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Climate Smart Agriculture: Enhancing Adaptive Capacity of the Rural Communities in Lebanon (AgriCAL)

Technical Support to Climate Change Unit at the Ministry of Environment

Linkages between Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) in the Agriculture Sector

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Article I. Introduction

Section 1.01 Definition of Climate Change (CC) and Climate Change Adaptation

The UNFCCC defines climate change as "A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (UNFCCC 1992). Vital natural resources all over the world on which millions of people (particularly rural communities) rely on for their existence, including land, agricultural crops, forests and rainfall are today being adversely affected by climate change. The main cause of recent climate change is the release of greenhouse gases, particularly carbon dioxide, into the atmosphere as a result of human activities *(Figure 1)* (IPCC 2014a).

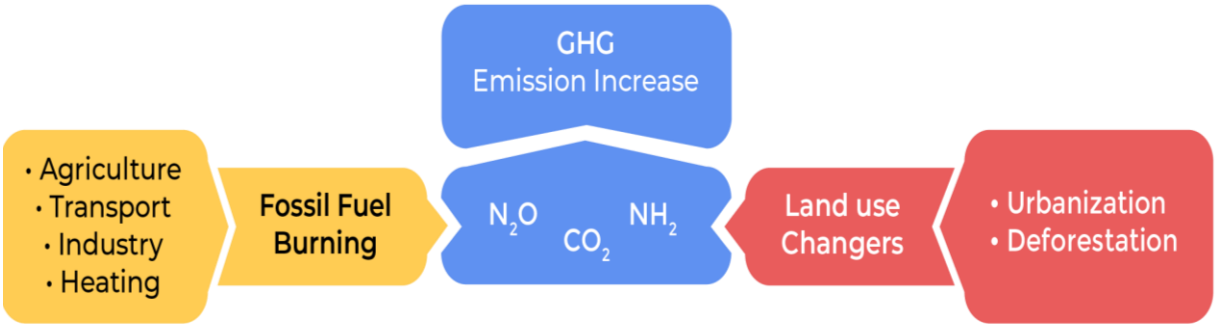

Figure 1 Human activities contributing to GHG emission increases

Greenhouse gases (GHG) released by human activities trap outgoing infrared radiation within the Earth's atmosphere, enhancing the natural greenhouse effect and resulting in anthropogenically induced global warming. This increase in temperature creates a ripple effect within the climate system, facilitating more frequent, intense and protracted extreme weather events, with increasingly detrimental impacts upon societies while increasing vulnerability (IFRC 2009). However, mitigating the reduction of GHG is no longer sufficient, there are global changes that have been set in motion that require different forms of adaptation. Vulnerability to climate change can be determined by three factors: exposure to hazards, the sensitivity of communities to those hazards, and their capacity to adapt to them. Adaptation measures can help reduce vulnerability as well as allow populations to benefit from opportunities of climatic changes, such as growing new crops in areas that were previously unsuitable or integrating climate change adaptation into national policies (Karfakis, Smulders, and Lipper 2012).

Section 1.02 Escalation of long-term CC impacts into hazardous natural disasters

Long-term changes in climate have already altered temperatures and distribution of rainfall, contributed to sea-level rise and increased the frequency and intensity of extreme weather events globally. Events of droughts, heatwaves, floods and cyclones have increased over the past few years; most recently, incidents such as the great floods in Thailand in 2011, Hurricane Sandy in the United States in 2012, and Typhoon Haiyan in the Philippines in 2013. The year 2014 was the Earth's warmest in 134 years of recorded history (IPCC 2018).

The Fifth Assessment Report (AR5) conducted by the Intergovernmental Panel on Climate Change (IPCC 2014b), highlights the socio-economic repercussions from recent climate-related extremes. Events such as heat waves, droughts, floods, cyclones, and wildfires reveal significant vulnerability and exposure of most ecosystems and many human systems to current climate variability, often with negative outcomes for livelihoods, especially for people living in poverty. *Table 1* lists some of the changes in climate that have and will continue to escalate into hazardous events.

Table 1 Climate change impacts

Temperature	Mean annual temperatures are likely to exceed 2° degrees Celcius (°C) with maximum projected increases up to 6°C by the year 2100
Precipitation	Is projected to decrease by 40% in the Arab region, especially North Africa, directly affecting crop production
Sea Level Rise	By the end of the century, climate change is likely to cause global mean sea level to rise by 26 to 82 centimetres. Combined with an increased frequency of storm surges and saltwater intrusion into rivers and aquifers it is likely to affect water quality and agricultural productivity in the low-lying coastal regions
Heat Waves	Were recorded across the Arab region with the hottest temperature in the World recorded in Kuwait and are expected to increase reaching record highs
Droughts	Droughts that used to occur every six to eight years now take place every one to two years, and the Horn of Africa recently experienced its most severe drought in 60 years

Section 1.03 Identify "Disasters" and Disaster Risk Management/Resilience (DRM/R)

Disasters are not random and do not occur by accident; they are the convergence of hazards and vulnerable conditions. Disasters reveal underlying social, economic, political and environmental problems, and contribute to worsening them (ISDR 2009). Such events pose serious challenges to development, as they erode hard-earned gains in terms of political, social and educational progress,

as well as infrastructure and technological development. Disaster risk is the consequence of the interaction between a hazard and the characteristics that make people and places vulnerable and exposed (Figure 2)

Figure 2 Disaster Risk

Environmental degradation, settlement patterns, livelihood choices and behaviour can all contribute to increase **disaster risk**, which in turn adversely affects human development and contributes to further environmental degradation. Principally, the poorest are the most vulnerable to disasters because they are often pushed to settle on the most marginal lands and have least access to prevention, preparedness and early warning. In addition, the poorest are the least resilient in recovering from disasters because they lack support networks, risk insurance and alternative livelihood options. Disaster risk is therefore considered as the combination of the severity and frequency of a hazard, the numbers of people and assets exposed to the hazard, and their vulnerability to damage (UNISDR 2016). There are different types of hazards that can be the cause of major loss of life and a high risk to vulnerable livelihoods (see Figure 3).

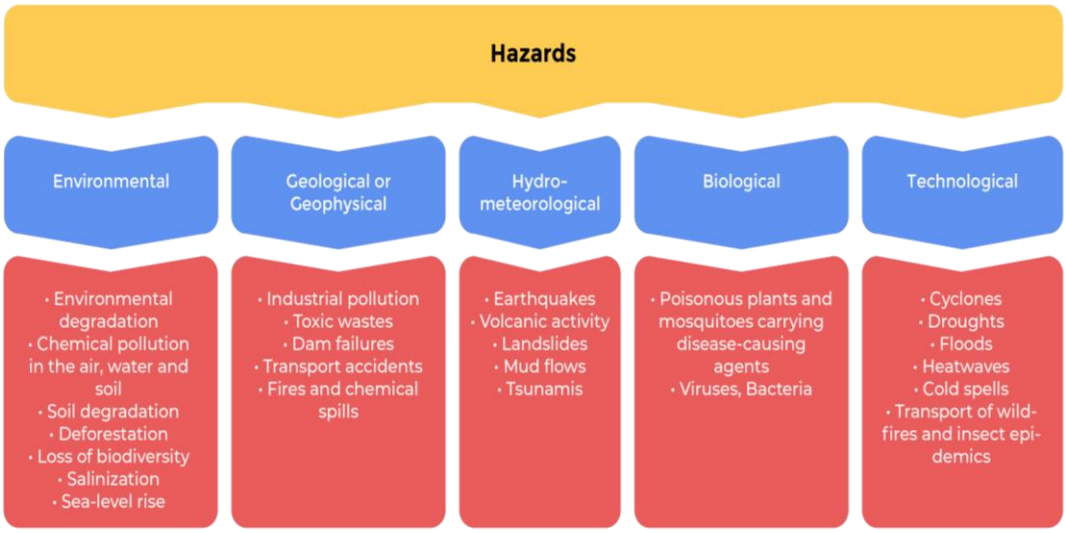

Figure 3 Types of Hazards

Disaster Risk Management

Disaster risk reduction (DRR) is the policy goal of antedating risk. Hence disaster risk management (DRM) is interchangeably used with DRR as a form of implementation to DRR. DRM describes the actions that need to be taken to achieve the objective of reducing risk. Disaster risk is an indicator of poor development, so reducing disaster risk requires integrating DRR policy and DRM practice into sustainable development goals. Practices such as avoiding the creation of new risks, tackling pre-existing risks, spreading risk awareness in order to minimalize disaster losses if and when disasters occur (UNEP 2008).

Successful DRR is the result of top-down institutional changes and strategies combined with bottom-up local and community-based approaches. Standalone DRM programs that do not follow institutional as well as community-based approaches have proven to be a failure (IPCC 2014b; ISDR 2009; UNISDR 2017). Underlying risk drivers need to be addressed and tailored to local contexts, there is no 'one-size fits all' approach to DRM, but there exist several approaches and frameworks, which have been effectively implemented to reduce disaster risk. But, before being able to reduce risk, there is a need to understand the hazards, and the exposure and vulnerability of people and assets to those hazards. DRM activities mainly focus on prevention, mitigation, transfer and preparedness. This is summarized in *Table 2*.

Table 2 DRM activities adapted from the UNISDR 2017 report

Prevention	Activities and measures to avoid existing and new disaster risks such as, relocating exposed people and assets away from a hazard area.
Mitigation	The lessening or limitation of the adverse impacts of hazards and related disasters. For instance, constructing flood defences, planting trees to stabilize slopes and implementing strict land use and building construction codes.
Transfer	The process of formally or informally shifting the financial consequences of particular risks from one party to another. For example, risk insurance.
Preparedness	The knowledge and capacities of governments, professional response and recovery organisations, communities and individuals to effectively anticipate, respond to, and recover from the impacts of likely, imminent or current hazard events or conditions. For instance, installing early warning systems, identifying evacuation routes and preparing emergency supplies.

The implementation of these protocols is rarely if ever done in isolation, numerous activities need to be implemented in combination such as identifying and measuring disaster risk, informing people about risk and raising awareness to the topic, incorporating DRM into national legislation and providing financial protection for people and businesses at risk. Essentially, DRR/M only succeeds in risk reduction by building on and strengthening the resources within a community, focusing on the increasing the resilience of people and eventually improve their well-being.

Article II. Linkages and Frameworks

Section 2.01 Linkages between CCA and DRM/R

"The environment and disasters are inherently linked" (IPCC 2014b) because of the strong dependency and interconnectedness of natural resources with the environment. Deforestation, degradation of catchments/watersheds, degradation of land and desertification, depletion of reefs and coastal ecosystems especially of corals and mangroves, among other factors, reduce nature's defence capacity against hazards and aggravate the impact of disasters such as floods, landslides, storm surges, hurricanes and drought. Disasters in turn contribute to ecosystem degradation and loss, including increased soil erosion, declining rangeland quality, salinization of soils, and biodiversity loss.

Degradation of environmental systems has major socio-economic repercussions on the human condition. It drives increasing numbers of people to marginal lands and fragile environments. In relation specifically to disaster risks, climate change is expected to result in more frequent and intensive climate-related hazards. It will magnify existing patterns of disaster risk and present scenarios that surpass the existing capacity of the humanitarian and development communities, it will also increase the frequency and intensity, reduce the predictability and change the spatial distribution of extreme climatic hazards, such as temperature extremes, floods and droughts, heat waves, wild-land fires and storms, with a range of effects in different regions. Some impacts will occur in regions with no history of a given hazard. All of which will increase the risk and vulnerability of social groups and economic sectors as existing vulnerabilities are compounded by climate change-related processes, such as sea level rise, glacier melt and ecosystem stress and degradation of natural resources. The increase in vulnerability will vary by region: regions dependent on subsistence agriculture may be affected by food and water shortages; small island developing states and coastal zones will experience a rise in sea level; regions depending on water from glacier melt for agriculture and human consumption could experience water shortages. A comprehensive approach to disaster risk reduction acknowledges the role of the environment in triggering disasters and protecting communities. At the same time, it recognizes that the environment is itself vulnerable to disasters and

post-disaster recovery. The overlap between climate change adaptation and disaster risk reduction can be seen in *Figure 4* (IPCC 2013; Karfakis et al. 2012; Wreford, Moran, and Adger 2010).

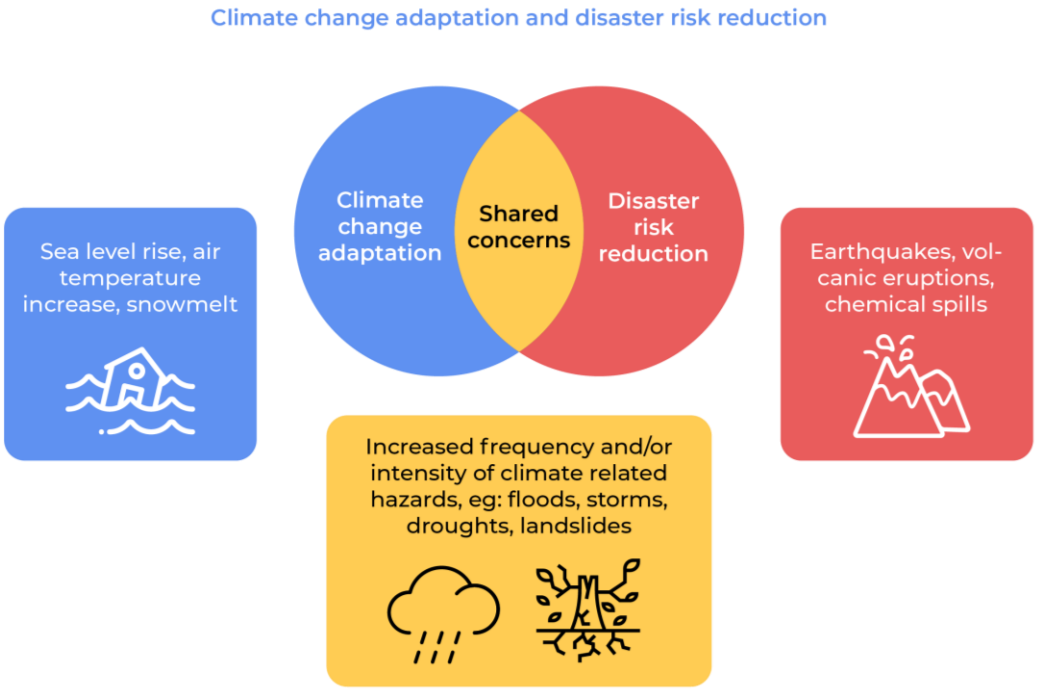

Figure 4 Common challenges between CCA and DRR

DRR and CCA share common objectives such as reducing community vulnerability and achieving sustainable development. They also share a common conceptual understanding of the components that make up risk and the methods and process to build resilience; both highlight exposure and vulnerability as a product of risk. Both exposure and vulnerability are compounded by other societal and environmental trends, such as urbanization, environmental degradation, and the globalization of markets. Thus, to reduce these risks, exposure needs to be minimized, vulnerability reduced, and capacities for resilience strengthened. This is a dynamic process requiring continual effort across economic, social, cultural, environmental, institutional and political spheres to move from vulnerability to resilience. The differences and synergies between DRR and CCA can be seen in Table 3.

Table 3 Differences and synergies between DRR and CCA

	DRR	CCA
Differences	• Focuses on all types of hazards	• Does not focus on natural disasters
	• Utilizes participatory assessments, policy analysis and secondary research	• Utilizes a combination of secondary assessments and research, as well as climate change scientific tools
	• Intervenes on a community level	• Intervenes on multiple levels, from community to international
	• Defines impact by number of lives lost, and people affected	• Defines impact by its effect on livelihoods, productivity and development process
	• Is driven by humanitarian actors	• Draws in actors from multiple sectors (environment, development)
	• DRR is grounded in local knowledge and experience	• Finds the links between local knowledge and international climate information, and focuses on future projections
Synergies	• CCA can be strengthened by taking into consideration the risk of natural hazards	
	• CCA builds on DRR local knowledge, and DRR can enhance prevention by taking into consideration CCA future climate projections	
	• Both CCA and DRR use similar sets of tools, these tools can be optimized in order to facilitate integration	
	• CCA funds can propel DRR forward and provide opportunities for long-term approaches	

Section 2.02 Linkages between CCA, DRM/R and Agriculture

Worldwide, there are 925 million undernourished people, and hungry people account for 16% of developing countries' populations. The livelihoods of 2.5 billion smallholders depend on agriculture, fisheries, forests and livestock for their livelihoods. These sectors are most affected by extreme weather events, making resource-poor farmers/fishers/herders even more vulnerable to disasters and impacts of climate change. In most of the Least Developed Countries, agriculture and related sectors are the main economic drivers and account for almost one-third of the GDP (Wreford et al. 2010). Globally, over 500 million people depend, directly or indirectly, on fisheries and aquaculture. Similar importance applies to livestock, which in many regions is central to the livelihoods of the poor and often forms an integral part of mixed farming systems; livestock provides sources of employment, income, quality food, fuel, draught power and fertilizer. Floods, hurricanes, tsunamis and other hazards destroy agricultural infrastructure and assets, crops, inputs and production capacity. Drought alone has caused more deaths during the last century than any other physical hazard. Asia and Africa rank first among continents in the number of people directly affected, while Africa has a high concentration of deaths associated with drought. These natural hazards have a direct impact on **agriculture**, **food safety** and **quality and food and nutrition security**. They interrupt market access, trade and food supply to the cities. They reduce income, deplete savings, and erode livelihoods.

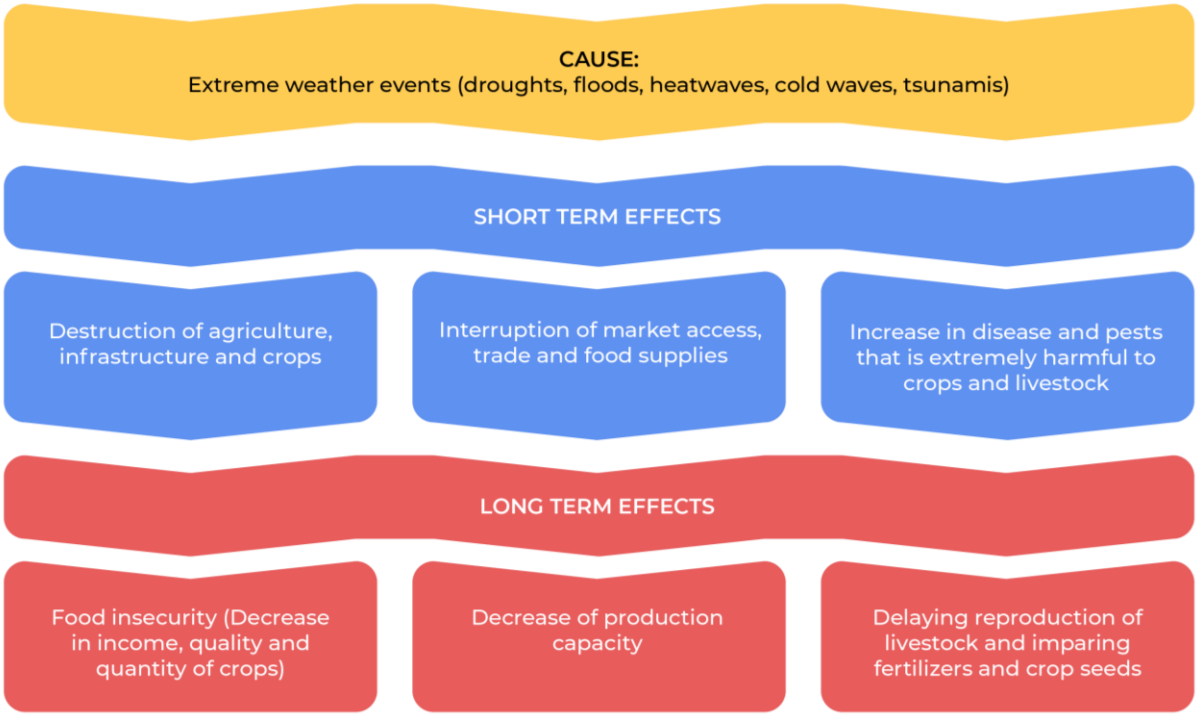

Figure 5 The impact of extreme weather events on the agricultural sector

Transboundary plant pests and diseases, such as locusts, armyworms and wheat rust, and transboundary animal diseases such as African swine fever, foot-and-mouth disease and Rift Valley

fever, have a direct economic impact by reducing or eliminating agricultural and livestock production. Furthermore, pests and diseases may adversely affect prices and trade, negatively affecting farm income. Reduced productivity of crops or animals can have a long-lasting effect as well (IPCC 2014a). Pest infestations can impair fertilization rates or seed recovery. Diseases can have lasting effects on livestock output by delaying reproduction, leading to a reduced population and extended food and nutrition insecurity *(Figure 5)*.

While distinct in scope, DRR and climate change adaptation share a common concern over climate-related extreme events. In the agriculture sector, they both aim to build resilient livelihoods in the sense that better DRR will help the world adapt to climate change, and that DRR should be applied "...as a first line of defence in adapting to climate change" *(Ban, 2008)*.

An analysis of crop and livestock production trends in 67 countries reveals significant losses associated with the medium- and large-scale disasters. The 67 countries analysed together faced a total of USD 80 billion in crop and livestock production losses after the 140 medium- to large-scale disasters assessed between 2003 and 2013, or an average of USD 7.3 billion per year (RICCAR 2017). These losses were suffered by countries that derive a substantial share of GDP from the agriculture sector (an average of 21 percent between 2003 and 2013), and where agriculture contributes an average of 30 percent of total employment. Most crop and livestock production losses occurred after floods and droughts, which together account for 83 percent of total losses. This provides further evidence that climate-related disasters have a considerable impact on agriculture.

Section 2.03 International examples of linkages between CCA and DRR

There has been a lot of progress as far as linking the processes of disaster risk reduction and climate change adaptation in many countries. The connections between DRR and CCA are a result of a decade of progress in the field of DRR. In many high-risk disaster-prone regions, local disaster management has become increasingly important and tied to climate change. While CCA tackles climate-related hazards associated with changes in the average climate conditions, DRR deals with all hazards, focusing on hydro-meteorological and geophysical hazards. Their point of convergence is in their management of climate-related risk.

One example is Bhutan, which fully adopted the shift from managing disasters to managing risks and has commenced taking part in regional projects to fully integrate climate change into DRR. Interventions such as:

- The Glacier Lake Outburst Flood (GLOF) Project, where it has been observed that the frequency of the occurrence of Glacier Lake Outburst Flood (GLOF), which may cause disasters to life and property downstream, has been increasing in the second half of the

twentieth century in the Himalayan region. GLOF is expected to provide results through baseline surveys that began in 2010 and have been followed by a series of activities for awareness raising including the production of GLOF hazard maps and relevant materials for use by local governments.

- "Preparedness for Climate Change phase two" project as part of a larger regional effort with the objective of building capacity in national societies and delegations at large to assess and address the humanitarian consequences of climate change.
- A Multispectral Technical Committee on Climate Change (MSTCCC) has been set up to support climate change activities in Bhutan in a technical and advisory role. Many agencies, NGOs and organizations in Bhutan also implement various activities and projects related to climate change within their respective sectors. Three projects prioritized under the Bhutan National Adaptation Program for Action (NAPA) are already being implemented.(Shrestha et al. 2015).

Another example is India which has been affected by numerous severe floods over the past few decades, especially in the city of Pune where three of its rivers converge. Relying on future climate projections and taking into consideration preventative measures to avoid future disasters; vulnerability assessments and early warning systems were used to serve adaptation policy-makers and managers in developing a climate change adaptation and mitigation plan. Actions were taken by analysing hourly rainfall intensity and examining the likely changes in impacts on low lying areas and places where natural drainage was blocked by construction of houses or by roads without adequate bridges; by developing a detailed city drainage map; and creating property tax incentives to encourage households to recycle wastewater or use rainwater harvesting by storing run off from their roofs for domestic use. These efforts were complemented by improvements in flood monitoring and warning systems and social protection for affected families.

In Peru, a collaborated effort between Peruvian national and regional authorities as well as international NGOs has resulted in an adaptation programme in the Southern Andean regions of Apurimac and Cusco, in which disaster risk reduction is highlighted as a major component. The programme, called the Climate Change Adaptation Programme (Spanish acronym PACC), focuses on water resources, disaster prevention and food security, and combines local and scientific knowledge in an interdisciplinary fashion (UNISDR 2009).

Experiences with integrating DRR in the context of CCA has its benefits and certainly has its challenges which are listed in ***Error! Reference source not found.***.

Table 4. Action towards integration and challenges of CCA and DRR

• Start-up trainings and workshops • Establishing a common resource center for DRR and CCA • Mainstreaming CCA and DRR into local development planning and school curriculums • Including disaster risk and climate vulnerability assessments when tackling sustainable development • Actions must be implemented through the policies of other sectors, in particularly, those of agriculture, water resources, health, land use, environment, finance and planning • Use of multi-setctoral and multi-stakeholder approach • Overcome fragmented policy frameworks • Practicing of roles and responsibilities for disaster response, since severe weather may become more frequent and intense with climate change • Draw upon traditional knowledge where possible and where possible, link local observations of climate change to scientific knowledge	• Institutional barriers cause cooperation rifts • Funding problems in most developing countries which depend on international aid • Problems in risk perception and communication (where the severity of the problem is not coming across by the scientific community) • There is more focus on response than there is on prevention • Lack of political will which affects policy making and pro DRR and CCA legislation to be in full effect

Section 2.04 What are the International frameworks for CCA and DRR?

A. Climate change:

There is not an abundance of international agreements or frameworks that function as a framework for tackling climate change problems around the world; however, the Sustainable Development Goals and more recently the Paris Agreement under the UNFCCC, function as a global mandate or guideline to reducing the effects of climate change globally. The 17 Sustainable Development Goals (SDGs) and 169 targets lie at the heart of the development framework which was the result of two years of intensive public consultations and engagement between states, civil society and other stakeholders. Its key areas of concern are “to eradicate poverty and hunger in all forms, to combat inequalities within and among countries, to build peaceful, just and inclusive societies, to protect human rights and promote gender equality and the empowerment of women and girls, and to ensure the lasting protection of the planet and its natural resources by 2030” (UN 2015). Goals 1 through 3 of the SDGs (poverty, hunger and well-being) highlight the human condition when exposed to disasters. DRR is highlighted in Goal 11 of the SDGs: “Make cities and human settlements inclusive, safe, resilient and sustainable”, which also calls for a focus on disaster resilient cities and human settlements, as well as

carrying out DRR at all levels. Similarly, climate change issues are dealt with separately in Goal 13 of the SDGs: "Take urgent action to combat climate change and its impacts", for which a specific annual

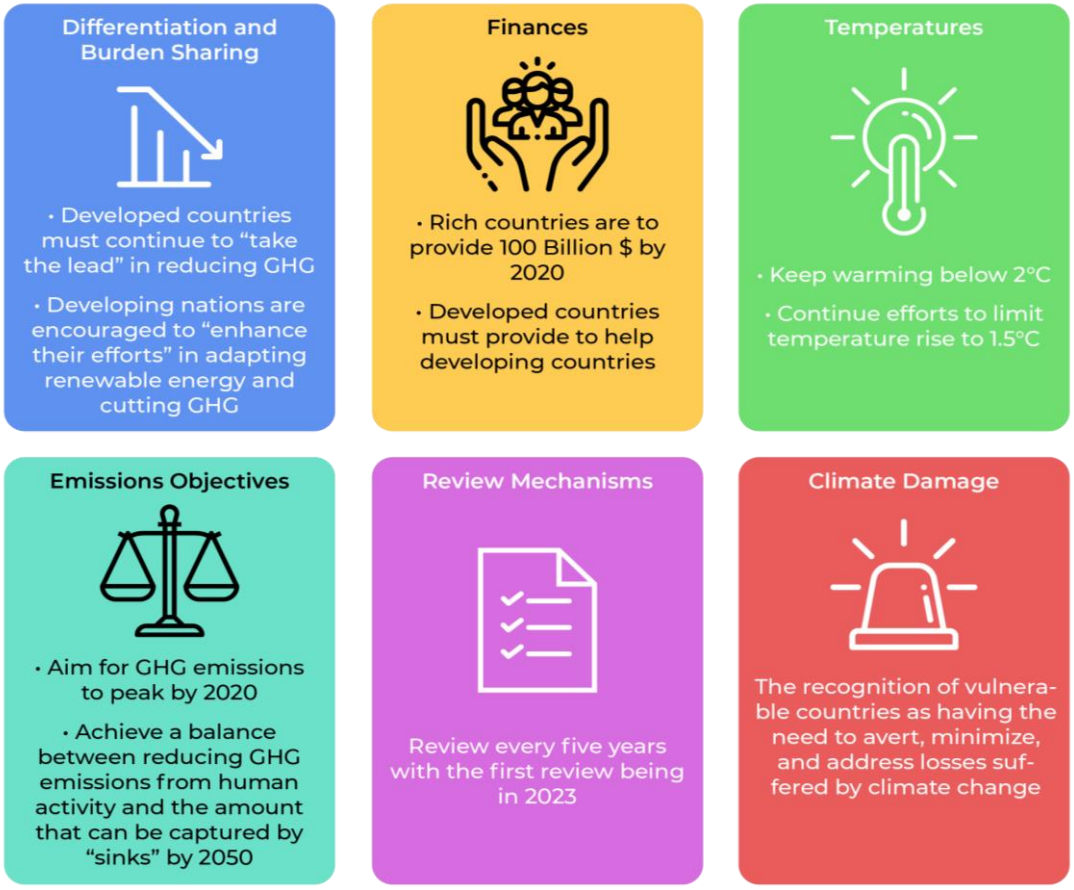

Figure 6 Highlights of the Paris Agreement (UNFCCC 2015)

fund target of USD100 billion has been set for 2020.

With goals set by the SDGs on such a general scale, climate change still lacked a global consensus on its framework, until the Paris Agreement took place in December of 2015. Mitigation options always dominated climate change issues in the early days of the UNFCCC, but then increases in climate related hazards prompted adaptation measures that started to garner the attention of the global community. Climate change adaptation was tackled in COP 10 in Buenos Aires, and then received successful boosts with the adoption of the Bali action plan in 2007, followed by the COPs in Cancun, Mexico, ending with the Paris Agreement. The key points from the Paris Agreement can be seen in *Figure 6* where the emphasis is on adaptation, loss, and damage issues. The Agreement acknowledges the significant need for adaptation and urges governments and related stakeholders to undertake measures that embody the Cancun Adaptation Framework for sharing information, strengthening institutional mechanisms, strengthening scientific knowledge, assisting developing countries in identifying suitable adaptation practices, and improving effectiveness and durability of adaptation actions.

The Hyogo framework addressed climate change in sector development planning programmes; in promoting the integration of risk reduction with existing climate variability through identifying climate disaster risks and designing specific risk reduction measures and an improved and routine use of climate risk information by planners, engineers and decision makers. It was seen as a positive contributor the progress towards the achievement of the Millennium Development Goals (UNISDR 2015)

Building on the Hyogo framework and learning from its lessons, the Sendai framework highlights the development, strengthening and implementation of relevant policies, plans, practices and mechanisms needed to aim at climate change agendas. It mentions how important it is to promote the conduct of comprehensive surveys on multi-hazard disaster risks and the development of regional disaster risk assessments and maps, including climate change scenarios. The Sendai framework clearly points out in its Preamble that effective disaster risk management contributes to sustainable development. It further notes that the increase in frequency and intensity of climate-induced disasters have impeded sustainable development – clearly linking the need for action in climate adaptation as a means to reducing disaster risk.

B. Disaster Risk:

The concept of DRR has evolved since its inception as the first UN resolution in 1985 which established the 1990-2000 decade as the International Decade of Natural Disaster Reduction (IDNDR) decade. The DRR concept then became the International Strategy for Disaster Reduction (ISDR) in 2000. As seen in *Figure 7*, the first world conference regarding disaster reduction was held in 1994 in Japan, the

Figure 7 SFDRR priority areas and targets

Yokohama conference was then followed by the establishment of the first global framework on DRR, which was the Hyogo Framework for Action (HFA) in 2005. The HFA had five priorities: 1) institutionalize DRR efforts; 2) identify, assess, monitor disaster risks; 3) use knowledge, innovation, and education to build a safer cultural environment; 4) reduce underlying risk factors; and 5) strengthen disaster preparedness for effective responses (UNISDR 2005). All the priorities link to development issues and climate change on different sectoral levels.

The Sendai Framework for Disaster Risk Reduction (SFDRR) is the successor of the HFA, established in 2015, the SFDRR has four priorities and seven global targets *(Figure 8)* (UNISDR 2015). Development issues are directly related to priority 1 as well as 3. SFDRR is characterised by its strong focus on stakeholder roles, such as civil society organisations, voluntary groups, academia, science and technology groups, the business community and the private sector.

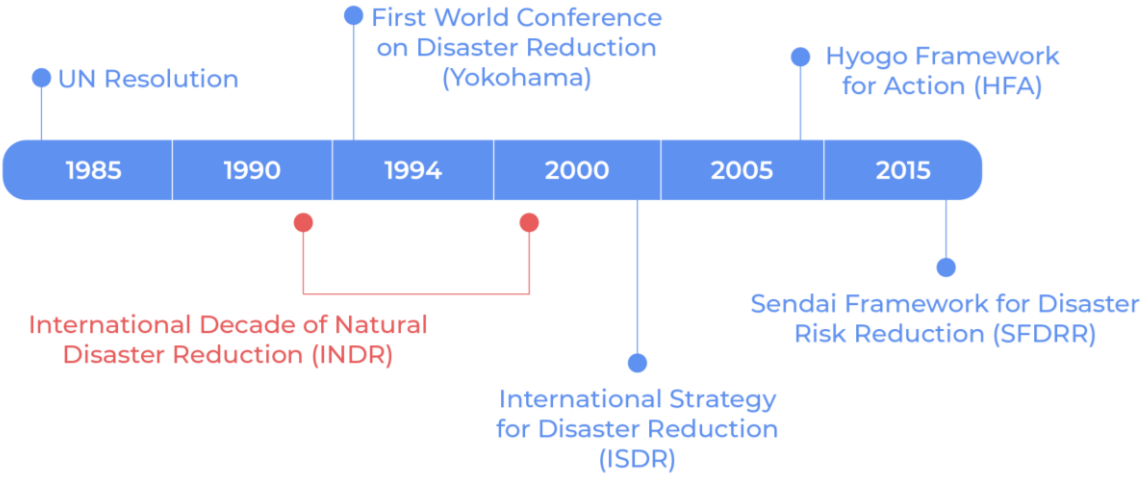

Figure 8 Evolution of the DRR concept

Section 2.05 Frameworks for CCA and DRM/R in Lebanon

Risk reduction is a common converging goal for CCA and DRR. Both CCA and DRR have an objective of reducing factors that contribute to climate-related risk. Both approaches envisage pro-active anticipatory actions to reduce climate risk of different time scales. The notion of possible emergence of historically not experienced climate risks due to climate change could entail disaster risk management to deal with uncertainty and new pattern of risks. Disaster risk management has a history of evolving, adapting and applying new tools and practices to deal with new information and emerging social and economic demands. DRR and CCA share a common feature. They are not sectors within themselves but must be implemented through the policies of other sectors those of agriculture, water resources, health, land use, environment, infrastructure, finance, planning, etc.. There are also

linkages with other policies, most notably poverty eradication and planning for sustainable development, and education and science.

The lack of integration amongst both concepts/policies can result in duplication of efforts and innovation, administrative inefficiencies, competition and poor communication. But mostly, it can lead to non-enduring, unsustainable results due to the lack of a well-structured political body to follow up.

Table 5 Frameworks and Strategies endorsed by Lebanon

	CCA	DRR
International	Paris Agreement (2015)	Sendai Framework (2015-2030)
	Sustainable Development Goals (2030)	
	Kyoto Protocol (1997)	Hyogo Framework (2005-2015)
	UNFCCC (1992)	
Regional	Arab Strategic Framework for Sustainable Development (ASFSD) 2015-2025	Arab Strategy for Disaster Risk Reduction (ASDRR; 2020)
	The Arab Framework Action Plan on Climate Change (AFAP- CC; 2010-2020)	
National	Nationally Determined Contributions (2015)	
	Ministry of Agriculture's National Strategy (2015-2019)	

The international frameworks that act as a guideline to developing regional and national strategies in the MENA region are presented in *Table 4*. Lebanon ratified the UNFCCC with Law No. 359 as a Non-Annex I Party in 1994; ratified the Kyoto protocol in 2006; took part and signed the Paris agreement in 2016, and ratified it in 2019, (Diehl, Bachinger, and Hamadeh 2015) .

To coordinate climate action in the Arab region, The Arab Framework Action Plan on Climate Change (AFAP- CC; 2010-2020) was developed as a strategic regional climate policy framework, the AFAPCC is supported by the RICCAR integrated assessment which utilizes climate models to inform climate change adaptation policies, measures and disaster risk reduction. The overall objective of AFAPCC is to strengthen capacities of League of Arab States (LAS) member states to take appropriate measures in addressing the urgent challenge of climate change and ensure climate-resilient development in the

Arab region with adaptation as a major priority. The poor were singled out for particular consideration especially that they are the most vulnerable to the dire impacts of climate change while having done little to cause it. Other AFAPCC priorities include: mapping climate risks in the region; conducting integrated vulnerability assessments; developing cross-sectoral adaptation strategies; and creating an enabling environment for regional action. Especially noteworthy in the AFAPCC is the focus on and linkage to DRR by advocating for the formulation and implementation strategies for DRR within climate change adaptation.

The Arab Strategy for Disaster Risk Reduction (ASDRR; 2020) is the commonly agreed on regional framework to integrate DRR measures into development, while also helping to build regional, national and local capacities in DRR. The development of the ASDRR was supported by the United Nations Office for Disaster Risk Reduction (UNISDR) with contributions by specialized agencies, Arab technical organizations, the International Federation for Red Cross and Red Crescent Societies (IFRC), and the World Bank Global Facility for Disaster Reduction and Recovery (GFDRR). The adoption of the ASDRR strategy was driven by the commitment made by LAS to promote integration of DRR measures into regional policies on sustainable development, CCA, and environment and disaster management (RICCAR 2017).

As far as national frameworks related to climate change, Lebanon submitted its Nationally Determined Contributions (NDC) in 2015 in which it pledged to promote climate change adaptation through mainstreaming and building institutional capacity. Mitigation targets were set to achieve a reduction of 15% compared to the Business As-Usual (BAU) scenario in 2030, 15% of the power and heat demand in 2030 would be generated by renewable energy sources, and a 3% reduction in power demand through energy-efficiency measures in 2030 compared to the demand under the Business-As-Usual scenario. A National Sustainable Development Strategy was also to be set in place but it is still in the works.

The Ministry of Agriculture Strategy (2015-2019) briefly tackles climate change impacts through ensuring sustainable management and use of natural resources (land, forest, water, genetic resources, fisheries and aquaculture resources…). In this strategy under the heading “Responding to climate change”, it was proposed to mainstream climate change into activities of MoA and also to introduce adaptation measures; and conduct studies to estimate greenhouse gas emissions from the agricultural sector, land use changes and forestry. The strategy aims through its various courses of actions/areas of intervention to reduce impacts of climate change and GHG emissions in the agricultural sector (MoA 2015).

With respect to DRR, Lebanon has been planning for a better disaster resilience for a decade by endorsing and adopting the Hyogo framework for Action (HFA) to reduce loss of lives and social, economic, and environmental assets when hazards strike. In 2015, Lebanon carried on by adopting the successor of the HFA, the Sendai Framework whose priority is to reduce the disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries. The framework recognizes that the State has the primary role to reduce disaster risk, but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders. . However, a National Strategy for Disaster Risk Reduction/Management has yet to be published for Lebanon.

On the local and sectoral level, the Ministry of Environment also implemented hazard-mapping on climate change and has updated its identification of hazard areas; and at sectoral level the Ministry of Environment developed the Climate Change Coordinating Unit (CCCU), designed to improve climate change governance through developing national and sectoral plans to coordinate climate change initiatives (MoE 2011).

Overall on the national level, and in addition to the above, Lebanon adopted the Arab Strategy for Disaster Risk Reduction (ASDRR; 2020) and other strategies that contribute to mainstreaming climate change adaptation into sectors such as biodiversity (draft National Biodiversity Strategy and Action Plan, NBSAP, 2015), water (National Water Sector Strategy, 2012), forestry and agriculture (National Forest Plan, NFP, 2015 and Ministry of Agriculture Strategy, 2015). These strategies either focus on DRR or CCA, however, the silo approach persists in that each strategy is developed in isolation of others. This leads to overlapping, and thus redundant, activities by various programs/strategies. It is hence important to initiate coordination activities at the outset during the development of the various strategies to ensure that synergies rather than redundant actions.

Article III. The Case of Lebanon

Section 3.01 Lebanon and the impact of CCA and DRR on the agricultural sector

Lebanon is a middle-income country with a democratic political system. Its liberal economy largely relies on services, and its society is characterised by cultural diversity and openness. Lebanon is endowed with a strategic location between Europe and the Gulf States and a Mediterranean climate favourable for fruits and vegetables production, along with fertile soils and a relative abundance of water. However, the country is vulnerable to disasters/crises risks from multiple sources including

natural hazards and human induced disasters (CNRS and FAO 2018). Lebanon's Mediterranean climate makes it vulnerable to specific climate change impacts which can be seen in the following table:

Table 6 climate change impacts in Lebanon

Changes	Impact	Damages
Temperature	• Increase in annual mean temperature of 0.11 °C per decade, more so in spring and summer • Increase in the number of "hot" nights by 7 percent, mostly from June to September • The fluctuation is temperature has caused frosts and heatwaves to become more frequent	• Reduced productivity of land used to produce most crops and fruit trees • Increased evaporation of surface water sources as well as reduced snow cover, earlier snowmelt altering seasonal water regimes • Temperature-induced changes or declines in marine fish stock and marine biodiversity (increase in sardine population, but also an increase in toxic algae blooms)
Rainfall	• Decrease in precipitation of 11 mm per month on average since 1950 • Projection of decrease in precipitation of 4–11 percent by 2100 (IPCC 2014)	• Crops and fruit trees damage • Fruit trees flower early • Increased vulnerability of agricultural plains of Akkar, Damour, Saida and Tyre to coastal flooding and inundation
Droughts	• According to LARI there is 40 to 50 percent decrease in rainfall in the country compared with an average year which has been causing droughts that have been drastically impacting the agricultural sector	• Rainfed agriculture affected • Groundwater sources did not replenish • Surface water sources dried up • Bekaa potato farmers lost crops or did not cultivate potatoes
Floods	• Increase in the intensity of floods occurring in the Baalbek-Hermel governorate affecting mostly the agricultural sector	• Damage to most crops field • Higher erosion risk

Lebanon's climate is typical of the Mediterranean region with four distinct seasons that encompass a rainy period followed by a dry period. The diverse weather serves for a diverse and rich agricultural sector. Lebanon's agricultural is the most economically vulnerable sector to climate change and disaster impacts as it is directly affected by change in rainfall patterns and temperature. A study conducted by the CNRS concluded that the most damaged agricultural sub-sectors reflected in the biggest economic losses are seasonal crops, followed by fruit strees, greenhouses, other permanent crops, forestry sector, animal sector and finally fishery sector. The study also ranked the most impactful disasters causing damage to these sub-sectors *(Figure 9)*. Economic cost of the damages was estimated as follows: Floods (US$330 million) are considered the most damaging disaster on agricultural sectors, followed by cold waves (US$241 million), winter storms (US$212 million), heavy rainfall (US$177 million), heat waves (US$149 million), wildfires (US$125 million), strong wind (US$93 million) and landslides/land erosion as cause of least damage (US$74 million) (CNRS and FAO 2018).

Over the past decade, the impact of climate change has escalated quickly and can be seen through the numerous disasters that have struck the country, having cataclysmic consequences on the human condition and increasing immensely the vulnerability of the Lebanese people.

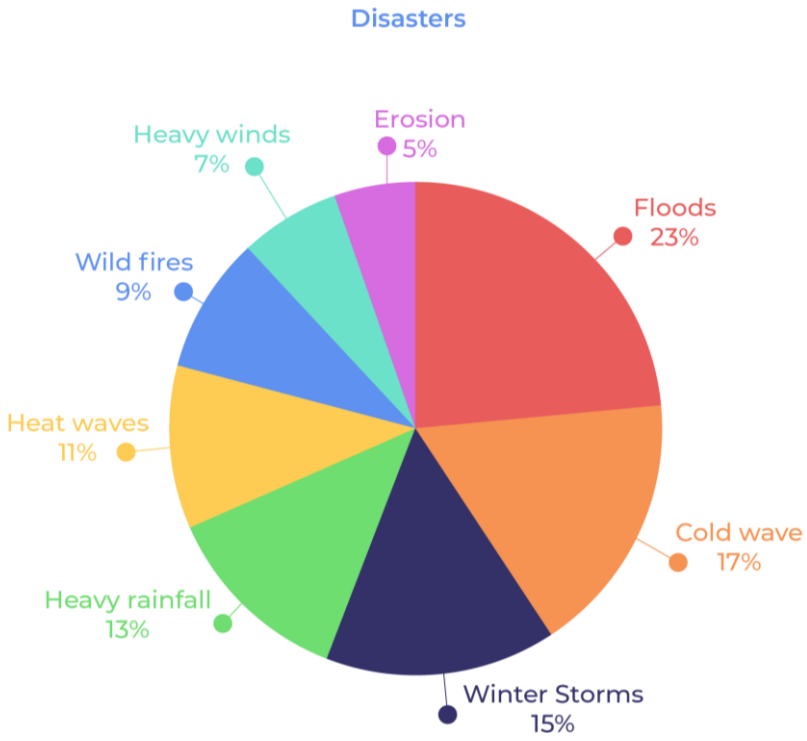

Figure 9 Disasters ranked by their damage to the agricultural sector adapted from CNRS and FAO (2018)

Frost and hail storms that caused major damage to citrus production and destroyed greenhouses all over the coast, as well as flood damages in the Bekaa Valley and Hasbaya which also included spoils in livestock and poultry.

Article IV. Summary of progress made on the national level

Section 4.01 Taking stock of CCA and DRR progress in Lebanon

On the national scale, although there has been no endorsed policy that covers actions to be taken regarding climate change and disaster risk, there has been over the past few years' progress made by branches of the Lebanese government and international organizations operating in Lebanon. Leading these efforts is the Ministry of Environment, especially its Climate Change Coordination Unit; the Ministry of Agriculture (MoA), the Disaster Risk Reduction Management Unit (DRR), the National Centre for Scientific Research (CNRS), the Food and Agriculture Organization (FAO), and the Lebanese Red Cross (LRC).

Ministry of Environment - CCCU

The Ministry of Environment's climate change coordination unit (CCCU) is responsible for tracking and reporting adaptation actions to the UNFCCC, the Climate Change Coordinating Unit (CCCU) is designed to improve climate change governance through developing national and sectoral plans to coordinate climate change initiatives. They developed the intended nationally determined contributions (INDCs), following the Paris Agreement, as a step in reducing GHG emissions on a national level as per the international agreement. The CCCU covers all sectors: energy, transport, agriculture, forests and land use, waste and wastewater, industrial processes, water, tourism, public health, and coastal zones. Within these sectors, they focus on adaptation, mitigation and means of implementing climate change adaptation. The CCCU reports on the progress Lebanon has made in reducing GHG emissions and in achieving the country's NDC.

Ministry of Agriculture

In its 2015 – 2019 strategy the Ministry of Agriculture (MoA) mentions climate change and the need for climate change adaptation, where in action plan 7 it is stated that *"Climate changes have a direct and a significant impact on the agricultural sector and natural resources such as forests, pastures, water and biodiversity. Therefore, the Ministry of Agriculture opted for the introduction of "Responding to climate change impacts" as one of the central courses of action for the next five years. MoA plans to assist the agricultural sector in many areas of intervention to better adapt to the impacts of climate change and to reduce its emissions, mainstream MoA activities related to climate change, introduce the adaptation measures through the various implemented programmes, and conduct a study to estimate the greenhouse gas emissions from the agricultural sector, land use changes and forestry"*. In their sixth course of action, the MoA strategy identifies an entry point for intervention through "*Supporting and activating the mutual fund for the insurance of agricultural sector against natural disasters through supporting the Mutual Fund for the insurance of the agricultural sector against the natural disasters and reviewing and assessing the proposed financial mechanism*". The MoA, though, does not specifically tackle disaster reduction or risk management in agriculture.

Disaster Risk Reduction Management Unit

The DRM unit works on different aspects, it covers the development of strategies, policies, action plans and tracks their implementation. It also focuses on awareness, early warning systems, research studies and understanding disaster risk. In the past two years the prime minister decreed that every organization that would work in disaster risk reduction needs to cooperate with the DRM unit in the Prime Minister's office. The DRM unit consists of two big committees: a) the National Crisis

Coordination Committee which covers response in the case of a national crisis; and b) a national taskforce (activated in 2018 and can be seen in *Annex B*) which represents all the ministries and their objective is to develop the national disaster reduction strategy, the response framework, the recovery framework and hopefully the mitigation and prevention framework.

The strategy needs to cover all pillars of disaster risk management, prevention and mitigation, preparedness, response and recovery. The unit coordinates work progress on all pillars.

The DRM unit's vision is to make Lebanon more resilient, to withstand both man-made and natural hazards. The DRM adopted the Hyogo framework in 2005, but post the 2006 war, the focus was mostly on recovery and response, and then with the impact of the Syrian crisis and the troubled geopolitical sphere at the time, the focus slightly shifted towards preparedness but was still mainly focused on recovery and response. As of 2015 and post the Sendai framework, the DRM started developing multi-hazard risk assessment that takes climate change into account and in 2016, they started to focus on floods and flood risk assessments. In 2018, taking into consideration the severe storms and floods that took place, the government's priority shifted from focusing on preparedness, recovery and response to adaptation and mitigation. As such, the DRM unit develops multi-hazard risk assessments, studies, and flood risk maps, and has drones that are used for scientific purposes, such as assessing landslides in Kfarnabrakh and the flood that occurred in Ras Baalbeck in 2018.

The supporting scientific research is conducted by the National Council for Scientific Research (CNRS). The CNRS is one of the main scientific bodies working for the DRM office within the Prime Minister's office, their National Operation Room provides early warning systems that cover amongst others, forest fires and floods through simulations.

DRM committees are spread out through operational rooms all over the country, they work on developing scenarios and hazard simulation and are always on standby in case of a hazardous situation.

The DRM is currently working on a national strategy. According to the decree by the Prime Minister *(Appendix B)* the task force has a timeline of one year to develop the strategy and present it to the house of ministries for adoption.

The new strategy will focus on the following priorities:

- The role of public sector in prevention and disaster risk
- The establishment of a policy for the systematic assessment of current risks
- Reducing risk at the sector and ministry level
- Developing a compilation of analysis of disaster losses

- Setting up early warning systems

Taking these priorities into account, the DRM unit will evaluate and assess what will be the centre of attention over the next five years. Amongst the important actions that were highlighted by the DRM were:

- Mainstreaming disaster reduction into ministries
- Development planning
- Building the capacities and technical resources of vulnerable communities
- Developing comprehensive community early warning system which has four components:
    1) Understanding the risks
    2) Developing a contingency
    3) Setting up the basis for early warning systems
    4) Communication and awareness with the mass population (which requires working closely with the municipalities)

In conclusion, the aim of the DRM unit over the next five years is to be aligned with the 2030 agenda on disaster risk management and climate change.

Lebanese Red Cross

The Lebanese Red Cross (LRC) DRR Unit has only recently started focusing on climate change and climate change adaptation. However, climate related hazards have been addressed before, as these often come up during community-based vulnerability and capacity assessments, allowing LRC to identify these hazards. As shown in the LRC's core components in *Appendix C,* the LRC DRR Unit focuses mostly on community resilience, disaster preparedness, mitigation and prevention. The Lebanese Red Cross works on all levels, ranging from individual and local to district, national and even international. Community resilience and sustainability are achieved by creating a DRM structure within a community. Capacity building is part of LRC activities. There is no specific focus on agriculture or agricultural areas, however, all mentioned hazards are targeted.

Key Take-aways

It is imperative for all entities working on DRM and CCCU to work together and collaborate with each other especially through the facilitation of the transfer and relaying of information. There is a need to build on the work that each is doing. The proposed DRM strategy addresses several issues, which include collaborating with the CCCU and SDG units. In many ways the 2030 agenda, had overlapping aims related to intervention, as all three units (DRR, CCCU and SDG) share the same goals and aims for better resilience. In their new strategy, according to an official from the DRM unit, the strategy will

work with the SDG unit at the PM office and the CCCU unit at the MoE, to enhance collaboration, build partnerships and joint initiatives by focusing on:

- The collaboration on international reporting
- Further collaboration and common action plans (urban resilience that considers climate change)
- Common working groups that will work on overlapping topics
- Sharing assessments, recommendations and results
- Working on maintaining data bases and indicators, and sharing them with the other units
- Joint initiatives and workshops

The DRM office has also reached out to think tanks and policy institutes, especially AUB's Issam Fares Institute for Public Policy and International Affairs, for help in making the policy work amongst all three units more coherent and productive.

The lack of an official government endorsed document such as a disaster risk management strategy, fails to reflect the ongoing efforts of the DRM unit. Nevertheless, there is progress, especially by the Prime Minister's office and its DRM unit, in integrating DRM and CCA separately within the structures of the Lebanese government.

Article V. Success Stories and Practices

Section 5.01 Successful stories and fieldwork to promote CCA and DRM/R practices

Even though there is still a lot of work to be done regarding: a) designing and endorsing a National Strategy for DRM; b) Integrating DRR and CCA; and c) taking into consideration climate change as a factor within the agricultural sector and its development. There has been a lot of progress and successful projects in Lebanon. An afforestation and reforestation plan were formulated with the technical support of FAO and the CNRS and was successfully launched in 2012, reforestation in areas vulnerable to landslides and erosion can be an effective prevention method. FAO also worked on a project boosting the resilience of small-scale family farming through the establishment of semi-intensive egg production units. By providing technical support for egg production and marketing, the project aimed to improve food security, nutrition and livelihoods of vulnerable Lebanese households affected by the Syria crisis, improving as a result the income of these households. Households that are normally vulnerable to floods, cold waves, and winter storms.

As far as disaster risk management, landslides in Kfarnabrakh and a major flooding in Ras Baalbeck were successfully handled by the DRM unit with the assistance of the LRC. Assessments were later

conducted by the CNRS for damage assessment and evaluation to provide the DRM unit with all the information required to build back better and adapt more effectively in the case of more floods later.

The Lebanese Agricultural Research Institute (LARI) and its early warning systems (EWS) are managed by the Department of Irrigation and AgroMeteorology (DIAM), although EWS is a cross-cutting topic for different departments (irrigation, phytopathology, etc.) The process for releasing an early warning goes through: data collection (meteorological and pest and disease observation), data processing (data quality and storage, and data analysis), and early warning (decision making, and preparing a message/statement).

LARI has been effective in providing weather forecasts for the public but more specifically in the data they provide farmers on a regular basis to help them avoid disastrous impacts to their lands. LARI developed a mobile application which, daily, sends to farmers, fishermen, as well as citizens, etc.:

- Weather forecasts for up to four days to a maximum of 10 days
- Updates of cumulated rainfall amounts (after every rainy day) with comparison on mean and previous rainy seasons
- Recorded maximum and minimum temperatures
- Alerts regarding heat waves for farmers, suggesting them to irrigate
- Alerts to farmers before expected frost, and suggesting to farmers to do practices to reduce the risk
- Windstorm alerts for farmers, fishermen, etc.

Section 5.02 Climate Risk Insurance:

Distinct tool that has been gaining attention recently is climate risk insurance. Climate risk insurance is a vital instrument within a comprehensive climate risk management system, spanning a continuum of prevention, risk reduction, risk retention and risk transfer such as insurance schemes. Climate risk insurance can play numerous roles - at individual, community, country, regional (international) and global levels - in providing security against the loss of assets, livelihoods and even lives in the post-disaster period; ensuring reliable and dignified post-disaster relief; setting incentives for prevention; providing certainty for weather-affected public and private investments and easing disaster-related poverty and spurring economic development. When linked with effective DRR strategies, climate risk insurance can be a useful component of a comprehensive risk reduction strategy (GIZ 2015).

At the 2015 Summit in Elmau, the G7 announced a Climate Risk Insurance Initiative (”InsuResilience”) that works with target partner countries, civil society, and local and international private insurance industries to help improve the resilience of poor people to climate stressors. In this way, the G7 countries demonstrate their commitment to sustainable development and improving the ability of

vulnerable countries and people to manage climate risks. Currently only about 100 million people in developing countries are covered by insurance schemes against climate risks, the aim of InsuResilience is to increase, by up to 400 million, the number of people in the most vulnerable developing countries who have access to direct or indirect insurance coverage against the negative impact of climate change related hazards (Ogden, Bovarnick, and Hoshijima 2015; Warner and Ranger 2009). Direct insurance schemes help vulnerable and poor people reduce development setbacks related to unexpected climate extremes (like using savings, taking children out of school, eating seed stock), and enable productive decisions by creating a secure investment environment while indirect insurance schemes provide country pay-outs after an event, in addition to identifying and pricing risks, building risk management into national planning, and the possibility of contributing to creating contingency plans that protect the poor against climatic disturbances.

Significant financing from the G7 will be necessary and can leverage several billion USD of risk capital (insurance and re-insurance capacity) from the private insurance and re-insurance industry. Depending on the region, instrument, and risk insured, the volume of the re-insurance capacity necessary can be like the insurance capacity volume needed. Besides providing the risk capital, the private insurance industry is already supporting the G7 Initiative on Climate Risk Insurance, and will give even greater support in future, by kindly supplying data for the risk assessment processes and expertise on how to organize the different insurance systems most efficiently (GIZ 2015; Kreft et al. 2017). The success in implementing climate risk insurance or the poor relies on the following factors:

- Using insurance to meet the needs of the targeted group and secure development goals: Insurance approaches for the poor should address the most pressing needs – uncertainty to livelihoods, food security and development aspirations – that get in the way of opportunities to reduce poverty
- A participatory approach: Successful insurance schemes are based on long-term partnerships. The first step of that process is to facilitate stakeholder dialogue, to make sure that the proper beneficiaries are included; Civil society will play a role in engaging target groups, in capacity building, and in evaluating and monitoring governance and implementation; the private sector's risk management expertise must be utilized to assess risks and design viable insurance products; the governments must also play a pivotal role with political buy-in, implementation on a national scale, supporting proper policies and needed legislations, and perhaps the biggest role is setting incentives that facilitate insurance provision in programs across various sectors.

Challenges:

To expand climate-related parametric insurance access to vulnerable countries in the developing world, it will be necessary for donor countries, international financial institutions, and multilateral development banks to overcome several key obstacles:

- Insurance policies require a country or other subscriber to pay a premium, which may be prohibitively expensive. In some cases, it may be necessary for developed countries or international organizations to aid that can help reduce the cost of the initial premium. To support the Pacific Catastrophe Risk Insurance Assessment and Financing Initiative, for example, Japan co-finances insurance premiums for Tonga, the Marshall Islands, Samoa, the Solomon Islands, and Vanuatu.
- Insurance schemes require extensive environmental data with high spatial resolution, as well as sophisticated modelling technology. Many developing countries do not have access to this information or technical capacity, making it difficult for their governments and domestic insurance providers to design parametric insurance products. G-7 countries that do possess the tools needed can help developing countries overcome these deficiencies by providing technical assistance.
- Insurance providers must reach new clients, educate them about the insurance model, and forge trusting relationships. These providers—such as international organizations and private insurers—face the additional challenge of frequently working with populations that are unfamiliar with insurance.

In the case of Lebanon:

Within the context of tackling disaster risk and developing resilience, insurance solutions can be very effective. It can lead to increased risk management awareness at the stakeholders' level. This increased awareness has the potential to be translated into risk reduction activities by individuals, thereby strengthening national and community resilience.

India is the prime example for successful climate risk insurance in the agricultural sector, rain-fed agriculture in India is widespread and leaves the country's farmers highly vulnerable to drought. To help manage the risk, India has developed a successful agricultural index insurance market that is jointly managed by its federal insurance provider—the Agriculture Insurance Company of India Limited, or AIC—and private insurers. To facilitate agricultural insurance enrolment, Indian states can opt into one of two programs: The National Agriculture Insurance Scheme (NAIS); or the Weather Based Crop Insurance Scheme (WBCIS). AIC offers farmers a heavily subsidized area-yield insurance policy through NAIS that is like standard crop insurance programs. However, area-yield insurance programs are relatively expensive because they necessitate "long and reliable series of area-yield

data" that are costly to gather and unavailable in many countries. In states that opt into WBCIS instead, the state directs AIC or a private insurer to offer federally subsidized weather index insurance policies to farmers. Weather index insurance has been offered by two private insurers since 2003 and by AIC since 2004. The index insurance program scaled up rapidly as states increasingly chose index insurance over area-yield insurance. Today, about 32 million Indian farmers purchase agricultural insurance, with 20 million covered by area-yield policies and 12 million covered by public or private weather index policies. The example of India also highlights the role the government can play to providing an incentive to subscribe to these insurance schemes. The National Agricultural Insurance Scheme highlights how governments can provide an incentive to push the concept further, the project tries to encourage farmers to adopt progressive farming practices by offering a discount on the premium to those who have adopted better water conservation and sustainable farming practices, an approached that proved to be effective (Warner and Ranger 2009).

In the case of Lebanon, to effectively implement climate risk insurance approaches there will be a need to:

- Provide data for climate risk insurance schemes (including digitized historical data on weather and losses)
- Place climate risk insurance in a wider risk management strategy, ideally within the National Adaptation plan for disaster risk management
- Ensure meaningful capacity development of key actors as well as insurance and financial literacy campaigns and education
- Encourage public-private partnerships. The public sector can undertake many activities that facilitate comprehensive climate risk management
- Strengthen social safety nets to bring risk sharing and transfer approaches to all segments of populations
- Revisit the concept of climate risk insurance in the upcoming NDCs. To further explore how climate risk insurance approaches can help achieve their national adaptation objectives

As there is still a lot of work to be done as far as developing a national adaptation plan and a national disaster risk management plan for Lebanon, the concept of climate risk insurance falls further into the background. There would be a need for numerous risk assessments across the agricultural sector to develop effective insurance schemes that are able to cover financial losses experienced by the smalls scale farmers as well as large agricultural organization in Lebanon. Insurance alone will be neither sufficient nor sustainable to help developing countries such as Lebanon manage the impacts of climate

change unless measures are taken to make sure the concept is integrated within national strategies, policies and frameworks.

Article VI. Measures and Recommendations

Section 6.01 Measures and entry points

There is strong evidence both globally and nationally that there is an increase in the observed frequency and intensity of weather and climate related hazards. In addition, the IPCC anticipates that in short and medium terms, many impacts of climate change may manifest themselves through a change in the frequency, intensity, and duration of extreme events. Thus, while responses to climate change may initially have been framed by a longer-term outlook, there is now as much emphasis on the present and immediate future. Similarly, the DRM community is moving rapidly from looking only at historic and current risk, to consider future risk.

The effects of climate change are magnifying the risk of disasters which will further burden humanitarian and development systems at all levels. Climate change, including an increase in extreme weather, poses a threat to food crop yields. Furthermore, adverse climate change will have impacts on natural systems and resources, infrastructure and labour productivity and may lead to reduced economic growth and increasing poverty. These effects threaten the achievement of the most basic SDG goals, such as eradicating extreme poverty and hunger, loss of livelihood and migration.

There is a need to link and focus the policy and governance frameworks for DRR, poverty reduction, and CCA in a way that can bring these local and sectoral approaches into the mainstream. There are practices and tools to facilitate the integration of DRR and CCA in a manner that helps to overcome barriers mentioned previously in the report. Some of the key actions to be taken are described below:

- At the national level, it is the government's responsibility to ensure a strong enabling environment which is of critical importance for local communities, as in Lebanon's case, where most CCA and DRR activities are focused. Communities typically see more value in pursuing and adopting an integrated approach if it is already reflected in national and sectoral development policies and plans.
- There is no denying the fact that there are strong legal frameworks for DRR and CCA separately in Lebanon; however, there is fragmentation in the capacity to tackle both DRR and CCA simultaneously. Due to this fragmentation of policies and the legal background, CCA and DRR are in separate departments and ministries. Lebanon's many commitments to international agreements (e.g. PA, Agenda 2030, Sendai) require a combined effort from the CCCU and the

DRM unit in addition to the SDGs unit (the latter two at the PM's office). Realizing the deficiency of the current setup, a coordination protocol should be formulated that mainstreams the activities of the three units in all sectors and at all levels: conceptualization, initiation of actions, conduct and implementation actions, and monitoring of results. Such an approach would not reduce overlap and ensure sustainability as well developing knowledge from "*lessons learnt*". This could be done through a monitoring unit at the PM's office that tracks the mainstreaming effort and ensures that all three units are well informed of any obstacles and barriers to allow for swift response to overcome them.

- CCA engenders more political interest than DRR as CCA has direct impact on people (hence voters) because political attention usually is focused on actions that produce immediate response. Integration of CCA and DRR does not yield quick results and thus gets pushed down the priority list which is reflected in funding preferences – with DRR getting the short end of the stick. In addition to the aforementioned reason, CCA, especially in agriculture, is easier for donor organizations to target than DRR because the results of the proposed actions of the former are more easily monitored and assessed given the plethora of scientific studies in its support. This leaves little allocation for DRR activities and even less for the integration of CCA and DRR. The government should develop a funding priority list targeting CCA and DRR and their integration that is free from political interference and donor bias and that stresses on the inclusion of both simultaneously.
- CCA innovations are more science oriented and the generated knowledge needs to be transferred to the local level. This knowledge transfer could be done in association with DRR awareness activities at the community and local levels.
- In addition to capacity building and creating an awareness for DRR and CCA, there also needs to be a focus on bottom-up community-based approaches. These approaches have proven to be successful in the past in Lebanon on small scale agricultural projects conducted by the CNRS and FAO within small scale farming communities in certain areas in Lebanon. However, the institutional framework was not available to further on enable and follow up on these projects.

Moreover, organizations and NGOs working on projects in Lebanon must start combining both DRR and CCA within their projects. FAO for instance as seen in *Appendix A*, has been tackling climate change, especially within the agricultural sector, through a series of projects that cover pest control, landscape and forestry management, reduction of invasive species, capacity building projects for small scale farmers, smart agriculture techniques, and promoting the SDGs and climate changes measures within national policies. Projects such as their Forest and Landscape Restoration Mechanisms (FLRM)

restore up to 1000 ha of grazing lands to meet the CO_2 reduction targets. Such a project addresses several issues at once grazing management, which falls within a landscape approach to combat climate change; highlighting different landscape uses and increasing the resilience of the landscape. The project is a direct response to climate change and the reduction of CO_2 emissions. Missing from these projects are aspects of disaster risk reduction. This could readily have been rectified by incorporating climate-induced disasters such as forest and brush fires, drought, etc. As listed above, if there were an overarching priority list that mainstreams and integrated CCA and DRR components, such elements would have been automatically included.

Section 6.02 Better ways to link CCA and DRM/R

There are tools that also facilitate the integration of DRR and CCA, tools such as vulnerability and capacity assessments, and climate risk insurance. The separation of CCA and DRR has resulted in the use of different tools to assess many commonalities. Both communities follow a risk management approach. Whether its vulnerability and capacity assessments or risk management approaches, the ultimate shared goal is to decide whether a risk is acceptable or intolerable, and in the case of the latter, what are then the mitigation processes that can properly prevent the most damage.

Specifically, in the case of Lebanon and based on the gathered information from the selected stakeholders, there are small actions that can set up a better entry point into cooperation:

- Establish and continually maintain a single, online database of past, current and planned DRR, SDG, CCA and related projects that have multi-country involvement. The database should include information on tangible benefits and learning generated, to promote joint planning, evaluation assessments and other activities.
- Document case studies, good practices, lessons learned, methodologies and tools that can be used to enhance the integration of DRR and CCA at regional, national and community levels
- Make every reasonable effort to co-convene DRM and CCA meetings at times and locations that maximize the coordination and integration opportunities, while also delivering the greatest environmental benefits in terms of minimizing GHG emissions
- Strengthen national policy and planning processes to reflect the importance of a strong, enabling environment for DRR and CCA initiatives at local (e.g. community and enterprise) level by ensuring policy cohesion and mainstreaming across all development sectors.

In conclusion, there has been a lot of progress in projects linking to CCA and DRR in Lebanon, albeit separately; however, there is currently an intention to tackle both concepts simultaneously on a policy and implementation level.

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Article VIII. Appendices

(i) Appendix A: FAO projects that link to climate change adaptation within the agricultural sector

Project Date	Project Title	Project Objective
2014	Surveillance and management of Fruit Flies in Lebanon	Capacity building of farmers in the implementation of surveillance and management of the fruit flies. The project is also expected to develop a national strategy for monitoring and managing fruit flies thus increasing the local farmers' income
2015	Strengthening the coordination of the National Afforestation and Reforestation Programme in Lebanon	Its aim is to support the MoA based on the recommendation made in the FAO supported road map, prepared and approved by MoA in 2013
2018	Support the MoA to update its National Strategy integrating the SDGs in its national agricultural planning	Twofold objectives: • Updating its strategy, preparing a new action plan 2019-2023 and proposing the organizational restructuring of the ministry • Developing a monitoring plan for the SDGs and their integration into MoA planning
2016	Reduce the risk of introduction and spread of Xylella fastidiosa	Prevent the introduction of the disease in the country through capacity building of technical staff and farmers on early detection, diagnosis and surveillance of phytosanitary measures
2016	Support the regional collaboration platform of water scarcity initiative to increase water productivity	To strengthen regional capacities and to enhance regional information exchange and to build the framework for the adaptation of pathways for increasing water productivity in selected farming systems of the beneficiary countries
2013	Optimizing the use of plant genetic resources for food and agriculture for adaptation to climate change	Increase the resilience of agricultural systems across the near East region through the widespread use of new crop varieties which are more productive, nutritious and stress resilient; thereby leading to an ability to adapt to anticipated climate change or shifting market demands
2014	Capacity building for food reduction in Middle East	Implement a large scale educational training programme (assessments, workshops, study tours) in order to strengthen national capacity of local leaders, managers, and extension personnel in the sub-region in these countries on improved value chain management for food producers, handlers, processors, distributers and marketers
2016	Promotion of agriculture livelihoods and employment through investment in land reclamation and water reservoirs	• Strengthen the capacity of the Green Plan to implement rural development projects for vulnerable people

		• Improve the livelihood of small and medium farmer communities through 390 ha of land reclamation and water conservation • Improve the know-how of 1220 farmers in establishing and managing orchards and irrigation systems • Create over 80000 man/day job opportunities in the agricultural sector
2015	Assessment of the integrated water cycle management in Lebanon	Define the essential components of a multi partnership to implement water cycle strategic research and agriculture innovation investigation to improve the water sector efficiency in Lebanon
2019	Prevention of Agrochemical pollution in the upper Litani Basin	Provide the support to sustainable and profitable agriculture and improve livelihood of male and female farmers with reduced risk to human health of producers and consumers and the environment
2014	Climate Change and Adaptation Solutions for the Green Sectors of selected Zones in the MENA Region	• Provide tailored adaptation measures for the green sectors to include cropping, forestry, rangeland, and fishery production systems derived for selected zones of the Arab Region for pre-defined climate change scenarios and targeted time-horizons • Upgrading the RICCARD framework for an improved performance of climate change impact assessment in the agricultural sector and on food security by adopting innovative platform to include FAO AquaCrop to identify pertinent adaptation measures for informed policy and action in the green sectors

(ii) ***Appendix B:*** *Decision and Circular forms from the Prime Minister related to the DRM Unit and National technical task force:*

الجمهورية اللبنانية
رئاسة مجلس الوزراء

تعميم رقم ٣/٢٠١٩

إلى جميع الإدارات العامة والمؤسسات العامة والبلديات وإتحادات البلديات والمجالس والهيئات

بشأن التعاون مع وحدة إدارة مخاطر الكوارث والحد منها لدى رئاسة مجلس الوزراء

بما أن وحدة إدارة مخاطر الكوارث، تعمل خلال الحالات الطارئة كمركز وطني لعمليات الطوارئ، من خلال غرفة العمليات المركزية، وتنسق مع لجان إدارة الكوارث والأزمات لدى كافة الوزارات والمحافظات وغرف عمليات الجيش و قوى الأمن الداخلي والدفاع المدني والصليب الأحمر، وتكون مهامها خارج الحالات الطارئة تجميع المعلومات وإقامة الدراسات بالإضافة إلى حملات التوعية والتنسيق والتدابير الإحترازية وتطوير وتحسين أجهزة الإنذار المبكر والإبقاء على الجهوزية التامة لمعالجة المخاطر،

وفي هذا الإطار صدر عن رئيس مجلس الوزراء القرار رقم ٢٠١٣/٤١ تاريخ ٢٠١٣/٢/١٨ المتعلق بإنشاء لجنة لدى رئاسة مجلس الوزراء لتنسيق عمليات مواجهة الكوارث والأزمات الوطنية والقرار رقم ٢٠١٨/٦٨ تاريخ ٢٠١٨/٠٦/١٢ المتعلق بتشكيل اللجنة الوطنية لوضع خطط الطوارىء لمواجهة الكوارث على أنواعها،

ولما للتعاون والتنسيق بين كافة المعنيين من أهمية قصوى لتدارك أخطار الكوارث والإستعداد لها ومواجهتها،

لذلك،

يطلب إلى جميع الإدارات العامة و المؤسسات العامة و المجالس و الهيئات و البلديات و إتحاد البلديات ،التعاون و التنسيق مع فريق عمل وحدة إدارة مخاطر الكوارث المكلف،فيما يلزم.

بيروت في ٢٢ كانون الثاني ٢٠١٩

رئيس مجلس الوزراء

سعد الحريري

الجمهورية اللبنانية
رئاسة مجلس الوزراء

قرار رقم ١١ ،

تعديل القرار رقم ٢٠١٨/٦٨ تاريخ ٢٠١٨/٦/١٢

(تشكيل لجنة وطنية لوضع خطة طوارىء لمواجهة الكوارث على انواعها)

ان رئيس مجلس الوزراء،

بناء على المرسوم رقم ٢ تاريخ ٢٠١٦/١٢/١٨ (تسمية السيد سعد الحريري رئيساً لمجلس الوزراء)،

بناء على القرار رقم ٢٠١٠/١٠٣ تاريخ ٢٠١٠/١١/٢٦ (تشكيل لجنة وطنية لوضع خطة طوارئ لمواجهة الكوارث على انواعها)،

بناءً على القرار رقم ٢٠١٨/٦٨ تاريخ ٢٠١٨/٦/١٢ (إعادة تفعيل عمل اللجنة الوطنية المؤلفة بموجب القرار رقم ٢٠١٠/١٠٣ تاريخ ٢٠١٠/١١/٢٦ لوضع خطة طوارئ لمواجهة الكوارث على انواعها وتعديله)،

بناء على كتاب رئيس اللجنة امين عام المجلس الاعلى للدفاع رقم ٤/أ.ع.مج.أ.د تاريخ ٢٠١٩/١/١٤ ،

يقرر ما يأتي :

المادة الاولى : تعدل المادة الاولى من القرار رقم ٢٠١٨/٦٨ تاريخ ٢٠١٨/٦/١٢ (تشكيل لجنة وطنية لوضع خطة طوارىء لمواجهة الكوارث على انواعها) بحيث يضاف الى اعضاء اللجنة ممثل عن ادارة الاحصاء المركزي.

والباقي دون تعديل ،

المادة الثانية : تعدل المادة الثانية من القرار رقم ٢٠١٨/٦٨ تاريخ ٢٠١٨/٦/١٢ بحيث تكون مهمة اللجنة:

- اعداد الاستراتيجية الوطنية للحد من مخاطر الكوارث.
- تحديث وتطوير خطط الطوارئ لمواجهة الكوارث والاطار العام لخطة الاستجابة الوطنية .
- وضع خطة العمل التنفيذية للاطار العام للاستراتيجية الوطنية وخطط الأستجابة.
- اعداد الاستراتيجية الوطنية للتعافي والنهوض بعد الكوارث،
- اعداد المعايير الوطنية لقياس التقدم المحرز في مجالات الحد من مخاطر الكوارث في لبنان بناء على اطار سينداي للحد من الكوارث ٢٠١٥ – ٢٠٣٠.
- العمل على تطوير وتحسين انظمة الانذار المبكر على الصعيدين الوطني والمحلي.

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(iii) ***Appendix C:*** *The core components of the LRC*