Namibia

Building agricultural resilience to animal pests and diseases

Case study
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Case study
Abstract

This case study focuses on the Republic of Namibia’s *ex ante* approach to preventing, controlling, and managing animal pest and disease outbreaks, which are often exacerbated by climate-related disasters, such as floods and droughts. It explores the good practices implemented by Namibia to reduce disaster risks, including:

- controlling livestock movement through a zoning strategy and movement permits;
- conducting import risk assessments;
- disease monitoring and surveillance;
- an animal identification and traceability system;
- undertaking annual vaccinations; and
- contingency plans.

The implementation of these measures will:

- enable Namibia to more effectively prevent, control and manage animal disease outbreaks so that food security, incomes and livelihoods are secured;
- ensure that Namibia’s meat is disease free and meets safety standards in export markets; and
- protect public health by preventing the transmission of zoonotic diseases between wildlife and livestock, and then to humans.
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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>BSE</td>
<td>Bovine spongiform encephalopathy</td>
</tr>
<tr>
<td>CBPP</td>
<td>Contagious bovine pleuropneumonia</td>
</tr>
<tr>
<td>CCA</td>
<td>Climate change adaptation</td>
</tr>
<tr>
<td>CVL</td>
<td>Central Veterinary Laboratory</td>
</tr>
<tr>
<td>CVO</td>
<td>Chief Veterinary Officer</td>
</tr>
<tr>
<td>CV</td>
<td>Chief Veterinarian</td>
</tr>
<tr>
<td>DAPEES</td>
<td>Directorate of Agricultural Production, Engineering and Extension Services</td>
</tr>
<tr>
<td>DCVO</td>
<td>Deputy Chief Veterinary Officer</td>
</tr>
<tr>
<td>DDRM</td>
<td>Directorate for Disaster Risk Management</td>
</tr>
<tr>
<td>DRM</td>
<td>Disaster risk management</td>
</tr>
<tr>
<td>DRR</td>
<td>Disaster risk reduction</td>
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<td>DRR/M</td>
<td>Disaster risk reduction/management</td>
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<tr>
<td>DVS</td>
<td>Directorate of Veterinary Services</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
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<tr>
<td>FMD</td>
<td>Foot-and-mouth disease</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross domestic product</td>
</tr>
<tr>
<td>MAWF</td>
<td>Ministry of Agriculture, Water and Forestry</td>
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<tr>
<td>MAWLR</td>
<td>Ministry of Agriculture, Water and Land Reform</td>
</tr>
<tr>
<td>MEFT</td>
<td>Ministry of Environment, Forestry and Tourism</td>
</tr>
<tr>
<td>NamLITS</td>
<td>Namibia Livestock Identification and Traceability System</td>
</tr>
<tr>
<td>NamVAC</td>
<td>Namibia Vulnerability Assessment Committee</td>
</tr>
<tr>
<td>NAU</td>
<td>Namibian Agricultural Union</td>
</tr>
<tr>
<td>NECFU</td>
<td>Namibia Emerging Commercial Farmers’ Union</td>
</tr>
<tr>
<td>NDRMC</td>
<td>National Disaster Risk Management Committee</td>
</tr>
<tr>
<td>NDRMP</td>
<td>National Disaster Risk Management Policy</td>
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<tr>
<td>NDRMS</td>
<td>National Disaster Risk Management System</td>
</tr>
<tr>
<td>NCA</td>
<td>Northern Communal Areas</td>
</tr>
<tr>
<td>NNFU</td>
<td>Namibia National Farmers Union</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<td>---------</td>
<td>--------------------------------------------</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<td>OIE</td>
<td>World Organisation for Animal Health</td>
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<tr>
<td>OPM</td>
<td>Office of the Prime Minister</td>
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<tr>
<td>RDRMC</td>
<td>Regional Disaster Risk Management Committee</td>
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<tr>
<td>RVF</td>
<td>Rift Valley fever</td>
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<tr>
<td>VCF</td>
<td>Veterinary Cordon Fence</td>
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</table>
Acknowledgements

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Introduction

The Republic of Namibia is located along the southwestern coast of Africa. The country borders with the Republic of Angola in the north, the Republic of Zambia and the Republic of Zimbabwe in the northeast, the Republic of Botswana to the east, the Republic of South Africa in the south and the Atlantic Ocean to the west. It has a surface area of 823 290 km² and consists of a coastal desert and inland plateau region and the dune- and grass-covered Kalahari Desert. It spans around 1 300 km from north to south and about 900 km from east to west, excluding the Caprivi Strip in the northeast.

Its three main types of vegetation include: i) savannah (64 percent of the country’s land surface; ii) desert vegetation (16 percent); and iii) dry woodlands (20 percent). The highest peak of the country is the Königstein, which is 2 606 m (FAO, 2005).

The country is adversely affected by natural hazards, such as floods, droughts and veld fires, among others. These extreme weather events have increased in frequency and severity in recent years and are expected to intensify as a result of climate change. In particular, a rise in the number of hot days, heat waves and droughts are expected (Ministry of Environment and Tourism, 2010). It is also anticipated that climate change will alter the distribution, incidence and intensity of animal and plant pests and diseases (FAO, 2008).

A key challenge that Namibia faces, is the co-existence of domestic livestock with the large wildlife population in the fertile area around the northern border with Angola. Certain wildlife in this area, such as wild buffaloes, are carrying foot-and-mouth disease (FMD). During droughts – due to the unsupervised and open nature of this border area – Namibian farmers may let their cattle graze alongside these buffaloes, which increases their risk of getting FMD. Managing these livestock movements is thus crucial to ensure that domestic animals are not infected.

Animal pests and diseases, such as FMD, contagious bovine pleuropneumonia (CBPP) (also known as lung plague), lumpy skin disease, anthrax, brucellosis and Rift Valley fever (RVF), pose a major threat to Namibia’s livestock sector. An outbreak can negatively impact the country’s livestock production, productivity and access to export markets and, thereby, affect and undermine local food security and livelihoods. Due to the importance of meat and meat products for the country’s export earnings, particularly the export of beef, ensuring that meat is disease-free is crucial to meet international food safety standards. Implementing appropriate, adequate and effective measures to prevent, control and manage disease outbreaks is therefore essential, not only to ensure farmers’ incomes and thus food security and livelihoods, but also to ensure public health so that zoonotic diseases are not transferred between wildlife and livestock and then to humans.
The first part of this case study provides an overview of the country’s agricultural and disaster risk profile; examines the legal and policy frameworks for disaster risk management and key disaster risk management stakeholders relevant for agriculture. The second part specifically focuses on animal disease related legislation and key stakeholders and the implementation of ex ante good practices aimed at preventing, controlling and managing animal pests and diseases in Namibia.

**Agricultural profile**

Namibia’s agricultural land is approximately 47.1 percent of its total land area, while its arable land is around 800 000 ha, which is a mere 1 percent of its total land. Its forest area is around 8.3 percent of its total land area (FAO, 2018). According to its 2013/2014 agricultural census, 83.5 percent or 7 800 966 ha of the country’s total land area is grazing land, while only 10 958 ha or 0.12 percent of land is used for permanent crops (Namibia Statistics Agency, 2019).

Agriculture is an important sector for Namibia as it remains the major source of income and livelihoods for the majority of the population, who primarily rely on subsistence agriculture. It is estimated that in 2018 the share of agriculture, forestry and fisheries was 7.2 percent of its total gross domestic product (GDP) and around half of its total population of 2.4 million resides in rural areas (World Bank, 2018). It is estimated that around 20 percent are employed in agriculture, of which 17 percent are female (ILO, 2019). Besides contributing to food security, creating jobs and generating income, agriculture also helps to alleviate poverty and provides national foreign exchange revenues through agricultural exports (MAWF, 2017).

Namibia has a total land surface of 824 000 km², of which 356 600 km² (43 percent) is freehold (titled agricultural commercial) land, 317 400 km² (39 percent) is communal land and 150 000 km² (18 percent) is state owned land (Namibia Statistics Agency, 2018). The largest part of the country is thus utilized by both commercial and subsistence farmers and mainly used for livestock production of cattle, goat, sheep and pigs. As the natural vegetation serves as grazing, the type of livestock raised varies in different parts of the country. Generally, in the south, sheep and goats are kept by both the commercial and communal sectors, while in the north and centre of the country, which receives more rain, primarily cattle and goats are raised and crops, such as maize, sorghum and millet, are cultivated (MAWF, 2017).

According to Namibia’s 2013/2014 agricultural census, there are a total of 169 871 agricultural holdings, of which the majority produce both crops and livestock and only 5 percent and 3.6 percent focus only on crops and livestock, respectively. The largest proportion (26 percent) of all agricultural holdings are located in the
northern Omusati and Ohangwena regions that border with Angola, where producers are engaged in both crop and livestock production. The majority of all agricultural holdings have a land size of between 2–5 ha (20 percent), 5–10 ha (26 percent) and over 10.01 ha (37 percent), while a minority have between 1–2 ha (7.7 percent) and 0.5–1 hectare (3.8 percent) (Namibia Statistics Agency, 2014). Secondary industries, meat processing as well as wood and wood products, only contribute 0.2 percent to the country’s total GDP, while grain mill products and other food products provide 0.9 percent and 1.9 percent, respectively (Table 1).

Table 1. Percentage contribution to GDP, by activity (at current prices), 2017

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<tbody>
<tr>
<td>1. Agriculture and forestry</td>
<td>5.1</td>
<td>5.0</td>
<td>4.9</td>
<td>3.4</td>
<td>3.9</td>
<td>3.3</td>
<td>3.4</td>
<td>4.5</td>
</tr>
<tr>
<td>Livestock farming</td>
<td>3.0</td>
<td>3.2</td>
<td>3.0</td>
<td>1.9</td>
<td>2.4</td>
<td>1.9</td>
<td>2.0</td>
<td>2.9</td>
</tr>
<tr>
<td>Crop farming and forestry</td>
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<td>1.8</td>
<td>1.9</td>
<td>1.5</td>
<td>1.6</td>
<td>1.4</td>
<td>1.4</td>
<td>1.5</td>
</tr>
<tr>
<td>2. Fishing and fish processing</td>
<td>3.5</td>
<td>3.2</td>
<td>3.1</td>
<td>3.0</td>
<td>2.8</td>
<td>2.6</td>
<td>2.7</td>
<td>2.5</td>
</tr>
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<td>Secondary Industries</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Meat processing</td>
<td>0.4</td>
<td>0.5</td>
<td>0.5</td>
<td>0.6</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.2</td>
</tr>
<tr>
<td>Grain mill products</td>
<td>0.7</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
<td>0.9</td>
<td>0.8</td>
<td>1.0</td>
<td>0.9</td>
</tr>
<tr>
<td>Other food products</td>
<td>1.8</td>
<td>1.8</td>
<td>1.5</td>
<td>1.8</td>
<td>1.6</td>
<td>1.7</td>
<td>1.9</td>
<td>1.9</td>
</tr>
<tr>
<td>Wood and wood products</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
</tbody>
</table>


Crop production is mainly practiced either in the north and northeast of the country, as these areas are fertile and receive sufficient rainfall, or near small irrigation schemes where water is permanently available. Similar to livestock production, crops are cultivated by both commercial as well as subsistence farmers. The main crops in Namibia are pearl millet, sorghum, maize, wheat, beans, alfalfa and some fruit and vegetables, such as melons, dates, grapes and tomatoes (MAWF, 2017).
According to the 2019 livestock census conducted by the Directorate of Veterinary Services (DVS), Namibia had 2.5 million cattle, 1.5 million goats and 1 million sheep, over 278,000 poultry and over 83,000 pigs (DVS, 2019). The country also has a huge wildlife population, which includes antelopes, elephants, lions and zebras, mostly in large fenced commercial farms and national parks.

Table 2 shows the percentage contribution of livestock and crops to the total agricultural output. In 2017, livestock contributed over two-thirds (67.6 percent), while crops contributed slightly less than one third (32.4 percent) to Namibia’s total agricultural output, of which cattle is the largest contributor (51.7 percent) followed by grapes (7.5 percent) (MAWF, 2019).

Table 2. Output of agricultural products as a percentage contribution to total agricultural output, 2014–2017

<table>
<thead>
<tr>
<th>Agriculture products</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Livestock</td>
<td>54.4</td>
<td>61.6</td>
<td>57.1</td>
<td>67.6</td>
</tr>
<tr>
<td>Cattle</td>
<td>35.6</td>
<td>40.6</td>
<td>37.1</td>
<td>51.7</td>
</tr>
<tr>
<td>Sheep/goat</td>
<td>11.2</td>
<td>12.9</td>
<td>10.7</td>
<td>9.4</td>
</tr>
<tr>
<td>Pigs</td>
<td>2.3</td>
<td>2.5</td>
<td>3.0</td>
<td>2.2</td>
</tr>
<tr>
<td>Karakul wool/pelts</td>
<td>1.8</td>
<td>1.8</td>
<td>1.9</td>
<td>1.3</td>
</tr>
<tr>
<td>Dairy (milk)</td>
<td>1.8</td>
<td>2.1</td>
<td>2.3</td>
<td>1.5</td>
</tr>
<tr>
<td>Other Animals and Animal Products</td>
<td>1.7</td>
<td>1.7</td>
<td>2.1</td>
<td>1.5</td>
</tr>
<tr>
<td>Crops</td>
<td>45.6</td>
<td>38.4</td>
<td>42.9</td>
<td>32.4</td>
</tr>
<tr>
<td>Maize</td>
<td>1.9</td>
<td>1.6</td>
<td>1.6</td>
<td>1.0</td>
</tr>
<tr>
<td>Wheat</td>
<td>5.6</td>
<td>3.8</td>
<td>5.0</td>
<td>4.6</td>
</tr>
<tr>
<td>Grapes</td>
<td>7.1</td>
<td>10.2</td>
<td>11.7</td>
<td>7.5</td>
</tr>
<tr>
<td>Own account*</td>
<td>30.6</td>
<td>22.4</td>
<td>24.2</td>
<td>19.0</td>
</tr>
<tr>
<td>Own construction**</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
<td>0.3</td>
</tr>
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</table>


*These are crop products that were retained for own consumption by the producer(s).

**These are construction activities undertaken by the garden or crop farm to ensure crop safety, which can include farm fencing.

The sector also significantly contributes to the country’s export earnings, particularly through the export of meat and meat products. In 2019, the value of all meat exports was N$ 1.3 trillion (around USD 87 million), of which approximately 62.6 percent was beef, while in 2020, the value of all meat exports was N$ 893 million (about USD 59 million), of which 33.5 percent was beef (Namibia Statistics Agency, 2021). In 2020, the largest amount of beef was exported to Europe (41 percent), followed by Africa (36 percent), while the countries that received the largest share of the beef exports included South Africa (28 percent), Norway (19 percent) and the People’s Republic of China (18 percent) (Meat Board of Namibia, 2021).
Namibia primarily imports cereals, including wheat, maize and millet as well as vegetables and fruits, of which mainly potatoes, apples, oranges and bananas. Figure 1 provides an overview of white maize, wheat and millet imports during the period 2014 to 2017, which shows an increase between 2014 and 2016, but a significant decline of 32.5 percent between 2016 and 2017 (MAWF, 2019).

Figure 1. Overview of cereal imports of white maize, wheat and millet (in tonnes), 2014–2017

Disaster risk profile

Namibia is prone to various natural hazards, in particular droughts and floods (Figure 2). During the 1982–2019 period, a total of 23 disasters were recorded, of which 9 droughts and 14 floods that affected over 350,000 people and caused USD 195 million in total damages. Among these, the major disasters that affected over half a million people included the 2011 flood as well as the droughts of 2013–2014 and 2015–2016, which impacted 780,000 and 580,000 people respectively. The year 2019 was the driest in 90 years and significantly affected the livestock sector and people’s livelihoods. In terms of the frequency of natural hazard-induced disasters, floods have occurred 65.2 percent more frequently compared to droughts during the 1990–2014 period as shown in Figure 2. One hundred percent of mortality from disasters during the 1990–2014 period was due to floods, while 89.5 percent of economic losses are estimated to be the result of droughts and 10.5 percent due to floods (OFDA/CRED, 2021).

Figure 2. Frequency of natural hazard-induced disasters in Namibia, 1990–2020

According to the INFORM Global Risk Index of 2019, Namibia has an overall risk index of 3.9 out of 10. Among its neighbouring countries, only Botswana has a lower risk index of 3, compared to Zambia (4.3), South Africa (4.7), and Angola (5) (INFORM, 2021). This composite indicator consists of 54 different indicators that fall within the three dimensions of hazard and exposure (events that could occur and exposure to them), vulnerability (susceptibility of communities to those hazards) and lack of coping capacity (lack of resources available that can alleviate the impact). Namibia has an overall natural hazard and exposure of 4.3, which includes a risk score of 6.1 for flood and 8.9 for drought and 4.7 for epidemics. The score for Namibia’s overall vulnerability is 4.9 and 4.9 for its lack of coping capacity.
Impact of natural hazard-induced disasters and animal pests and diseases on agriculture

Floods
The excessive rains and flooding that occurred in February/March 2009 across Angola, Zambia and Namibia, substantially affected 7 regions in the northern and eastern central regions of the country. Moreover, these floods aggravated the impacts of the 2007 drought and the 2008 floods, especially on subsistence farmers, and resulted in damage and losses to crops and livestock, particularly in the low-lying areas. It was estimated that total damage and losses amounted to USD 136.4 million and USD 78.2 million, respectively, of which nearly 3.5 percent and 20 percent were damage and losses to the agriculture sector and approximately 163 000 people required immediate food security assistance (FAO/WFP, 2009). As a result, the country’s average annual GDP growth decreased from 1.1 percent before the flood to 0.6 percent after the flood (OPM, 2017).

Drought
During the last few years, Namibia has been affected by recurring droughts. These were caused by erratic and below normal rainfall during the 2013/14, 2014/15 and 2015/16 rainfall seasons, which severely impacted agricultural production in most parts of the country, particularly in the communal areas (MAWF, 2017). For instance, according to an assessment conducted in August 2016, the average crop losses for maize were between 73 and 85 percent in the northern border region with Angola, due the impact of an El Niño induced drought (FAO, 2016). Moreover, as mentioned earlier, 2019 was the country’s driest year in 90 years, which resulted in a 53 percent decline in the cereal harvest compared to the previous season and over 42 percent below compared to the 20-year average production, while over 59 000 head of cattle died due to inadequate grazing (MAWF, 2019a; FAO, 2020).

The drought of 2014/2015 also led farmers in the Northern Communal Areas (NCA) to move their livestock into Angola in search of water and pastures for grazing, which led to an outbreak of FMD in 2015 after an absence of almost 27 years. Due to the open border between both countries, the Namibian cattle congregated and mingled with the wild buffaloes, some of which were carrying FMD. In total, 264 cases at 28 foci were recorded of cattle with signs of FMD. In order to control the outbreak, a total of 600 000 cattle were vaccinated in two rounds, which represented a vaccination coverage of 90.2 percent. The outbreak was declared in Namibia in August 2015 and then in April 2016 on the Angolan side (World Organisation for Animal Health [OIE], 2016).

The country experienced an outbreak of RVF from May to July 2010. RVF is a virus transmitted by mosquitos and primarily affects livestock, such as cattle, sheep,
goats and wild ruminants like buffalos. It is considered a zoonotic disease as it has the capacity to infect humans. This outbreak was caused by a strain of RVF virus closely related to virus strains that were responsible for the outbreaks in South Africa during 2009–2010, where over 14 000 cases and the death of 8 000 animals were reported. This large RVF outbreak in South Africa was attributed to heavy rainfall during January–February 2010. In Namibia, it resulted in the mortality of 2 019 sheep and the morbidity of 35 000 sheep and goats. It led to the vaccination of 130 000 sheep and 67 000 goats (DVS, 2011; Monaco et al., 2013).

**Climate change impacts**

The average maximum temperature during the hottest months of September to February is generally above 30°C, except in the cooler coastal areas, while July is the coolest month with an average minimum of less than 10°C (Republic of Namibia, 2020). During the 1970 to 2015 period, an average rise of temperature of around 1.5°C was observed in Namibia. With regards to rainfall, the average annual precipitation for Namibia is around 276 mm, while the mean number of wet days is limited and estimated at 44 days (CIMA/UNISDR, 2018). During the 1981 to 2018 period, it was estimated that the mean average rainfall varied between 25 to just over 600 mm (Republic of Namibia, 2020).

According to different greenhouse gas emission scenarios, a rise in temperature is observed in all three periods of 2025–2049, 2050–2074 and 2071–2095. In the high emission scenario (RCP8.5), an increase between 3°C and 4°C is expected for the 2050–2074 period and an increase between 4°C and 5°C for the 2071–2095 period. Although predictions regarding rainfall are much more uncertain, the models generally anticipate a decrease in precipitation in all periods and for all different emission scenarios (CIMA/UNISDR, 2018). Predictions for mid- and end-century show, with a low confidence, a 7 percent and 14 percent reduction from the base period (1981–2018). As a result, it is anticipated that Namibia will become drier, while rainfall variability will likely increase and extreme weather events, such as droughts and floods, are expected to become more frequent and intense (Republic of Namibia, 2020).

The expected impacts of climate variability and change on agriculture, include the increase of irrigation demands due to rising temperatures, spatial changes in the optimum growing regions for field crops and forestry, reduction in yields of rain-fed crops – including maize, sorghum and millet – and the increasing risks of floods and other extreme weather events that will negatively impact crop production. Moreover, the increase in temperatures will adversely affect livestock production and productivity, especially in the southern and central regions. In addition, the increase in the emergence and outbreak of animal and plant pests and diseases, may negatively affect the quantity and quality of feed, heat stress in
animals, and their susceptibility to livestock related pests and diseases (Republic of Namibia, 2020).
Legal and policy frameworks for disaster risk reduction/management

Namibia has established various legal and policy frameworks for disaster risk reduction/management (DRR/M). The country’s 2012 Disaster Risk Management Act outlines an integrated and coordinated disaster risk management approach, including preventing and reducing risks, preparing for emergency response, as well as effective disaster response and post-disaster recovery and rehabilitation (Republic of Namibia, 2012). It provides the roles and responsibilities of the prime minister and the main disaster risk management institutions in Namibia. It also makes reference to the establishment of the national disaster risk management framework, programmes and plans, as well as setting up a national disaster fund. Agriculture, as well as other sectors, are stakeholders within disaster risk management (DRM) committees at the various levels.

The 2009 National Disaster Risk Management Policy (NDRMP) aims to contribute to the country’s sustainable development in line with its Vision 2030 (2004) through the strengthening of national capacities to reduce disaster risks and build community resilience to disasters (Republic of Namibia, 2009). It focuses on the shift away from reactive emergency response towards proactive disaster risk reduction. The policy also emphasizes that environmental and natural resource management initiatives must support and promote the integration of disaster risk reduction (DRR) and climate change adaptation (CCA) into strategies to reduce disaster risks and adaptation to climate change.

The policy also recognizes the importance of gender mainstreaming in DRM as a pivotal component of DRM implementation. Enhancing gender aspects requires increasing women’s participation in DRR, but also involves balancing the entitlements and responsibilities of both males and females and making sure that there is equality in the implementation of disaster reduction interventions. The policy acknowledges that DRM is a multi-sectoral and multi-disciplinary responsibility. Though the different sectors are not specifically mentioned, all sectors are addressed in the different key performance areas that guide the implementation of the national DRM policy in Namibia.

The aim of the 2011 NDRMP is to provide a collaborative framework for disaster risk management, which helps to enhance planning for disaster prevention, mitigation, preparedness, response and recovery in Namibia (Republic of Namibia, 2011a). It provides an overview of the hazard profile as well as describes the country’s legislative framework for DRM, its 2009 NDRMP and the institutional framework for DRM. DRR is addressed within the context of a changing climate and the expected increase in frequency and severity of extreme weather events. Guiding principles of the plan include the shift towards proactive DRR, the
protection of sustainable development gains in Namibia by mainstreaming DRR into development and the aim towards sustainable ecosystem and environmental management.

The NDRMP takes a sectoral approach, which creates a more coherent and inclusive process as well as opportunities for integrated DRM programming across sectors. Agriculture, referred to in the NDRMP as the food security and livelihoods sector, is considered a key priority. The sector’s responsibilities are outlined and divided into prevention, preparedness, response and recovery activities. These activities are primarily non-structural and include, among others, conducting community risk and vulnerability assessments, promoting good agricultural and land use practices with a particular focus on drought mitigation, sustainable natural resources management, livelihood diversification, issuing early warnings, and providing DRR capacity building trainings and raising awareness among communities and local authorities.

The overall objective of the National DRM Framework and Action Plan, 2017–2021 is to provide a regulatory and policy framework of the DRM system in Namibia, which is based on clear objectives as well as a set of prioritized, integrated and multi-sectoral activities at all levels and across sectors that are monitored through a set of indicators (Republic of Namibia, 2017a). This framework is in line with the Sendai Framework for Disaster Risk Reduction and is also linked to other relevant national laws, policies, plans and strategies, including the DRM Act of 2012, the 5th National Development Plan 2017/18–2021/22 (2017) and the National Strategy for Mainstreaming DRR and CCA into Development Planning in Namibia 2017–2021 (2017), among others. Agriculture is considered a priority sector and investment in DRM for this sector is linked to the need to establish financial schemes for risk reduction and risk transfer as well as the set-up of public-private partnerships.

As adverse impacts of disasters and climate change can significantly undermine the achievement of national development and poverty reduction goals, there is a need for disaster and climate risk reduction interventions that are integrated into national and sector development planning. Despite the existence of laws, policies and plans for climate and disaster risk management, their implementation is still separate and not sufficiently integrated. Within this context, the National Strategy for Mainstreaming DRR and CCA into Development Planning in Namibia 2017–2021 (2017) was established. The goal of this strategy is to enhance coordinated DRR and CCA implementation and building community resilience to the impacts of climate change and disasters.

It includes an action plan with performance indicators that are sector-specific. Identified activities that are under the direct responsibility of the Ministry of Agriculture, Water and Land Reform (MAWLR), the Ministry of Environment,
Forestry and Tourism (MEFT) as well as other ministries, include, among others:

- the assessment of capacities for EWS and climate risk management;
- liaison with mobile network providers on setting-up a mobile phone early warning, farming and related advisory information dissemination platform for farmers;
- mobilization of resources for the construction of weather monitoring stations, including expert support for flood modelling and the use of technology for real-time monitoring of flood events.

The National Drought Policy and Strategy (1997) strives to develop an efficient, equitable and sustainable approach to drought management, thereby acknowledging the adverse impacts that frequent droughts have on the sector. Namibia’s National Agricultural Policy (2015) is in line with this. This policy aims to shift responsibility for managing drought risk from the government to the farmers, with short-term financial assistance and food security interventions only considered in the event when an extreme drought is declared. It provides a new focus on reducing vulnerability to drought in the long-term instead of short-term drought relief interventions, and promotes drought mitigation practices and technologies and an enabling policy environment.

It mainly focuses on the promotion of non-structural DRR and agricultural measures, such as: hazard and risk mapping; vulnerability assessments; early warning systems; improved weather data collection and analysis; and agricultural practices, like agroforestry, water conservation measures, (small-scale irrigation, rainwater harvesting and use of drought-resistant varieties and dry seeding); and, improved post-harvest technologies, which will continue to receive sustained government support. In addition, the policy includes the use of punitive water tariffs in order to increase consumption efficiency and hence, limit the demand from primary sources as well as the implementation of specific regulations to promote the sustainable use of water resources by farmers. The country is currently updating the national drought policy based on lessons from the 2018/2019 drought.

The National Drought Relief Response Plan (2013) includes a specific food security sector response plan and outlines specific drought response activities for the agriculture sector, such as:

- provision of market incentives to encourage farmers to sell their livestock (destocking);
- introduction of a transport subsidy for farmers willing to move their livestock to areas where there is grazing;
- enhancement of farmers’ access to grazing lease subsidies;
- rehabilitation and drilling of new boreholes; and
- provision of food assistance.
This plan includes only a few agricultural relevant DRR measures, like the promotion of appropriate post-harvest management techniques to help reduce post-harvest food losses due to poor post-harvest food storage practices and the encouragement to use high value drought tolerant varieties.

DRR is not mainstreamed in Namibia’s 2015 National Agricultural Policy, although the impact of climate change on the sector is recognized (Republic of Namibia, 2015). The policy acknowledges the national and international protocols and conventions dealing with climate change. It also promotes agricultural DRR and CCA measures, for instance, the development of improved and well-adapted crop and livestock genetic material, the development of sustainable rangeland strategies and practices, as well as good animal health and husbandry practices aimed at the prevention, control and management of animal disease outbreaks, through vaccinations, control of (transboundary) animal movements and animal disease surveillance, among others.

In the Strategic Plan for the Ministry of Agriculture, Water and Forestry 2017/18–2021/22 DRR is also not considered a key priority (MAWF, 2017b). Although the strategic objective of sustainable livestock and forestry management is to enhance resilience to natural hazard-induced disasters and climate change. The formulation of the strategic plan is guided by the national policies, plans and strategies, such as the country’s Vision 2030 (2004), the 5th National Development Plan 2017/18–2021/22 (2017) and international frameworks, like the Paris Agreement and the 2030 Agenda for Sustainable Development, that the country is party to. Among the DRR and CCA measures included, are those that mainly focus on the prevention, control and management of animal pests and diseases, such as vaccination of animals, the Veterinary Cordon Fence (VCF) to help control (transboundary) animal disease outbreaks in the NCA, as well as sustainable forest, crop and water management practices, like reforestation, agroforestry, conservation agriculture, the construction of water harvesting infrastructure and development of water basin management plans. The country is currently finalizing its first sector-specific DRM strategy for agriculture led by the Ministry of Agriculture, Water and Land Reform (MAWLR).

The goal of the 2011 National Policy on Climate Change for Namibia is to contribute to the achievement of sustainable development in line with the country’s Vision 2030 (2004) through the strengthening of national capacities to reduce climate change risk and build resilience to climate change related shocks and stresses (Republic of Namibia, 2011b). However, the main focus of the policy is on the implementation of climate change mitigation and adaptation strategies and actions, although DDR/M is one of its strategies. Food security and sustainable resources is integrated in the strategy through the promotion of climate-resilient and sustainable agricultural systems. In this regard, the government will support the application of conservation agriculture, promote highly adaptive and productive livestock breeds and crop varieties and encourage sustainable
rangeland, pasture and forest management to prevent land degradation and deforestation.

Disaster risk reduction/management is mentioned as a cross-cutting issue in the National Climate Change Strategy and Action Plan 2013–2020 (Ministry of Environment and Tourism, 2013). It has the strategic aim to strengthen the climate risk management strategy, enhance forecasting and early warning systems and disaster preparedness, and to develop a coordinated and appropriate timely disaster response mechanism. The specific agricultural DRR and CCA related measures as included in its 2011 national climate change policy are outlined in the action plan of this strategy.

Namibia’s 5th National Development Plan 2017/18–2021/22 supports its long-term vision as expressed in its Vision 2030 (2004) (Republic of Namibia, 2017b). DRR/M is integrated in the area of food security and the agriculture sector as a key strategy aimed at enhancing preparedness for effective response, recovery and reconstruction under the championship of the Office of the Prime Minister (OPM). While other related DRR/CCA strategies, such as improving animal production and health and the promotion of drought resistance varieties is under MAWLR’s leadership. The strengthening of disaster risk governance is a key strategy under social protection, with the desired outcome to increase the understanding of, and investment in, DRR and the fostering of collaborations and partnerships across sectors and institutions (also assigned under OPM’s responsibility).

The goal of the Namibia Vision 2030 is to enhance the quality of life of the Namibian people and transform the country into a healthy and food secure nation by 2030 (Office of the President, 2004). As the country adopted the 2030 Agenda for Sustainable Development with the 17 Sustainable Development Goals, sustainable development is viewed as the cornerstone to achieve the Vision 2030. Neither climate change nor the country’s proneness to extreme weather events – such as droughts and floods – are mentioned as one of the future challenges. However, the country’s ability to reduce the impacts of droughts, through implementing mitigation, preparedness and response strategies, is considered as one of its comparative advantages.
Key disaster risk management institutions relevant to agriculture

The National Disaster Risk Management System (NDRMS) in Namibia, consists of various key institutions, which are described in this section.

The Office of the Prime Minister (OPM) has the overall responsibility for the operation of the NDRMS in Namibia and maintains the Directorate for Disaster Risk Management (DDRM). DDRM is mandated to coordinate the disaster risk management activities and provides support to the regional, constituency, settlement and local authorities’ DRM committees, and also acts as the Secretariat to the National Disaster Risk Management Committee (NDRMC). It thereby serves all government offices, ministries and agencies at national, regional and municipal level, as well as relevant statutory bodies, private sector, communities and other non-state actors who are involved in disaster risk management in Namibia.

The NDRMC is responsible for the development and implementation of disaster risk management policy and plans in Namibia, including the establishment and maintenance of integrated and coordinated disaster risk management. It serves as the national multi-stakeholder platform and the committee reports directly to the President and the Prime Minister. The Secretary to the Cabinet serves as the chairperson of the NDRMC and, as already mentioned above, the DDRM provides the Secretariat. An overview of the institutional framework for DRM in Namibia is shown in Figure 3.

Figure 3. Overview of the institutional framework for disaster risk management in Namibia

Other key actors in the NDRMS include the Namibia Vulnerability Assessment Committee (NamVAC), which is coordinated by DDRM. It is a multi-stakeholder committee that undertakes vulnerability assessments. NamVac also manages an institutionalized information system and undertakes multi-disciplinary analysis to help address vulnerability reduction and food security issues that inform policy and decision making. The NamVAC committee consists of various relevant stakeholders including MAWLR, MEFT, UN agencies and the Namibia Red Cross Society.

The National Focal Persons Forum, which is also coordinated by DDRM, provides a mechanism for all relevant stakeholders to consult one another and coordinate their DRM planning and activities. Each actor involved in DRM must appoint an individual who will act as the focal point for DRM. The focal point ensures, for example, horizontal coordination with relevant stakeholders at the national level through the NDRMC and vertical coordination via the DDRM, participates in disaster risk assessments, facilitates the mobilization of DRM resources, as well as monitors and assesses whether capacity and resources are sufficient to adequately implement the DRM activities.

The DRM committee structure at national level is replicated in each of Namibia’s 13 regions and the Regional Disaster Risk Management Committee (RDRMC) coordinates the DRM activities implemented by the relevant stakeholders at regional level. The regional governor oversees the activities of RDRMC and advises the government on disasters and DRM issues that are impacting the region. The chief regional officer chairs the RDRMC and a technical subcommittee to the RDRMC facilitates the integration of DRR into the development planning of relevant regional offices, ministries and agencies. Some of the responsibilities of the RDRMC include the alignment of regional early warning systems, establishment of a regional disaster risk information database, development of disaster response and recovery plans, testing of sectoral and regional contingency plans, participation in disaster risk assessment and post-disaster damage assessments, and the provision of support to the constituency and settlement or village disaster risk management committees to implement DRR awareness raising programmes.

The disaster risk management framework of each local authority is an integral part of their respective Regional Disaster Risk Management Plan. The Local Authorities Disaster Risk Management System is established in accordance with the national disaster risk management policy and operates within the legal framework governing local authorities in Namibia. The Local Authorities Disaster Risk Management Committee is part of the Local Authorities Disaster Risk Management System and among its responsibilities include, the coordination of DRM activities in the local authority, conducting disaster risk assessments, integration of the local authority’s DRM plans into the regional disaster plans, preparation and updating of the local authority’s response and recovery plans, provision of emergency
response services, and acting as a channel of communication to the community on all DRM related issues.

The Constituency Disaster Risk Management Committee and the Settlement Disaster Risk Management Committee are mandated to coordinate disaster risk management activities at the constituency and settlement or village levels. These committees have similar responsibilities as the regional and local authorities’ DRM committees at each of their levels, such as the participation in disaster risk assessments, development of constituency and village disaster contingency plans and carrying out disaster response activities, among others. These committees consist of governmental representatives, such as teachers, nurses, agriculture and other extension staff, staff from non-governmental organizations, traditional leaders and representatives of faith-based organizations.

The Namibia Meteorological Service provides quality weather and climate services to all sectors of the economy. It offers daily and 7-day weather forecasts, a daily rainfall bulletin, rainfall progression charts and seasonal rainfall outlooks, among others. It has a climate data bank, which includes climatological data that is collected from the network of meteorological stations located across the country. This data is processed and stored in a digital database and can be accessed and retrieved in different formats for use within the Meteorological Service and outside, by different sectors, including agriculture, land, water and environment.

MAWLR aims to realize the potential of the agricultural, water and land sectors through the promotion of efficient and sustainable socio-economic development for a prosperous Namibia, thereby envisioning the nation’s sustainable and equitable use of its natural resources for improved livelihood, wellbeing and wealth for all. In order to promote, develop, manage and utilize these resources, the ministry carries out policy reviews, coordinates strategic and sectoral planning processes and, monitors and evaluates development programmes. The Ministry consists of five departments, including the Department of Agriculture Development, Department of Water Affairs, Department of Land Management, Department of Land Reform, Resettlement and Regional Programme Implementation and the Department of Planning, Marketing and Administration.

At present, Namibia has three farmers’ associations, including the Namibia National Farmers Union (NNFU), which was established in 1992. It serves as the voice of the communal and small-scale farmers and herders. At present, 12 regional farmers’ unions are affiliated to the NNFU.

The Namibian Agricultural Union (NAU), set up in 1947, is the union of farmers that represents commercial or non-subsistence farmers. It has a small secretariat, which oversees 68 farmers’ associations and various commodity associations in

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1 For further information on Namibia’s Meteorological Service, please see www.meteona.com.
2 For further information on the Namibia National Farmers Union, please see www.nnfu.org.na.
3 For further information on the Namibian Agricultural Union, please see www.agrinamibia.com.na.
10 regions. The NAU is a membership-based organization and is part of the International Federation of Agricultural Producers, a global organization, which advocates for farmers.

**Namibia Emerging Commercial Farmers’ Union (NECFU)** is a non-profit, non-political, non-ethnical organization, that was inaugurated in 2010. It aims to serve as a platform to advance the interests of resettled farmers, emerging commercial farmers and the beneficiaries of the government’s affirmative action loan scheme in Namibia. This loan scheme enables emerging farmers from disadvantaged communities to acquire farms in commercial areas. The organization helps to lobby for an enabling environment where farmers are able to be fully involved in the agricultural value chains in order to maximize the potential contribution of the agricultural sector to the country’s economy.

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*For further information on the Namibia Emerging Commercial Farmers’ Union, please see www.necfu.org*
Animal disease prevention, control and management good practices

This section specifically describes in detail good DRR practices that Namibia is implementing to prevent, control and manage animal disease outbreaks, which are significantly influenced by the occurrence of natural hazard-induced disasters. These types of disasters, such as floods and droughts, negatively affect the health of animals through enhancing their susceptibility to livestock diseases. Through the implementation of *ex ante* measures the resilience of the livestock sector to animal pests and diseases is enhanced in Namibia.

Animal disease prevention, control and management related legislation

Namibia has several animal health related legislation to help prevent, control and manage animal pests and diseases, for example:

- **The Animal Health Act 1 (2011)** is the primary legislation for the prevention, control and management of animal pest and disease outbreaks in the country. It defines the roles of the DVS, the Chief Veterinary Officer (CVO) and veterinary officials. The Act also defines the roles and responsibilities of livestock keepers with respect to the reporting of animal diseases and cooperating with veterinary officials. Since its review and promulgation in 2011, the Act is considered holistic and comprehensive in its aim towards prevention, mitigation, preparedness, response and recovery of all animal pests and diseases.

- **The Prevention of Residues in Meat Act (1991)** prohibits or regulates the use of growth stimulants, antibiotics and chemicals that may be harmful to humans if consumed through meat.

- **The Stock Brands Act (1995)** compels all livestock owners to acquire and apply a hot iron brand, in order to identify the ownership of livestock and to support the traceability of animals during animal disease outbreaks.

The Namibian constitution prescribes the adoption of foreign legislation in cases where Namibia is a signatory to and has ratified the international convention or treaty. This provision ensures that the country can adopt and enforce best practices from other jurisdictions to prevent, control and manage animal pest and disease outbreaks. The CVO, as the head of the DVS of MAWLR, can legally enforce international standards, as set by the OIE, World Health Organization or the Codex Alimentarius, to strengthen the disaster risk management capabilities in the country. In this regard, some of the zoo-sanitary measures that Namibia adopted from the OIE to prevent, control and manage animal diseases include the regionalization and zoning for FMD and CBPP, the control of livestock movement,
and the traceability of livestock and mass vaccination for certain (transboundary) animal diseases. While, conducting an import risk assessment and undertaking a systematic preventive approach to food safety are some of the practices that the country adopted from the Codex Alimentarius.

**Key stakeholders for animal disease prevention, control and management**

**Structure and function of the Directorate of Veterinary Services**

The DVS is one of three Directorates that fall under the Department of Agriculture Development of MAWLR. The DVS is headed by the CVO and consists of four divisions, namely: Animal Disease Control; Veterinary Public Health; Epidemiology, Training, Import and Export Control; and Diagnostic Services, which are each headed by a DCVO, as shown in Figure 4.

**Figure 4. An organigram of the Directorate of Veterinary Services of MAWLR**

![Organigram of the Directorate of Veterinary Services of MAWLR](image)

*Source: MAWF, 2017a.*

The DVS employs 1,173 staff across the entire country, of which 85 are veterinarians that are assisted by 211 para-veterinarians, animal health technicians and agricultural scientific officers, 116 veterinary hygiene inspectors and 761 support staff, including clerical and administrative personnel (MAWF, 2017a). DVS is a predominantly hierarchal organization with strict levels of supervision and

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5 Due to a restructuring in 2020, the Ministry of Agriculture, Water and Forestry is now the Ministry of Agriculture, Water and Land Reform.
a chain of command from the CVO to all staff members. It closely collaborates with relevant stakeholders including:

- parastatals, such as the Meat Board of Namibia and the Meat Corporation of Namibia;
- farmers associations, namely NAU, NNFU and NECFU;
- non-governmental actors, such as the OIE, FAO, United Nations Industrial Development Organization, World Health Organization and the International Atomic Energy Agency; and
- OPM and other ministries, such as MEFT and the Ministry of Trade and Small and Medium Enterprise Development as well as other governmental directorates and the departments, like the Directorate of Agricultural Production, Extension and Engineering Services (DAPEES) and the Department of Agriculture Planning.

**Chief Veterinary Officer**

The CVO is appointed by the Minister of Agriculture and bears overall responsibility to administer the Animal Health Act of 2011 and all other relevant legislation that specifically empowers the CVO or the DVS. The CVO is responsible for the prevention, control and management of animal pests and diseases as well as being the Namibian delegate to the OIE. The CVO also maintains all bilateral relations with the neighbouring countries and regional bodies with regard to the control and management of transboundary animal diseases. For instance, Namibia has signed a memorandum of understanding for cooperation on animal health with the Republic of Angola. The CVO is also engaged with the African Union Inter-African Bureau for Animal Resources and the Southern African Development Community Livestock Technical Committee with regard to the facilitation of cross-border trade. The officer also issues veterinary notifications to direct livestock keepers or the general public with regard to implementation of disaster risk management practices. Depending on the intended audience, notifications are disseminated, using various media platforms, such as emails, radio and television broadcasts, newspapers and WhatsApp messages.

**Animal Disease Control Division**

The Division of Animal Disease Control is the largest in the DVS and is divided into two divisions; the Animal Diseases Control North, namely, regions north of VCF, and the Animal Disease Control South, namely, the FMD free zone without vaccination, south of the VCF (Please refer to Zoning Strategy, later in this section). Each division is headed by a Deputy Chief Veterinary Officer (DCVO), who is supported by chief veterinarians and state veterinarians. Both divisions are responsible for the surveillance, diagnosis and treatment of animal diseases and the enforcement of relevant legislation.
State Veterinary Offices

There are 22 State Veterinary Offices (SVO), which are situated in all major towns across Namibia. They are responsible for:

• attending to sick animals;
• being present at all animal gatherings, such as auctions and farm inspections;
• collection and submission of surveillance data;
• enforcement of legislation;
• maintenance of veterinary infrastructure, such as the veterinary cordon fence, quarantine camps and auction pens; and
• overseeing the control of imported animals and animal products into their area of jurisdiction.

In the NCA, the state veterinarian is also responsible for the planning and execution of mass vaccination campaigns against FMD and CBPP.

Chief Veterinarian

The Chief Veterinarian (CV) provides supervision and oversight to the SVOs according to the delegated functions by the CVO and DCVO. The CV ensures compliance to directives from the headquarters and audits SVOs for compliance with national and international standards.

Veterinary Public Health Division

The Division of Veterinary Public Health is responsible for interpreting import conditions of trading partners and advising the CVO on Namibia’s ability to meet such requirements. It also ensures the certification and continuous auditing of meat export slaughterhouses and also prepares the country’s food safety audits. The division is headed by a state veterinarian, who supervises the veterinary hygiene inspectors and the veterinary hygiene inspector assistants. Its inspection staff, based at the various export slaughterhouses, are responsible for the ante- and post-mortem inspection at export abattoirs and the certification of products compliant with the requirements of exporting countries. The inspection of meat for local consumption is conducted by the Ministry of Health or by the municipalities.

Epidemiology, Import Control and Traceability Division

The Epidemiology subdivision of the Division of Epidemiology, Import Control and Traceability is responsible for the design of surveillance programmes as well as the collection and consolidation of surveillance data, which informs the CVO on the animal disease situation in the country. This subdivision is also the initiator and designer of the national contingency plans. While the import control subdivision, is responsible for the design and issuance of the import permits to members of the public and the verification of the imported animals and animal products at the various border posts around the country, this includes presence at the Hosea
Kutako international airport and the Walvis Bay harbour. This subdivision is also the custodian of the Namibia Livestock Identification and Traceability System (NamLITS).

Diagnostic Services and Research Division
The Division of Diagnostic Services and Research is based at the Central Veterinary Laboratory (CVL) in Windhoek and oversees a satellite laboratory in Ondangwa. The overall objective of CVL is to provide laboratory confirmation of animal disease and public health conditions. It is accredited with the ISO 17 025 standard for competence of testing laboratories. In case tests are not available locally, due to the OIE laboratory twinning initiatives, tests can be conducted in other laboratories elsewhere in the world.

Agricultural Engineering and Extension Services Directorate
The DVS also closely collaborates with MAWLR’s DAPEES, which is responsible for the production and dissemination of agriculture related information. DAPEES has agricultural extension centres in all constituencies of the country where farmers are trained on agricultural good practices, including building farmers’ capacities to prevent, control and manage animal diseases.

Livestock producers
The livestock producers are the primary care takers of the animals and therefore able to identify animal disease conditions and able to take measures to prevent and mitigate the adverse impacts, if they have adequate knowledge of what to do and when. Producers are responsible for:
- identification of their livestock;
- involvement in the drafting of disease-specific contingency plans;
- reporting of outbreaks and disease conditions to the DVS;
- compliance with disease control measures as directed by DVS; and
- presenting livestock for annual inspection as directed by DVS.

Private veterinarians
Registered private veterinary clinics are located mostly in urban centres, such as in Windhoek, Swakopmund and in the areas south of the VCF. There is currently only one private veterinary clinic in Oshakati, situated north of the VCF. Private veterinarians derive all their income from the farmers they serve. There is a strong interaction between DVS, private veterinarians, and the Veterinary Association of Namibia. Veterinarians are obliged to register and adhere to the legal obligations set by the Veterinary and Para-Veterinary Professions Act 1 of 2013. Their duties with regard to the prevention, control and management of animal disease outbreaks include:
- provision of veterinary services to the livestock and wildlife sectors;
• reporting of notifiable diseases if observed or suspected;
• sharing of veterinary extension information and the training of farmers; and
• surveillance and control of disease outbreaks.

The execution of their responsibilities is constantly monitored by the Veterinary Council of Namibia, which aims to protect the public from acts of negligence by registered veterinarians and to protect the honour of the profession.

**An *ex ante* approach to prevent, control and manage animal pests and diseases**

The following section describes the various DRR good practices that Namibia is implementing to prevent, control and manage animal disease outbreaks, which are significantly influenced by the occurrence of natural hazard-induced disasters. These types of disasters, such as floods and droughts, negatively affect the health of animals through enhancing their susceptibility to livestock diseases. Through the implementation of *ex ante* measures, the resilience of the livestock sector to animal pests and diseases is enhanced in Namibia.

**Disease monitoring: passive and active surveillance**

Animal disease surveillance is an important activity to assess the occurrence or continued absence of animal diseases in a country. Namibia is implementing both active and passive surveillance strategies to monitor diseases. Passive surveillance includes:

• the treatment of animals at veterinary clinics and on farms;
• the inspection of animal gatherings, such as auctions, livestock shows and exhibitions;
• the inspection of imported cattle and those that will be exported;
• ante and post-mortem inspections at slaughterhouses;
• farm and community visits according to an annual farm inspection programme; and
• the assessment of bi-annual filled-in animal health declaration forms by farmers.

Active surveillance programmes are in place for FMD, bovine spongiform encephalopathy (BSE) and residues in food. The active detection of a disease involves the collection of blood or tissue samples from suspected animals, which are then screened and tested at the CVL. If this laboratory screening capacity does not exist in the country, arrangements are made to send the samples to regional and international collaborating laboratories for disease confirmation. Surveillance data and laboratory results are provided to the Epidemiology subdivision of the DVS for analyses and reporting, which enables evidence-based decision-making with regard to animal disease status and the appropriate measures to be undertaken.
Namibia Livestock Identification and Traceability System and movement permits

To support the surveillance of animal diseases, NamLITS, managed by the DVS, has been established in close partnership with the private sector, farmers’ organizations, and the Meat Board of Namibia. The system requires that all cattle over 6 months of age need to be identified with individual ear tags. The acquisition and sale of ear tags is managed by the Meat Board of Namibia on instruction by the DVS for the FMD free zone, whilst DVS manages the tagging of cattle north of the VCF. The traceability system also covers small ruminants, such as sheep and goats, but these are identified as “lots” belonging to individual farmers from the same holding. Once the animal is tagged, registration forms are submitted to DVS or entered online to link the animal identification with a specific holding.

Movement permits are issued by DVS for the recording of animal movements from one registered holding (for example, farm, abattoir, auction pen or loading facility) to another. A departure register is completed by the dispatching livestock owner and the departure and arrival registers are completed by the receiving livestock owner, along with the endorsed livestock movement permit, which are then returned to the DVS for the reconciliation of the movement. Livestock movement permits are valid for 14 days. A holding may be blocked from receiving further animals if documents are not promptly returned and farmers may be prosecuted should they be involved in illegal livestock movements.

Commodity based trade

Namibia is following chapter 8.8.22 of OIE’s Animal Health Terrestrial Code (OIE, 2019a), which outlines the procedures to produce fresh beef from FMD infected zones where no FMD free zoning is possible. In this way, it provides a marketing opportunity to farmers in FMD infected countries to increase their income from their livestock. According to these OIE guidelines compliance requires that:
- cattle received at least two vaccinations against FMD;
- cattle are placed in supervised isolation in a quarantine camp for 30 days;
- ante and post-mortem inspections are conducted at approved slaughterhouses; and
- deboning and de-glanding of the beef is undertaken to reduce risk of FMD.

Fresh boneless beef produced under these conditions may, under DVS authority, move from and within the infected and protection zone into the FMD free zone and may technically be exported if suitable markets are identified. Whilst this provides an opportunity for beef produced from the NCA, it has received limited support so far, given that all export orientated abattoirs in the NCA have closed due to the lack of markets for this commodity. Although, with the reopening of the Katima Mulilo slaughterhouse in August 2021, marketing opportunities have been created under the principle of commodity-based trade so that livestock keepers
can start earning an income from their livestock production. In addition, there are plans to establish a meat cooking facility at Bukalo in the Zambezi region, which aims to ensure the marketing of beef even during disease outbreaks, which will thus limit the impact that such a disaster has on the livelihoods of the producers as they can then still earn income from the sale of their meat.

Import risk assessment

The assessment of risk with regard to emerging and exotic animal diseases remains the priority of the import control subdivision of DVS. The risk is assessed based on the available information on the country exporting the specific commodity and the likelihood that the imported product may contain the infectious agent. The assessment of import risk of livestock and livestock products ensures that Namibia objectively determines which commodities may be imported from which country in the region and elsewhere. Namibia, therefore, ultimately limits access to trade in livestock and livestock products from other countries and ensures that their animal and public health is preserved. Thus, through undertaking import risk assessments, it ensures that imported livestock and livestock products are not infected and are safe for human consumption.

Zoning strategy

Namibia implements zoning strategies as prescribed by the OIE in order to maintain distinct animal sub populations in the country with respect to FMD and CBPP. This zoning strategy also ensures that some sub populations in the country can benefit from international trade. The VCF divides the country into the “FMD free zone without vaccination” and the “FMD undetermined zone”. The undetermined zone is further subdivided into the protection zone and the infected zone, which comprises the entire Caprivi Strip in the northeast as shown in Figure 5. The “FMD free zone without vaccination” also enjoys OIE recognized free status from CBPP, rinderpest, BSE and *peste des petits ruminants*. 
Figure 5. Overview of the foot-and-mouth disease zones in Namibia

Source: Adapted from DVS, 2009.

**Veterinary Cordon Fence**

The VCF was constructed in 1897 and traverses the entire width of the country along the 20th parallel from the Atlantic coast in the west to the border with Botswana in the east as shown in Figure 5. The fence is composed of two separate fences, including an outer 1.2 metre stock proof section to prevent the crossing of domestic animals and a game proof 2.2 metre inner section to prevent wild animals from jumping over the fence. A 9-metre cleared buffer area separates the two fences and there are 9 manned and permanent checkpoints along the entire length of the fence to prevent all livestock movement. In the event of a disease outbreak, these crossings may be closed in order to essentially seal off the FMD free zone from the rest of the country and the African continent. Constant maintenance is undertaken, and the fence is regularly patrolled by the DVS, the police and farmers. The latter, due to their proximity to the fences, is able to quickly notify the authorities and be first responders in case of any issues.
The objective of the FMD free zone is the early detection and prevention of outbreaks of this animal disease. The FMD free zone is defined by the VCF to the north, the Orange River in the south, the Botswana border to the east and the Atlantic Ocean to the west. It is essentially an enclave on the African continent, as it excludes all contact between domestic and wild animals from other zones or other countries. The north to south movement of livestock, game or livestock products is not allowed across the VCF, but the animals can move in the opposite direction. An FMD free population of 803 African buffaloes is currently present within the confines of the Waterberg Plateau Park (MEFT, 2020). These buffaloes are jointly sampled and tested by DVS and MEFT every three years, to reconfirm their FMD free status. These buffaloes are not allowed to move out of the park, except to be sold to neighbouring countries and no buffalo can be introduced into the park.

The aim of the FMD protection zone is to confine African buffalos in fenced parks. This zone is defined by the VCF in the south, the Kavango river at the Bagani breach in the east, the Atlantic Ocean in the west and the Angolan border to the north. The fertile area around the Namibia-Angolan border called “the Cuvelai plains” is used for horticulture production as well as animal grazing by a large range of wild and domestic animals. Due to the unsupervised and open nature of the northern border with Angola, livestock can move freely between the two countries as the communities on both sides of the border share close cultural and ethnic ties. However, some of the buffaloes in this area are carrying FMD and during droughts, Namibian farmers may let their cattle graze there, which increases the cattle’s risk of getting FMD.

The 2015 FMD outbreak demonstrated that the protection zone remains vulnerable given the porous border with Angola and the re-emergence of African buffaloes in this area. The control of this outbreak is an example of multi-sectoral disaster risk management cooperation as it involved the collaboration of livestock keepers, the police force, DVS, DAPEES, OPM, the Meat Board of Namibia, Meatco, and the NNFU. Moreover, cross border cooperation was also initiated to coordinate efforts along the border and reduce the spread of the infection. Similarly, the Botswana Vaccine Institute as the supplier of the vaccine, and OIE’s regional reference laboratory were closely involved in the diagnosis and provision of the vaccines.
Infected zone

The objective of the infected zone is to maintain a high herd immunity against CBPP and FMD. This zone, which covers the Caprivi strip and includes the eastern part of the Kavango east region and the Zambezi region, is referred to as the infected zone, due to the presence of free roaming buffaloes that are intermingling with cattle. As a result, FMD outbreaks are frequent, particularly in the eastern flood plains when a large number of cattle are trapped on higher lying areas. In order to prevent and control the spread of these diseases, annual mass vaccinations occur three times per year. Outbreaks in this area are mostly due to failure to maintain the vaccination schedule, farmers who are not presenting cattle for vaccination or the mismatch between vaccine and prevailing strains of the virus. To overcome these challenges, close cooperation is maintained between the producers, veterinary services and the Botswana Vaccine Institute for the supply of vaccines and post-vaccination serosurveillance\(^6\) and vaccine matching.\(^7\)

Annual vaccinations

Annual vaccination of all cattle in the entire country against anthrax and brucellosis is mandatory according to the country’s Animal Health Act 1 of 2011 and proof of such vaccination needs to be provided to the DVS officials if farmers would like to engage in livestock trade. Moreover, north of the VCF, the government administers the FMD and CBPP vaccine as its control is considered a public good. Vaccination is normally conducted twice a year. In 2020, over 62,000 and more than 58,000 cattle were vaccinated against FMD and CBPP (DVS, 2020).

Ideally the initial dose must be followed by a booster 30 days apart, however, given the difficult terrain and vast distances that are covered, revaccination occurs on average between 90 and 120 days later. Thus, there is always a concern about the efficiency of vaccination and whether protective immunity is being achieved. The target of such mass vaccination campaigns is to attain 80 percent vaccine coverage in the animal population.

The 2011 Animal Health Act also states that livestock keepers are responsible for the care and preventative vaccination of all their livestock. Thus, livestock raisers may also administer a variety of other vaccines against other diseases, such as black quarter, botulism, pasteurellosis and lumpy skin disease as per their annual vaccination programmes or on the advice of a registered veterinarian.

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\(^6\) Serosurveillance is the detection of vaccine antibodies in the blood after vaccination.  
\(^7\) Vaccine matching is comparing the field strain to the vaccine strain.
Contingency planning and simulation exercises

Namibia has contingency plans for FMD, CBPP, BSE and avian influenza, which outline step by step what should be done, and by whom, during outbreaks of these animal diseases to ensure the rapid movement from preparedness to action. In addition to this, DVS maintains fully stocked stores in Otjiwarongo, Oshakati and Katima Mulilo, which include diagnostic kits, camping material and stationery. These stores are supervised by the chief veterinarians to ensure that the equipment, materials, and inputs are replaced in a timely manner and remain ready to be used during an outbreak.

The drafting of the contingency plans involves all relevant stakeholders, and the DVS ensures that the routine review of the updating of the contingency plans responds to the changing prevailing conditions. Real-time or desktop simulations are performed and evaluated to maintain staff and community awareness during times when there are no outbreaks. Currently, there is no defined frequency at which such reviews should take place. Reviews are conducted on a needs-basis, particularly during and after outbreaks, utilizing feedback from such outbreaks. As a result, the contingency plans for rare or infrequent disease situations are hardly reviewed or simulated and awareness is not raised among all relevant stakeholders.
Conclusions and recommendations

Namibia is prone to various natural hazards, including floods, droughts, and veld fires, among others. These extreme weather events have increased in frequency and severity in recent years and are expected to intensify due to climate change, especially floods and droughts. These types of disasters are negatively affecting the health of animals through enhancing their susceptibility to animal diseases, such as FMD, RVF and CPBB, among others. These animal diseases pose a major threat to Namibia’s livestock sector as an outbreak can negatively impact the country’s livestock production, productivity and access to export markets and thereby affect and undermine local food security and livelihoods. Due to the importance of meat and meat products for the country’s export earnings, particularly the export of beef, ensuring that meat is disease-free is thus crucial to meet international food safety standards.

Namibia has established legal, policy and institutional DRM frameworks that focus on the prevention, control and management of animal pests and diseases. The DVS is the central authority that ensures enforcement of prevention, mitigation, preparedness, response and recovery measures before, during and after the outbreak of animal diseases. It is involved in the coordination of stakeholder engagement across sectors and at all levels. The control of the 2015 FMD outbreak is an example of successful multi-sectoral disaster risk management cooperation. It involved collaboration from livestock keepers, the police force, DVS, DAPEES, OPM, Meat Board of Namibia, Meatco and the NNFU. Moreover, cross border cooperation was also initiated to coordinate efforts along the border and reduce the spread of the infection.

The country has adopted an ex ante approach to prevent, control and manage animal pests and diseases through the implementation of good practices. These include a Veterinary Cordon Fence that divides the country in different zones to help prevent, control, and manage outbreaks of FMD. This is required because during droughts, Namibian farmers may let their cattle graze in the area along the country’s open border with Angola where they mingle with the infected wild buffalos, which increases the cattle’s risk of getting FMD. Through the implementation of its zoning strategy, the country can ensure that the export of meat is disease-free. Other DRR measures that Namibia applies include, the application of disease monitoring through passive (for example, inspections at auctions, ante- and post-mortem at slaughterhouses) and active (for example, collection of blood or tissue samples from suspected animals) surveillance, along with an animal identification and traceability system (NamLITS) and movement permits. The country also conducts import risk assessments to ensure that its imported livestock and livestock products are disease-free, undertakes mass vaccination, and has contingency plans in place for FMD, CBPP, BSE and avian
influenza to prevent and mitigate the adverse impacts of these diseases, as well as to enhance preparedness for response in case of outbreaks.

**Recommendations**

**Areas for improved outbreak management in Namibia**

Despite the substantive progress achieved to ensure animal health through the implementation of interventions that help to prevent, control and manage the outbreak of animal diseases, certain challenges remain that can be addressed. The following recommendations are put forward for consideration.

**Expand NamLITS coverage to include individual identification for sheep, goats, and pigs to support disease surveillance**

NamLITS currently covers cattle as well as small ruminants, but the latter are identified as “lots”. Introducing the individual identification for sheep, goats and pigs under the country’s livestock identification and traceability system would improve animal disease management, especially for diseases that affect multiple species, such as RVF.

**Enhance the implementation and enforcement of NamLITS**

Enhancing the implementation of NamLITS north of the VCF, including through applying penalties to offenders, would foster farmers’ compliance. Stricter enforcement of livestock movement permits and import certification in the NCA would also ensure the early detection and rapid response to prevent and control widespread animal disease outbreaks.

**Regular revision of animal disease contingency plans and simulation exercises**

Conducting regular updates of the animal disease contingency plans that are currently in place and undertaking more frequent simulation exercises, especially in the areas south of the VCF, could help enhance stakeholder’s knowledge, awareness, and preparedness to respond to outbreaks in areas where diseases have not been identified for prolonged periods of time. Through the updated contingency plans, as well as regular simulations and dry runs, it could be ensured that all relevant stakeholders are aware and have the capacities to carry out their responsibilities during outbreaks. In this regard, it is critical to have updated and logical legal procedures in place that compel stakeholders to act in a predetermined fashion in order to adequately control and manage the outbreak. Defining a clear hierarchy and roles and responsibilities is key. Roles and responsibilities of stakeholders would also need to be framed under the national legislation. Finally, it could be beneficial to appoint an officer, who would be specifically responsible for contingency planning and outbreak coordination.
Encourage regular transboundary cooperation and collaboration with neighbouring countries

Namibia could benefit greatly from regular engagement with neighbouring countries to harmonize animal disease diagnoses, vaccination, and prevention programmes. Close regional cooperation on animal disease surveillance and control could foster regional disease freedom.

Pursue a gradual northward relocation of the veterinary cordon fence

Implementing robust eradication programmes for FMD and CBPP in the NCA is possible through the gradual northward relocation of the VCF. This would allow for the extension of the FMD free zone and allow farmers in the protection zone to also export their beef and mutton to higher value markets (which are currently only accessible to farmers south of the VCF). To address the lack of market opportunities in the NCA with regard to the sale and export of beef, Namibia should promote this commodity-based trade.

Secure adequate resources to ensure prevention, control and management of animal disease outbreaks

Given the importance of the livestock sector in Namibia’s economy, it would be important to ensure adequate and continuing funding for the coordination of stakeholders and the prevention, control, and management of animal diseases. Critical activities, such as mass vaccination and farm visits, need to be undertaken regularly and their planning and execution could benefit greatly from reliable and structured funding sources.
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