climate or weather resilient techniques e.g. greenhouses or tunnel farming

3. Establishing early warning system for drought alert at local and regional level. Actions need to be taken at different levels (national, governorate, and district and community level) e.g.

- Upgrade the existing relevant line departments with advanced machineries and trainings
- To establish drought/disaster monitoring committees at community, sub-district and district level and DRR plans to be developed and oriented at all levels;

- to establish district level committees or structures preferably headed by government official to manage disasters especially drought;
- establish disaster management committees at the villager level which can frequently monitor the hazards of the disasters and can guide community members for coping mechanisms
- action needs to move the society from a re-active state to a pro-active society that is resilient and adapted to the drought risk, i.e. adoption of proactive risk management strategies at the national level through developing drought policies and drought disaster management plans.

4. Active interventions are needed from Government side during and after disaster situations to avoid negative coping mechanisms. Creation of jobs opportunities for the most vulnerable households is one of such intervention.

5. At the government level-local leaders-NGOs and other stakeholders should initiate advocacy for completion of Al Jazeera irrigation water project.

6 Annex 1

Aljazeera Irrigation Project

The three irrigation projects/ Northern, Eastern, and Southern are among the most important irrigation projects that serve agriculture in Nineveh, which have been planned since the sixties of the last century. The project aims to divert part of the Tigris waters towards the vast areas of agricultural lands in Nineveh and contribute to the irrigation of tens of thousands of dunums of lands that were originally producing grains when sufficient amounts of rain were available to make the soil suitable for agriculture. These projects cover a large part of the shortage in grain production in excellent lands, as well as saving Iraq from the permanent shortage in the production of strategic grains such as wheat, barley, rice, corn, sunflower, potatoes and others, as the Tigris water will provide the possibility of cultivating grain in those areas for two seasons in one year.

Eastern Irrigation Project aims to irrigate more than a quarter of a million acres of land in the areas of Talif, Bashiqa, Bartella, Hamdania and Nimrud, the contract for its construction was signed with a Turkish company in 2009 and work continued on it until 2014/ ISIS crises.

Profiles of the targeted villages								
Village	# of farmers/ villages	# of crops producers/ village	Primary crop type?	Other livelihood resources available, locally or nearby?	Other Rangeland	#women are engaged in agriculture and allied activities?		Employment opportunity for women, if any?
Bazgrtan	20	60	Wheat and barley	livestock	Little orchards	5%		1%
Shahrazad	20	25	Wheat and barley	livestock	Little orchards/ olives	15%		10%
Ali Rash	100	40	Wheat and barley	livestock	5 acre/ irrigated land/ olive	5%		10%
Community profile								
Village	Location	Population	Sex ratio	Youth %	Literacy rate	Elderly people - 60> years olds	Vulnerability %	IDPs in village
Bazgrtan	Bartula sub-district	375 HHs/ 2300 individuals	Males 50%, Female 50%	20%	50%	15%	100%	30 HHs
Shahrazad	Bartula sub-district	120 HHs/ 690 individuals	Males 60%, Female 40%	60%	90%	5%	40%	35HHs
Ali Rash	Bartula sub-district	1000HHs/ 6000 individuals	Males 50%, Female 50%	30%	90%	10%	100%	300HHs
Agriculture and Allied Sectors:								
					Main types of livestock			
village	Total arable land in acre	Irrigated land	Agriculture Production System		sheep	cattle	Other source of income	
Bazgrtan	4000	10 acre	Open system/ crop production		2000	500	Agriculture	

Shahrazad	600	Little -	Open system/ crop production	650	400	Agriculture only	
Ali Rash	100000	-	Open system/ crop production	700	50	Agriculture only	