



THE SOCIO-ECONOMIC IMPACT OF ANTI-VEHICLE MINES IN ANGOLA



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ACKNOWLEDGEMENTS

This study was made possible thanks to financial support from Irish Aid, Department of Foreign Affairs and Trade of Ireland. The ideas, opinions and comments herein are entirely the responsibility of its authors and do not necessarily represent or reflect Irish Aid policy or the view of the involved organisations.

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The GICHD, KCL and SIPRI would like to extend their sincere thanks to the National Intersectoral Commission for Demining and Humanitarian Assistance (*Comissão Nacional Intersectorial de Desminagem e Assistência Humanitária*, CNIDAH), The HALO Trust Angola, and the Engineering and Physical Sciences Research Council Global Challenges Research Fund (EPSRC-GCRF),¹ whose support was indispensable in carrying out this research.

Also, the research team would like to thank the following institutions in Angola that generously took part in the interview process and which shared relevant insights:

- *Acção para o Desenvolvimento Rural e Ambiente* (ADRA)
- Angolan Chamber of Commerce and Industry (CCIA)
- APOPO
- *Associação de Conservação do Ambiente e Desenvolvimento Integrado Rural* (ACADIR)
- *Associação dos Profissionais Angolanos de Acção contra Minas* (APACOMINAS)
- *Caminho de ferro de Moçâmedes*, (CFM) and *Caminho de ferro de Benguela* (CFB)
- *Caritas Diocesanas*
- *Companhia Siderúrgica do Cuchi* (CSC)
- Development Workshop
- Health Department in Kuando Kubango
- *Menschen gegen Minen* (MgM) – People against Landmines
- Mines Advisory Group (MAG)
- Ministry of Agriculture and the Forests and Agriculture department in Huambo and Kuando Kubango
- Ministry of Construction and Public Works
- Ministry of Tourism and Tourism department in Kuando Kubango
- Ministry of Transports
- National Demining Institute (*Instituto Nacional de Desminagem*, INAD)
- Owini
- The MENTOR Initiative
- World Vision

The research team also extends its gratitude to the *sobas* and villagers from the communities of Cambamba, Cuatili, Liambambi, Bairro Mavengo, Samaria, Savipanda, Senga, and Shipopa.

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LIST OF ACRONYMS AND ABBREVIATIONS

APACOMINAS

Associação de Profissionais Angolanos de Acção Contra as Minas

APM

Anti-personnel mine

APMBC

Anti-Personnel Mine Ban Convention

AVM

Anti-vehicle mine

CCW AP II

Amended Protocol II Prohibitions and Restrictions on Mines, Booby-traps, and Other Devices of the Convention on Certain Conventional Weapons

CED

Executive Commission for Demining (*Comissão Executiva de Desminagem*)

CHA

Confirmed hazardous area

CNIDAH

National Intersectoral Commission for Demining and Humanitarian Assistance (*Comissão Nacional Intersectorial de Desminagem e Assistência Humanitária*)

DRC

Democratic Republic of the Congo

ECP

Poverty reduction strategy (*Estratégia de Combate à Pobreza*)

EO

Explosive ordnance

ERW

Explosive remnants of war

FAA

Angolan Armed Forces (*Forças Armadas Angolanas*)

FALA

Armed Forces of the Liberation of Angola (*Forças Armadas de Libertação de Angola*)

FAPLA

People's Armed Forces for the Liberation of Angola (*Forças Armadas Populares de Libertação de Angola*)

FNLA

National Front for the Liberation of Angola (*Frente Nacional de Libertação de Angola*)

GICHD

Geneva International Centre for Humanitarian Demining

GoA

Government of Angola

HALO Trust (The)

Hazardous Areas Life-support Organization

HRW

Human Rights Watch

IDP

Internally displaced person

IED

Improvised explosive device

IMSMA

Information Management System for Mine Action

INAD

National Demining Institute (*Instituto Nacional de Desminagem*)

INAROOE

National Institute for the Removal of Explosive Devices (*Instituto Nacional de Remoção de Obstáculos e Engenhos Explosivos*)

LIS

Landmine Impact Survey

KCL

King's College London

MAG

Mines Advisory Group

MASFAMU

Ministry of Social Action, Family, and Women's Promotion (*Ministério da Acção Social, Família e Promoção da Mulher*)

MgM

People against Landmines (*Menschen gegen Minen*)

MOTAPM

Mines other than anti-personnel mines

MPLA

People's Movement for the Liberation of Angola (*Movimento Popular de Libertação de Angola*)

MRE

Mine risk education

NPA

Norwegian People's Aid

NTS

Non-technical survey

OCHA

United Nations Office for the Coordination of Humanitarian Affairs

SAC

Survey action centre

SDGs

Sustainable Development Goals

SHA

Suspected hazardous area

SIPRI

Stockholm International Peace Research Institute

UN

United Nations

UNDP

United Nations Development Programme

UNITA

National Union for the Total Independence of Angola (*União Nacional para a Independência Total de Angola*)

UXO

Unexploded ordnance



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EXECUTIVE SUMMARY

The humanitarian and developmental impact of anti-vehicle mines (AVMs) is particularly relevant in immediate post-conflict reconstruction efforts. However, the comprehensive analysis of how AVMs hamper the socio-economic and sustainable development outlook of communities in the medium and long term has often been overlooked.

This pilot study depicts the impact of AVM contamination on socio-economic development and the benefits of AVM clearance on sustainable development. To do so, the Sustainable Development Goals (SDGs) serve as a framework to measure the impact of AVM clearance on agriculture, infrastructure, and access to social services.

A community-based participatory research approach² was used to gather and analyse qualitative and quantitative data in the two case studies, the provinces of Huambo and Kuando Kubango.

Based on interviews, focus group discussions, as well as documentary analysis and cross-checking of primary data, the study concluded that:

- Mine contamination has a drastic effect on access to agricultural land, which in turn affects the livelihoods and food security in the communities studied, during and after conflict, hindering their development prospects for decades. This also poses a significant challenge in terms of infrastructure, resulting in the total disruption of the railway service in both case studies.
- Mine clearance appears to be a direct enabler for the expansion of safe agricultural land, positively affecting the quantity and diversification of produce, which in turn increases sales and incomes for the local communities, enhancing their food security and livelihoods.
- Safe and rehabilitated infrastructure fosters mobility and access to transportation, as well as a greater participation in trade activities, resulting in income growth and improved living conditions.
- While the use of cleared land for agricultural activities took place soon after clearance, the impact of mine clearance on infrastructure relies largely on the availability of additional investment for rehabilitation, construction of new systems or maintenance of existing infrastructure.

- Since various types of devices appear to be combined in minefields and on roads, there are difficulties in differentiating the impact of AVMs on sustainable development, from that derived from mixed mine contamination.

The findings of the pilot study, and the lessons learnt in relation to the methodological approach, will guide the development of additional evidence-gathering exercises regarding the socio-economic impact of mine action. It is expected that future studies will benefit from a comprehensive, interdisciplinary and participatory approach that relies on the Sustainable Development Goals as the analytical framework.



Truck damaged by AVM explosion in Angola.

INTRODUCTION

As a type of landmine designed to damage or destroy vehicles (including battle tanks and armoured combat vehicles), and to injure or kill vehicle crews and passengers,³ AVMs have a significant humanitarian and developmental impact during and after conflict.

Amended Protocol II on Prohibitions or Restrictions on Mines, Booby-traps, and Other Devices of the Convention on Certain Conventional Weapons (CCW AP II) contains minimal limitations on the use of mines other than anti-personnel mines (MOTAPM). States Parties to CCW AP II discussed the issue of MOTAPM from 2001 to 2006 and again since 2012, without reaching a consensus on possible further limitations to the use of MOTAPM.

The Geneva International Centre for Humanitarian Demining (GICHD) and the Stockholm International Peace Research Institute (SIPRI) conducted a study on the humanitarian and developmental impact of AVMs in 2014,⁴ followed by four reports on the humanitarian effects of AVMs, published annually since 2015.⁵ Moreover, King's College London (KCL) is working on the ACRA project⁶ which proposes to develop a combined technological and socio-economic approach to freeing affected communities from AVMs.

While the evidence on the direct humanitarian impact of AVMs has been strengthened, it is recognised that the impact of AVMs becomes particularly relevant when post-conflict countries begin reconstruction efforts, since these landmines hamper the socio-economic development of communities.

This pilot study aims to assess the social and economic impact of AVMs⁷ in Angola and how their clearance can contribute in the medium and long term to local sustainable development and social well-being, and as such, towards the 2030 Agenda for Sustainable Development. It also builds on the increasing relevance given to the developmental impact of mine action by piloting and presenting mixed, interdisciplinary and community-based participatory research approaches which could be applied to future impact assessments in the mine action sector.

The study focuses on the provinces of Huambo and Kuando Kubango where the blockages posed by AVM contamination and the effects that clearance had in agricultural production and trade, infrastructure, and access to social services are examined. The analysis is limited to the period from 2002 to 2018.



I. METHODOLOGY

RESEARCH OBJECTIVES AND QUESTIONS

The pilot study aims to answer the following research questions:

Primary

- How does the clearance of AVMs interact with the social and economic development of beneficiary communities? To what extent can AVM clearance be linked with improved social and economic development processes and outcomes?

Secondary

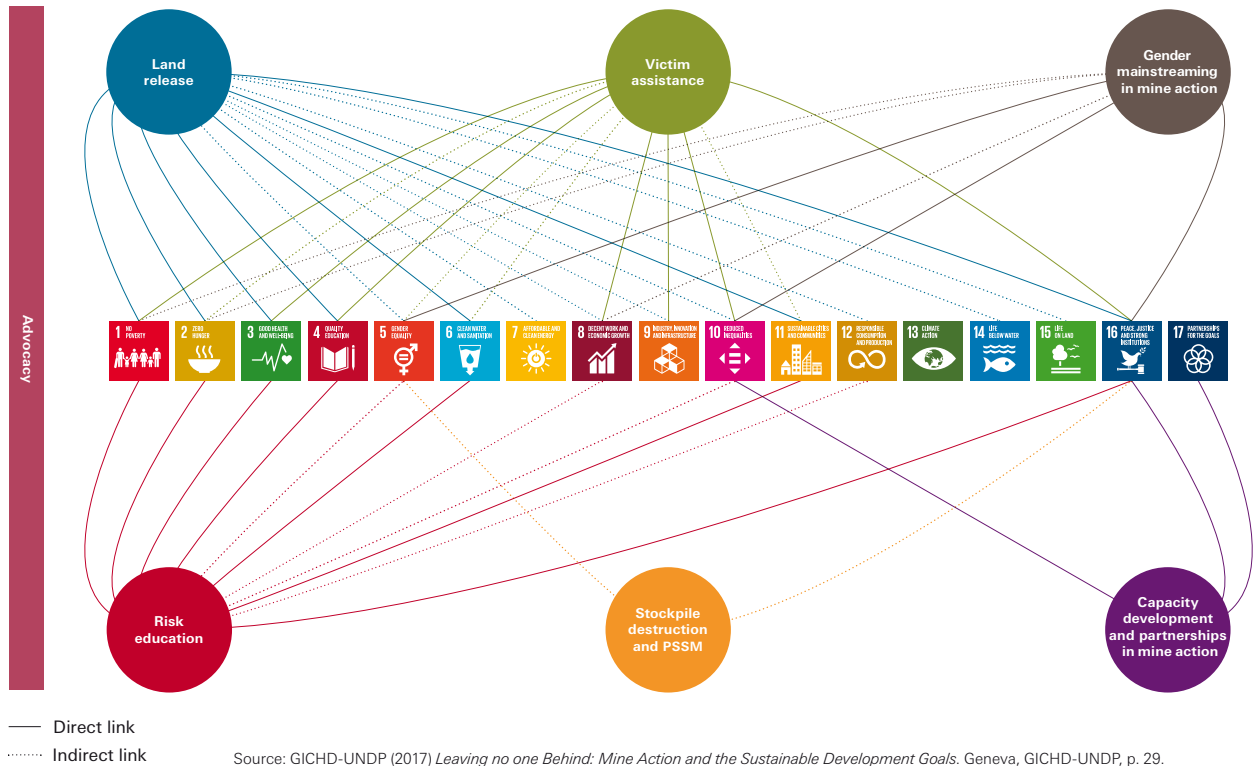
- To what extent is AVM clearance related to changes across agricultural production, transport, infrastructure, and access to social services?
- What are the gendered impacts arising from the interaction between AVM clearance and development outcomes?

The study builds on an initial mapping of the contribution of mine action to the Sustainable Development Goals (SDGs) published by the GICHD and the United Nations Development Programme (UNDP)⁸ which suggests that mine action contributes positively to the attainment of the SDGs directly in the case of 12 goals and indirectly to another four (see Figure 1). Within the SDG-mine action framework, the interactions between socio-economic development factors and mine clearance are mostly directly linked to land release.

Considering these linkages, this study seeks to increase the evidence base on the long-term socio-economic contributions of mine clearance in sectors such as:

- Economic recovery and growth, agriculture, trade and tourism
- Physical infrastructure rehabilitation and development
- Social services coverage
- Food security

FIGURE 1 MAJOR DIRECT AND INDIRECT LINKS BETWEEN MINE ACTION AND THE SDGs



RESEARCH APPROACH AND METHODS

Two Angolan provinces were selected as case studies, namely, Huambo and Kuando Kubango, which enabled a detailed qualitative analysis of the major changes in the lives and livelihoods of beneficiaries.

The HALO Trust was selected as a partner for the field research component, since it is the largest mine action operator in Angola and the sole remaining non-state operator in both provinces. Seeking a range of views on social and economic development in Angola and in the chosen provinces, the research team sought to engage with key government ministries and officials, civil servants, mine clearance operators, civil society organisations, traditional authorities (*sobas*),⁹ and beneficiary communities through semi-structured and unstructured interviews and focus group discussions (FGDs).

The selection of interviewees, including that of beneficiary communities, was made through a combination of desk research, recommendations from the National Intersectoral Commission for Demining and Humanitarian Assistance (CNIDAH)¹⁰ and The HALO Trust.

Three field research days were undertaken in Huambo, resulting in nine interviews and two FGDs, followed by three days in Luanda during which seven interviews were held. The third component, undertaken in Kuando Kubango, resulted in fifteen interviews and seven FGDs.

In total, 31 semi-structured and unstructured interviews, 9 FGDs with *sobas* and community members, and a total of 12 observations at rural and urban sites in Huambo City, Menongue, Cuito Cuanavale and Cuchi were undertaken.¹¹

At the beginning of each interview and FGD, a summary of the pilot study was shared, to confirm participation as well as to clarify the terms of anonymity and the opportunity to withdraw from the study.¹² The data was mostly collected in Nganguela,¹³ Umbundu,¹⁴ and Portuguese with the assistance of a local translator. Members of the research team were fluent in Portuguese which served to validate and clarify the translations in real time.

The FGD communities were identified by the project partner, The HALO Trust, as they were beneficiaries that had experienced AVM clearance. Communities were selected based on the diversity and dimension of potential clearance impacts on the agricultural use of land and trade, availability of infrastructure and access to social services. Individuals taking part in the discussions were defined by each community.

The research team, composed of five women, sought to promote women's participation during the FGDs in beneficiary communities. Although FGDs were group exercises and most women did not actively participate, questions specifically targeting women were part of each FGD to encourage their participation and response. In some male-only FGDs, respondents alleged that women were not present due to work schedules.

After field research was conducted, interview data was analysed using a theoretically driven thematic analysis,¹⁵ and through a coding exercise of interview data across 42 titles which covered: mine contamination and clearance; topics related to poverty, hunger and income (SDGs 1, 2, 8, 10) such as food security, economic activities including agricultural cultivation, livestock rearing; topics related to physical infrastructure such as road rehabilitation and use, transport, energy and water systems (SDGs 6, 7, 9, 11); topics related to social infrastructure including health and education (SDGs 3, 4); safety and security (SDG 16).

Resulting from this coding, three major themes were identified from the data: 1) the impact of contamination; 2) the impact of mine clearance on agriculture; 3) the impact of mine clearance on infrastructure.

Due to the unavailability of systematic, reliable and disaggregated secondary data across the pilot study's 16-year period, the analysis of primary data on contamination and development, gathered through the aforementioned interviews and FGDs, allowed for a nuanced and micro-level approach to the socio-economic development outcomes experienced, in particular at the case study level.

Primary data was also complemented by documentary analysis of HALO's project documents including survey, re-survey and completion reports of visited tasks. In order to minimise the risk of bias that can arise from informants, the available data was cross-checked against primary data whenever suitable.

The analysis of cleared tasks using HALO documentation was complemented by satellite imagery analysis to illustrate the development change after AVM clearance. These three major data sources (primary data from interviews, secondary data from open sources, HALO documentation and satellite imagery) allowed for the observation and cross-referencing of data.



II. BACKGROUND

LANDMINE USE AND MINE-LAYING PATTERNS DURING THE CONFLICT IN ANGOLA

The length of the conflict in Angola, spanning from the country's War of Independence in 1961 to the Luena Memorandum of Understanding in 2002, attests to the complexity of involved actors, their tactics, and deployed devices.

Angola's conflict can be classified within three different periods: the War of Independence (1961–1975)¹⁶ that involved the People's Movement for the Liberation of Angola (MPLA),¹⁷ the National Front for the Liberation of Angola (FNLA),¹⁸ and the National Union for the Total Independence of Angola (UNITA);¹⁹ a second period of internationalisation during the Cold War and after independence (1975–1991), and a third phase (1992–2002), focused on the control of power and resources²⁰ after the first peace negotiations and multiparty elections in 1992. The death of UNITA leader Jonas Savimbi in 2002 led to the end of armed hostilities by UNITA—then the major warring party against the MPLA government—and its integration into the political system. The Luena Memorandum was signed the same year, concluding the long and often frustrated peace process.

The use of landmines was a key feature of the Angolan conflict from 1961 onwards, although much of the contamination resulted from the period between 1975 and 1988.²¹ Mines were used by all parties in the conflict and given that many engaged, directly or indirectly, in hostilities, it is not surprising that mines were used according to different military tactics and doctrines, leading to a complexity of devices practically unseen anywhere else.²² The rationale behind the deployment of landmines was based on different purposes, such as denying access to and use of roads and bridges, protecting key strategic infrastructure, ambushing opposing forces, deterring attacks or instilling terror through random mine-laying patterns.²³

AVMs were especially deployed for blocking the use of roads and tracks and disrupting the movement of opposing forces' troops and supplies, which contributed to famine.²⁴ AVMs were also laid to protect APMs. This often entailed structured minefields with mines laid in belts, which were sometimes marked and mapped. AVMs were usually emplaced at two-metre intervals and often complemented by APMs.²⁵ Even though AVMs were emplaced in low numbers along large strips and roads, it rendered these unusable,²⁶ and both metal-case and minimum-metal AVMs were employed throughout the conflict. Ambushing of the opposing forces was also done using directional mines at key sites. With regard to bridgehead mining, prevalent in southern Angola in particular,²⁷ mines were used to prevent access to functioning bridges or the reconstruction of destroyed infrastructure.

Landmines were also used to protect crucial economic facilities such as electricity pylons, roads, railroads, dams, oil installations, water pipelines, and strategic locations (including specific towns or military bases).



Tank on the side of cleared road task by HALO from Menongue to Cuchi, Kuando Kubango, 3 August 2019.

Amidst such a wide range of targets and strategies in which AVMs were used by different parties to the conflict, APMs and AVMs as well as explosive ordnance (EO) contamination²⁸ remained an issue even after the cessation of hostilities and the Luena Memorandum of Understanding in 2002. Since the outset, mine contamination provoked significant limitations for post-conflict reconstruction, humanitarian assistance and development, as will be described in the following section.

THE IMPACT OF AVMs IN THE POST-CONFLICT CONTEXT

From 1975 to 2002, about one and a half million Angolans died.²⁹ Among them, 160,000 perished in combat—the highest battle casualties in absolute terms of any conflict in Africa in the 20th century.³⁰ Another four million were internally displaced and more than half a million sought refuge in neighbouring countries. In the last years of the conflict, it is estimated that more than three million were forced to leave their homes.³¹

After the war ended, millions of Angolans depended on food assistance: 60 per cent of the population lived under the poverty level, life expectancy did not surpass 45 years, and only one third of the population had access to drinking water.³²

Moreover, deterioration of infrastructure and the threat posed by landmines restricted the ability of humanitarian organisations to travel and provide assistance, due to the impact of mines on transport, loss of equipment and the safety of humanitarian staff.³³ The Mid-Term Review of the UN Consolidated Inter-Agency Appeal for Angola³⁴ recorded that only coastal roads and routes within the security perimeters of major provincial cities were useable by humanitarian agencies.³⁵ Similarly, during the emergency phase after the conflict, more than 70 per cent of all humanitarian assistance was transported by air due to poor roads, access and insecure links, which led to high delivery costs. In response to this, at least six major road corridors were opened in 2000, which facilitated delivery of humanitarian assistance through more cost-effective routes.³⁶

Specifically, AVM contamination had a direct impact on the ability to support local populations. The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) recorded 16 incidents related to AVMs that affected humanitarian aid between October 2002 and February 2003. These incidents restricted humanitarian aid delivery for 300,000 people and kept communities from receiving assistance despite the end of the conflict.³⁷ European Civil Protection and Humanitarian Aid Operations (ECHO) projects also encountered severe constraints in securing access due to AVMs, with over 90 per cent of its projects in 2003 experiencing this difficulty.³⁸ Furthermore, due to the limited vehicle movement at the time (1994–2002), AVM-related accidents were not encountered by civilians, meaning that AVM contamination was therefore not addressed or prioritised by demining agencies, who mainly dealt with anti-personnel minefields affecting IDPs.³⁹ Additionally, the lack of communication and reporting mechanisms, along with the inexistence of a national casualty surveillance system, increased the likelihood that most accidents were underreported.⁴⁰

Landmines and, specifically, AVMs, were strategically used in areas of significance for access by local communities, such as roads, bridges and agricultural land. This had lasting impacts during and after the conflict, and resulted in the need to develop an adequate national architecture to address landmine contamination in the country. The following section details the set-up of the national mine action programme in Angola, progress made on clearance and the remaining contamination challenge.

MINE ACTION IN ANGOLA

Mine clearance activities in Angola began in 1991 under the United Nations Angola Verification Mission Teams (UNAVEM I) and were suspended with the outbreak of war, resuming in 1994 with the signing of the Lusaka Protocol. This signalled the entrance of international non-governmental organisations (INGOs) into Angolan territory, amongst them international mine action operators.⁴¹ Under UNAVEM III and through the UNDP support, the first national mine clearance authorities were established, and systematic clearance started in 2002 after the signing of the Luena Memorandum of Understanding.⁴²

Clearance was a means of guaranteeing the minimum physical security conditions for citizens after the conflict, as stated under the objective of security and civilian protection in the first national poverty reduction strategy (ECP),⁴³ covering the period of 2004 to 2006. The national programme for demining was also established under this objective. Considering that the main development aims of the government were also to restore connections between provinces and to guarantee the provision of basic services and infrastructure, demining was a component of the programme for rehabilitation and reconstruction of basic infrastructure, highlighting the impact of AVMs in particular in this sector. It is also during this period that the architecture for the national mine action programme of Angola was established. Angola's national mine action programme is currently regulated by two national entities, the CNIDAH, established in 2001 and the Executive Commission for Demining (CED),⁴⁴ established in 2005.⁴⁵

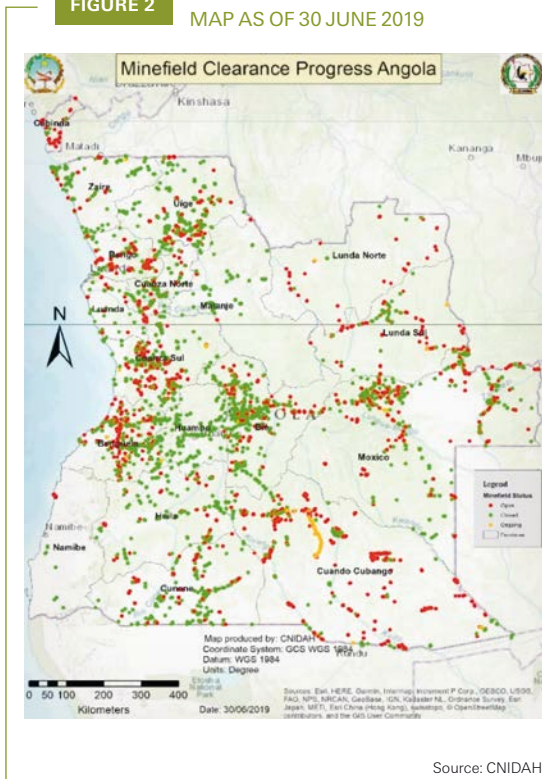
From 2004 to 2007, in order to identify the socio-economic impact of landmines and obtain a realistic image of the level of contamination in Angola, the Landmine Impact Survey (LIS) was undertaken, coordinated by the Survey Action Center (SAC), implemented by international operators and supervised by the CNIDAH. Its results served as the baseline for the national mine action programme⁴⁶ until a nationwide non-technical survey (NTS)⁴⁷ was undertaken between 2010 and 2019⁴⁸. The LIS identified significant socio-economic blockages that contamination posed to communities at the time,⁴⁹ which are corroborated in this study's analysis. However, while this was the first assessment of the state of mine-affected communities and landmine victims in Angola, the LIS had several issues regarding validity of data, accuracy and coverage, which were the main reasons for which a nationwide NTS was conducted from 2010.⁵⁰ Its limitations surfaced in the second national strategy (2013–2017),⁵¹ as well as the first Article 5 extension request submitted to the APMBC,⁵² with the major part of the second Article 5 extension request being the reporting of NTS results for 15 out of 18 provinces.⁵³

From the start of mine clearance activities to the first extension request in 2012, the CNIDAH stated that a total area of 4,491,707,182 m², 12,933 km of roads, 133,830,000 m² of fibre optic lines; 229,737,064 m² of high voltage power lines, and a 76,800,000 m² extension of railway line were cleared. It further reported that a total of 434,042 APMs, 24,092 AVMs and 2,424,812 unexploded ordnance (UXO)⁵⁴ were destroyed. Between the first APMBC Article 5 extension and 2016, the CNIDAH reported that 393 areas equivalent to 23,810,940 m² and 717.3 km of roads in 18 provinces were cleared by NGOs, identifying and destroying 15,624 APMs, 902 AVMs and 2,836 UXO.⁵⁵

This exemplifies the government’s post-conflict priorities in clearing and rehabilitating roads, railways and other key infrastructure as defined in the two national development plans following the emergency phase (2013–2017⁵⁶ and 2018–2022),⁵⁷ which highlight the role of demining in unblocking roads and areas of socio-economic impact.

FIGURE 2

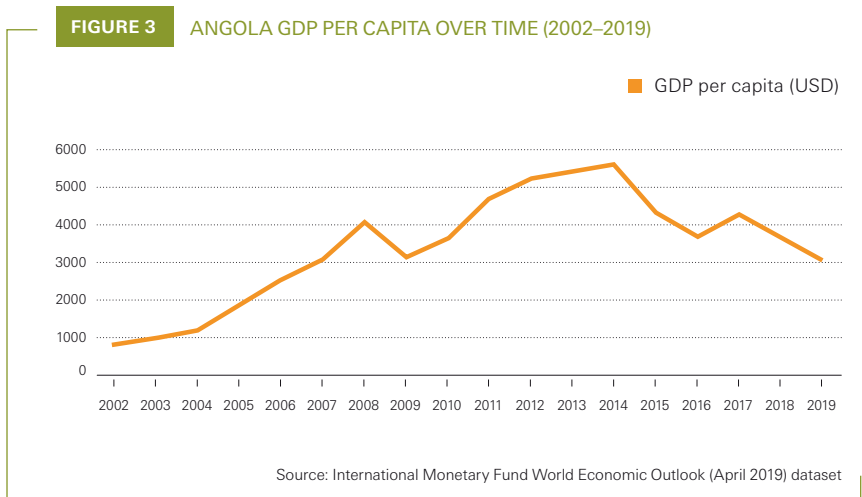
**MINEFIELD CLEARANCE PROGRESS
MAP AS OF 30 JUNE 2019**



Source: CNIDAH

As a result of NTS, database cleaning and harmonisation efforts,⁵⁸ more than 90 per cent of LIS suspected hazardous areas (SHAs) were cancelled and 274 km² of land released in 2017.⁵⁹ As of June 2019, minefield clearance has progressed in several provinces, as seen in Figure 2.

To understand the importance of mine action at the national level, the progress of clearance as well as the remaining challenges posed by contamination, it is important to understand the national economic context. From the cessation of the conflict in 2002 to 2019, Angola's GDP per capita has increased from USD 841.42 to USD 3,060.02 as a result of the oil boom in 2010 (see Figure 3).



This means that Angola achieved an upper-middle income status, which in turn has influenced donors' decisions to reduce funding to the national mine action programme from USD 32.6 million in 2013 to USD 3.1 million in 2017. Major donors significantly reduced funding to their mine action programmes in the country during the last decade. Notwithstanding the fall of oil prices in 2014 and in the context of an ongoing recession, the Angolan government's state budget for 2019 included close to USD 15 million for demining, with USD 4.7 million allocated to CED for demining areas of social and economic impact.⁶⁰

From the set-up of the national mine action architecture in the early 2000s to the present day, much progress has been made. However, a significant socio-economic impact from landmines remains, affecting at least 16 provinces in Angola—apart from Malanje and Huambo which are nearly mine free. The following section will detail both the nature of remaining contamination as well as the sectors it is currently affecting or blocking.

REMAINING CONTAMINATION CHALLENGES

Contamination is mostly present in rural and developing areas, as clearance has been previously prioritised in urban and peri-urban zones.⁶¹ It is especially important to prioritize these regions since they incorporate 58 per cent of the poorest inhabitants in the country.⁶²

Landmine casualty data from the Landmine Monitor illustrates the lasting impact of mine contamination.⁶³ Of the combined casualties from AVMs and APMs, more than 30 per cent were due to the former (110 in comparison to 193 casualties) from 2002 to 2017. In 2012, 2013 and 2016, AVM casualties outnumbered APM casualties.⁶⁴ In 2018, GICHD-SIPRI recorded five casualties from two incidents in Angola—one resulted in the death of a woman in Huambo who was working in an agricultural field and the other incident injured four passengers of a vehicle due to an explosion on the road in Cuito Cuanavale.⁶⁵ Incidents with AVMs reveal how the unpredictability of their location, together with increased population movement, can have enduring post-conflict impacts.

In order to obtain an up-to-date overview of current contamination, both at national level as well as at the case study level of the selected provinces, the national Information Management System for Mine Action (IMSMA) database⁶⁶ was consulted. As of September 2019,⁶⁷ it indicates that 1,110 areas and 101,571,037 m² of minefields remain to be addressed by 2025.⁶⁸

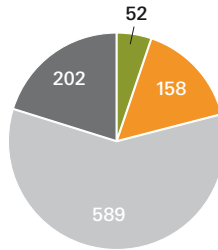
When disaggregating by type of contamination at national level, 589 confirmed hazardous areas (CHAs) contain devices other than AVMs, specifically UXO and APMs (see Figure 4a). These are followed by 202 areas with unspecified contamination,⁶⁹ 158 of mixed contamination containing AVMs, and finally, 52 areas solely containing AVM contamination (see Figure 4a). A total of 20,833,706 m² out of an estimated 89,160,593 m² of CHAs are believed to contain some mixed contamination, which equates to 23 per cent of the total CHAs. Regarding SHAs, the second largest portion of contamination is also that of mixed EO contamination, including AVMs.

FIGURE 4a

**MINE CONTAMINATION TYPE IN MINEFIELDS
(AS OF 27 SEPTEMBER 2019)***

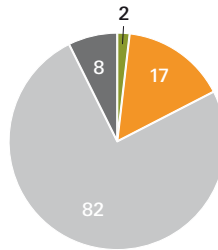
Angola

**Proportion of CHAs
by contamination type**

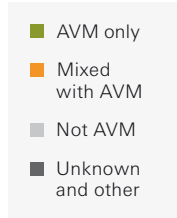


Total CHAs: 1,001

**Proportion of SHAs
by contamination type**



Total SHAs: 109



Source: National IMSMA database

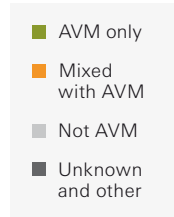
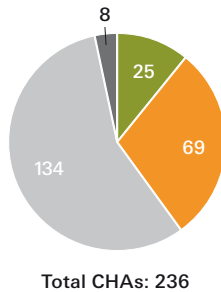
*Detailed tables with the referenced data are available in Annex II

At provincial level, Huambo is nearly mine free, with only one remaining open task. In Kuando Kubango, the remaining CHAs mostly comprise non-AVM contamination, however, 69 CHAs contain mixed hazards including AVMs while 25 contain AVMs only. Mixed and AVM contamination represents 9,415,459 m², nearly half of the total CHA in Kuando Kubango.

FIGURE 4b MINE CONTAMINATION TYPE IN MINEFIELDS (AS OF 27 SEPTEMBER 2019)*

Kuando Kubango province**

Proportion of CHAs by contamination type



**There are no open SHAs in Kuando Kubango province as per the national IMSMA database

Source: National IMSMA database

*Detailed tables with the referenced data are available in Annex II

With the standardisation of IMSMA forms and data recording and entry, the national database now mostly reflects the influence that minefield contamination may have in further blocking a variety of sectors within the key pilot study’s criteria, such as agricultural land, road access, access to water resources and infrastructure. Information on blockages per sector were disaggregated and are presented as provided by operators.⁷⁰

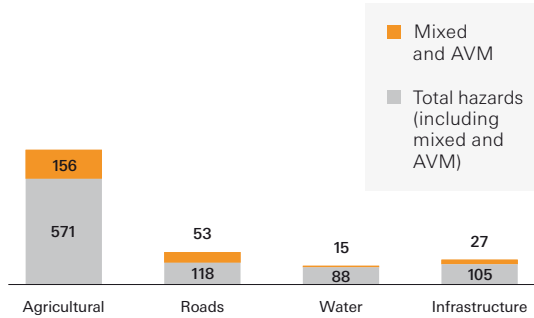
Considering that a total of 1,001 CHA minefields remain in Angola (see Figure 4a), it is significant to note that more than half (571) cause agricultural blockages at a national level, followed by road (118), water (88) and infrastructure (105) blockages (see Figure 5). Mine contamination continues to pose significant blockages to land availability for agricultural expansion, rural market development and food security.⁷¹ This has an impact on local farmers given that there is a marked increase of imports which exposes rural farmers to competition from cheaper agricultural produce, especially when facing low investments in agriculture, as has been the case in Angola for a number of years.⁷²

As the Kuando Kubango province case demonstrates in Figure 5, of these major blockages, mixed and AVM contamination mainly block access to agricultural land. This reflects the perception that contamination still hinders the development of agricultural activities, transport infrastructure, access to basic services and goods such as water, and general infrastructure development.

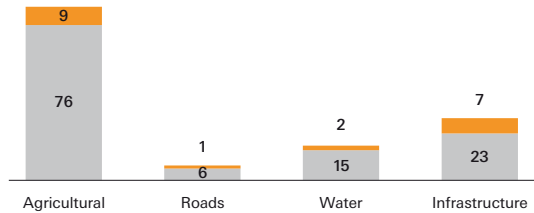
FIGURE 5 BLOCKAGES CAUSED BY TYPE OF MINEFIELDS (AS OF 27 SEPTEMBER 2019)*

Angola

Blockages caused by type of minefields (CHAs)

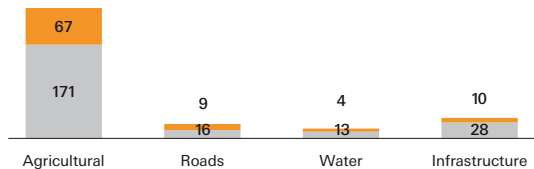


Blockages caused by type of minefields (SHAs)



Kuando Kubango province**

Blockages caused by type of minefields (CHAs)



**No SHAs were included as there are none in the national database for Kuando Kubango province.

Source: National IMSMA database

*Detailed tables with the referenced data are available in Annex II

Figure 6 shows current mine-contaminated roads including the type of contamination at national and provincial levels. Although there have been reported issues with road recording in the database for both suspected and known road contamination, it indicates that 114 road CHAs and SHAs remain to be addressed at a national level, totalling an extension of 3,748 km.⁷³ Similarly to that of AP minefields, contamination by disaggregated hazard type is not always available for roads, with 66 road CHAs being recorded without any hazard identification, and only four of these recorded as mixed contamination (including AVMs) and solely containing AVMs.

FIGURE 6a

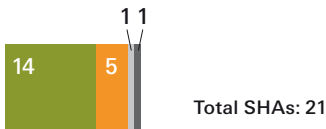
**MINE CONTAMINATION TYPE ON ROADS
(AS OF 27 SEPTEMBER 2019)***

Angola

Mine contamination type on roads (CHAs)



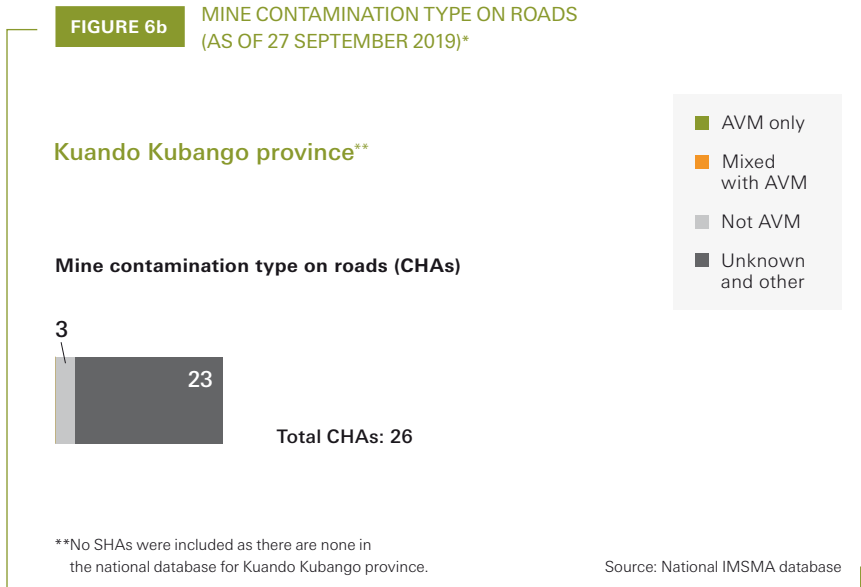
Mine contamination type on roads (SHAs)



Source: National IMSMA database

*Detailed tables with the referenced data are available in Annex II

In Kuando Kubango, 26 road CHAs remain contaminated with a total extension of 1,738 km, although the type of contamination for 23 of these remain to be identified.



*Detailed tables with the referenced data are available in Annex II

By contrast, all main railways were cleared by 2009, amounting to an extension of 380 km. The country has a railway network of 2,950 km⁷⁴ which includes three separate railway lines—Luanda, Moçâmedes and Benguela—which are currently operational.⁷⁵

KEY DEVELOPMENT INDICATORS

Despite progress in survey and clearance, for most of the Angolan population, human development benefits accruing from recent growth and economic diversification remain to be seen, with the country ranked only 147 out of 189 countries and territories, in 2017, in the Human Development Index.⁷⁶ With a population of 29.8 million as of 2017,⁷⁷ 64.8 per cent live in urban areas and, as previously mentioned, most of the remaining contamination is concentrated in rural areas, whose populations are underserved as compared to urban ones.

Considering that the studied sectors are influenced by factors other than contamination, it is important to measure the progress during the period analysed in this study and present a general perspective of current socio-economic development in Angola, before detailing further effects in the provinces in focus.

As highlighted in the methodology section, the lack of disaggregated development data at the provincial level has been overcome in the present pilot study with available macro data to better understand Angola's performance towards sustainable development, using the thematic areas analysed in the study and the SDG framework.

The study collected available data pertaining to the period 2002–2018 for the following sectors:

Agriculture



The incidence of poverty has decreased from 68 per cent in 2000 to 37 per cent in 2018, although 30.1 per cent of the population lived below the income poverty line (USD 1.90 a day) in 2018. In terms of living conditions, life expectancy at birth has increased over time from 49.3 in 2002, to 61.8 in 2017.⁷⁸ Stunting is a condition affecting 46 per cent of children under five in rural areas, compared to 32 per cent in urban contexts.⁷⁹

As of 2016, the major sectors of employment were agriculture (49 per cent), services (42 per cent) and industry (9 per cent).⁸⁰ Beyond contamination, productivity in the agricultural sector remains low due to a number of reasons,

such as the lack of mechanisation in farming, lack of access to markets for seeds, fertilizers and tools, as will be seen in the provinces in focus in the next chapter.

However, significant development in the agricultural sector has also been observed. The value of agricultural production has increased, especially for crops and food production between 2002 and 2017. Crops with the greatest harvests in 2017 were citrus fruits (2,026,544 ha), sorghum (330,074 ha) and maize (2,534,860 ha), whilst tree-nuts and wheat have not seen as dramatic an increase.⁸¹ The highest export values are for fixed vegetable oils, food goods and vegetable and animal oils as of 2017.⁸²

Land use change is also evident since the area of permanent meadows and pastures decreased 3 per cent between 2002 and 2016, whilst arable and cropland has increased at the same rate. Tree cover loss is predominantly driven by shifts in agriculture, commodity driven deforestation, forestry and wildfires.⁸³

Access to social services



The under-five mortality rate has decreased from 193.4 per 1,000 live births in 2002 to 81.1 in 2017.⁸⁴ Access to healthcare services in rural areas differs greatly when compared to urban ones, as only 17 per cent of births are delivered in health facilities in rural Angola in comparison with 65 per cent in urban environments.⁸⁵ Vaccination coverage also remains low in Huambo and Kuando Kubango with 26 per cent and 6 per cent respectively,⁸⁶ below the national average coverage of 31 per cent.

Since 2001, expected years of schooling have increased from 5.9 to 11.8 in 2017.⁸⁷ However for lower secondary, net attendance rates remain stable, with urban rates being 42 per cent compared to 9 per cent in rural areas, even decreasing to 39 and 7 per cent correspondingly for upper secondary attendance.⁸⁸

Access to infrastructure



As of 2018, Angola had a road network of 76,000 km: 12,300 km of primary roads, 27,200 km of secondary roads, 36,500 km of tertiary roads, and only 18,000 km of paved roads.⁸⁹ Although the rehabilitation of roads is being implemented, Angola's road network density is far behind the Southern African region average.⁹⁰ Improvement in the density and quality of roads remain as key challenges in upgrading Angola's transport sector.

Road conditions also impact trade in agricultural products, limiting access and engagement in domestic and international markets, which are compounded with very limited agricultural credit programmes.⁹¹

Regarding access to water and sanitation, only 49 per cent of the population used improved drinking water sources in 2015, and 51.6 per cent had access to improved sanitation facilities.⁹² In rural areas, including communities visited in the study, surface water remains the predominant source of drinking water (41 per cent) for households and in non-piped form (28 per cent), whilst in urban areas, at least basic services are available (71 per cent), and water in piped form (58 per cent).⁹³



III. CASE STUDY

Three prevalent themes are identified from the data gathered during the field research. Impact of contamination; impact of clearance on agriculture; and impact of clearance on infrastructure. Furthermore, two factors that are pertinent to the research questions—the interactions between women and clearance as well as the ways that clearance may influence social infrastructure—are engaged across all three themes.

These themes highlight how the overall transition from contamination to clearance can support potential efforts towards the SDGs, as previously described in the methodology and key development indicators sections.

The study focuses on two provinces: Huambo and Kuando Kubango.

These two provinces were part of the fifteen in which mine clearance was prioritised in the ECP in 2002⁹⁴ and were chosen due to the contrast and relevance of both provinces' profiles: (1) being almost mine free, Huambo was an ideal case study that allowed for a long-term analysis and documentation of development outcomes arising from AVM clearance and, (2) having benefited from clearance but remaining contaminated in areas of strategic importance for national development, the selection of Kuando Kubango served to analyse the results of clearance in the development of a previously marginal and impoverished region, whilst documenting remaining challenges posed by contamination.

FIGURE 7 MAP OF ANGOLA AND THE SOUTHERN AFRICAN REGION



HUAMBO

Huambo is one of the largest provinces in Angola with a population of just over 2 million people,⁹⁵ concentrated mainly in its capital, Huambo city. It has predominantly been an agricultural province, considered the breadbasket of Angola, and continues to be the core of the agricultural centre of the country.⁹⁶ As a key node in the rail transport network within and beyond Angola to the Democratic Republic of the Congo (DRC), Huambo is of strategic importance to wider socio-economic dynamics. The Benguela—Luau railway corridor covers 1,344 km of extension with Huambo comprising about 15 per cent of it (198.3 km). As will be seen in the analysis below, clearance has enabled the development of these key economic sectors. AVM clearance in Huambo has been an essential element of the national mine clearance strategy and its prioritisation has led to far-reaching efforts since 1997, implying it is nearly mine-free.

Theme 1: Impact of mine contamination

Huambo is an important site for understanding the interactions and linkages between clearance and wider developmental processes and outcomes, given that clearance has been undertaken with some success since 1997. Understanding the impact of mine contamination allows for considering the trajectory of change from contamination to clearance over time across strategic transport and energy systems, agriculture, mobility, reconstruction, the resilience of communities as well as safety and security. In all visited sites in Huambo province, AVM contamination was acute especially affecting roads and transport infrastructure. Key roads such as the road connecting Huambo to Bié were mined in line with conflict patterns, since government and opposition troops used mines to protect their structures from invasion as well as to discourage returning opponents.⁹⁷ The contamination of railway lines imposed a north-south divide across Angola as a war strategy and limited the international transportation of merchandise.⁹⁸ AVM contamination was also widespread on some agricultural land. This was due to the location of agricultural land near strategic main roads and/or militarily-sensitive sites. This was the case in rural sites in Liambambi community, located along the main road leading from Huambo to Bié and by a military training facility.⁹⁹ Mine contamination also targeted strategic infrastructure such as an electricity grid and radio station in Huambo. This, in turn, impacted on agricultural land because agricultural activity also occurred around such power lines.¹⁰⁰

Impact of contamination on agriculture

Contamination influenced agricultural activities in particular ways. AVM contamination led to loss of life of agricultural workers. This occurred with four reported AVM fatalities in rural sites such as Liambambi and Bange, which were researched for this study.¹⁰¹ This is of some relevance to SDG indicator 16.1.4¹⁰² as it led to a diminished sense of safety and subsequent lack of use of agricultural land. There was also a loss of livestock due to contamination in Liambambi.¹⁰³ This contributed to the abandonment of agricultural land as members of agricultural households halted their activities and/or emigrated from conflict-affected and mined areas.¹⁰⁴ These realities can be expected to have impacted livelihoods through agricultural incomes and earnings and food supply both from crops and livestock. This can be seen as relevant to SDGs 1, 2 and 10 in the potential impact on income, production of and access to food, as well as income and earnings for agricultural workers. The impact of contamination on women's socio-economic roles is substantial in agricultural households, where women play a significant role in generating agricultural incomes and tend to dominate livestock rearing.¹⁰⁵

Impact of contamination on infrastructure

Mobility was further challenged by the contamination of railways. The railway into Huambo did not function from 1992 to 2012 as a result of the war and the subsequent AVM contamination.¹⁰⁶ This affected the transportation of goods and people, serving to disrupt trade and social relationships between Huambo and other commercial centres, including Bié and Moxico. The significance of Huambo as an agricultural centre hindered food security, as other regions depended on its agricultural produce.¹⁰⁷

Contamination is cited as limiting the field operations of NGOs and their accessibility to agricultural communities.¹⁰⁸ This affected the work of local organisations, such as Development Workshop, which works on agricultural land rights and sustainable water use. This can be seen as reinforcing the challenges posed by mine contamination on SDG 11 on sustainable cities and communities, and its interlinkages to SDG 2 and SDG 6 in terms of risks to food security and access to clean water.

In the aftermath of conflict, physical reconstruction has also been hampered by mine contamination, primarily through delays and increased costs associated with infrastructure projects. This has been the case with the Benguela–Huambo–Moxico railway rehabilitation.¹⁰⁹ Furthermore, contamination has challenged the provision of water to communities by impinging on the rehabilitation of wells

and reconstruction of new water sources,¹¹⁰ which highlights links to SDG 6 on clean water and sanitation.

Despite the challenges of mine contamination, communities have exhibited resilience with the continuation of social and economic activities. Members of agricultural households continued to travel across contaminated roads and lands to undertake cultivation.¹¹¹ The discovery of an AVM during the rehabilitation of a bridge that connects Huila to Huambo highlights the risks that many communities were exposed to in the continued use of the bridge. The urgency of clearance was seen as going beyond opening up access, to securing lives and enabling safer work environments, contributing towards SDG 16 on peace and security. Mine action played a significant role in this regard, even prior to clearance, through mine risk education (MRE), which is highlighted as having impacted positively on the movement of communities in contaminated areas in and around Huambo even prior to mine clearance.¹¹²

Theme 2: Impact of mine clearance on agriculture

Huambo is a prominent agricultural production base in Angola. Key crops produced in the visited communities include beans, corn, soy, cassava, avocados, sweet potatoes and potatoes.¹¹³ Agricultural activity has traditionally been on a subsistence basis with an emerging transition to commerce and trade. AVM clearance has been significant for agricultural production with cultivation of staple foods taking place shortly after clearance.



Visit to Liambambi village, Huambo, 21 July 2018.

This was the case in Bange with the cultivation of beans in 2019 following clearance in 2017.¹¹⁴ After clearance, land that is located near roads is often prioritised for agricultural activity.¹¹⁵ This interaction is linked to the improved levels of safety that facilitate access to and cultivation of agricultural areas. In Bange, cultivation ceased with the finding of an AVM during agricultural work in 2015, with resumption following clearance by The HALO Trust in 2017.¹¹⁶ This can be seen in the image below, as the majority of the contaminated area was converted to agricultural use in 2019, two years following clearance (see Figure 8).

FIGURE 8

SATELLITE IMAGES OF BANGE IN 2001 AND 2019



28 December 2001



13 May 2019

Mine clearance has been important in improving agricultural sector performance in a number of ways. First, improved accessibility to previously contaminated land has led to an expansion in areas of cultivation.¹¹⁷ Although there can be tensions between statutory and customary land claims, there appear to be low levels of land conflict due to the limited pressure on rural land and the lower incidence of mine contamination.¹¹⁸ Second, the area expansion has been linked to better production planning and surplus for trade, beyond production for consumption.¹¹⁹ Third, increased production and trade is seen as having a pull effect in generating mechanised farming—animal traction—as a replacement for manual methods.¹²⁰ Cultivation has expanded to include higher levels of agricultural output.¹²¹ This is connected to the possibility of planting over two seasons annually.¹²² There is some debate about the extent to which clearance can be linked to increased crop variety from cereals, to include vegetables and potatoes as a result of additional cropping seasons.¹²³ Fourth, lower levels of livestock accidents and fatalities are

noted as enabling expansion in numbers, through reproduction, thus supporting food security and trade.¹²⁴

Improved agricultural performance has been integrated with development priorities, food security and incomes and thus shows the ways in which mine clearance contributes towards SDGs 1, 2, 3, 4, 10 and 16 on addressing poverty and hunger, income and social infrastructure as well as safety and security. First, wider crop varieties were highlighted as supporting nutrition needs as a part of food security.¹²⁵ Second, evidence from the rural sites suggests that hunger was not a key concern, due to the result of thriving agricultural activity. In Liambambi, although agricultural trade is acknowledged, some respondents disagreed that increased surplus for trade was a necessity for ensuring food security. Agricultural production for subsistence in the post-clearance period was viewed as a sufficiently robust basis for food security.¹²⁶

Increased crop variety and output levels are seen as improving trade levels and underscoring an increasingly more equal balance between production for subsistence and trade.¹²⁷ Agricultural trade is highlighted as being influenced also by the size and practices of agricultural households, in particular better production and planning for trade.¹²⁸ These practices are encouraged by the sense of safety and security that is enabled by mine clearance.¹²⁹ Improved trade levels are noted as supporting rural agricultural income growth for rural households.¹³⁰ Women tend to dominate trading activities, hence improvements in this regard will likely have a gender-based and potentially inclusive impact.¹³¹ As mentioned by the NGO ADRA, based on their work with agricultural communities, the income growth from agricultural production enables the investment of savings and access to social infrastructure in health such as medicines and primary school education.¹³²

Theme 3: Impact of mine clearance on infrastructure

Mine clearance has been essential to developments in strategic physical infrastructure in Huambo across rail and road transportation as well as energy infrastructure. This has been a key priority in the development phase after conflict and has been significant for socio-economic development processes and outcomes on trade and settlements. As a result of this process of prioritisation, mine clearance has been a core element of major construction projects in Huambo.¹³³ The economic crisis in Angola that resulted in a recession in 2016–2019 has, however, implied a slowdown in road rehabilitation, as reconstruction projects have been in decline due to shortfalls in capital.¹³⁴

Mine clearance has been significant for providing a context within which domestic and foreign public and private capital inflows have supported the reconstruction of the railway (facilities as well as locomotives) from 2012. The Huambo railway has enabled mobility of passengers across Benguela, Huambo, Luau and internationally to the DRC. After clearance and rehabilitation, the railway started functioning in 2012 and as of 2019 it was transporting about 2,300 passengers per day from Huambo.¹³⁵ International rail transport has opened up for both passengers and goods, such as minerals from DRC to the port of Lobito. In particular, there are opportunities to support the trade of minerals from the DRC and Zambia in the wider region. In addition to this, the transportation of merchandise is considered a key revenue stream, unlike passenger travel. This provides evidence of the way in which clearance interacts with transport as a development priority and can directly support SDGs 9 and 11 on infrastructure development and access to transport systems.

Trade and energy

Improved railway transport services are integrated with development priorities, trade, food security and inclusion. The rehabilitated railway has facilitated the domestic trade of goods, especially agricultural produce across Benguela, Huambo, Bié, and Moxico.¹³⁶ Benguela and Moxico are important sources of local fish, an important protein source for Angolans, enabling food availability and food security.¹³⁷ Through the railway, Moxico has access to different food sources from Huambo, in particular vegetables that are not locally produced.¹³⁸ This supports food availability, addresses nutritional needs and therefore also increases food security. The possibility of such trade enables access to wider markets for agricultural goods from Huambo offering potentially important opportunities for income growth.

Road clearance has had a more tenuous interaction with agricultural trade. In general, clearance has supported trade through a heightened sense of safety and security as noted earlier. However, the lack of rehabilitation of roads, significant for rural agricultural trade, limits the potential clearance benefits. Evidence suggests that even after clearance, agricultural communities are challenged by poor road conditions as they transport goods from farms to the market. The previously mentioned expansion of areas for cultivation is, in some cases, reported as not necessarily translating into increased trade.¹³⁹ As a result, it was noticed that traders are organising transportation of produce in phases, using three-wheeled motorcycles and animal carts on secondary and tertiary roads in poor condition, from farms to tarmac roads for onward travel in trucks.¹⁴⁰ Access to vehicles is highlighted as a critical determining factor to the extent of which cleared roads translate into improved transportation.¹⁴¹ Gender-based patterns of

access and use of vehicles are also highlighted in rural contexts with men owning or having access to vehicles and women relying on men for access and use. These aspects underscore how the overall transition from contamination to clearance can potentially support efforts towards the aforementioned SDGs.

Road clearance in Huambo has been significant for trade development priorities, and access to markets, social infrastructure, water, energy infrastructure, transport and settlements; as well as being crucial to the construction of energy infrastructure including power lines and the hydroelectric dam in Huambo,¹⁴² enabling the transmission of electricity to Huambo town, Huila and Bié provinces.



People using alternative means of transport on a cleared road task by HALO, Huambo, 22 July 2019.

Access to social services and settlements

Clearance has been significant for opening up access to schools and health centres as well as access to water sources in Huambo.¹⁴³ Mine clearance has encouraged a greater sense of safety and security that has especially led to increased confidence in mobility. There has also been the expansion of settlements with population inflows, increased residential structures and schools in cleared areas in rural Huambo. In Liambambi, road and agricultural land clearance has been followed by a government initiative to expand a rural settlement through the provision of social and physical infrastructure. Since 2008, policies have been in place to encourage the expansion of central villages close to key roads to facilitate the improved provision of amenities.¹⁴⁴ In Liambambi, village expansion started following mine clearance in 2006, through new settlements and returnees. The government initiative has supported expansion in the construction of two primary schools and a solar-powered water tank to provide water to villagers.¹⁴⁵ This illustrates the ways in which mine clearance benefits wider development policies and how settlement expansion is linked to both.

KUANDO KUBANGO

Kuando Kubango is the second largest province in Angola with an area of 204,000 km² and with an estimated population of 619,757 in 2019, which makes it the least densely populated in the country.¹⁴⁶ Situated in the south-eastern corner of Angola, bordered to the east by the Republic of Zambia, and to the south by the Republic of Namibia, it forms Angola's main gateway to the rest of southern Africa and has the potential to become a crucial hub for cross-border trade.¹⁴⁷ It consists of nine municipalities,¹⁴⁸ its capital being Menongue.

Kuando Kubango was the traditional stronghold for UNITA and was subject to a major government offensive from 2001 to early 2002. Thus, the province faces development challenges with extremely limited infrastructure, especially in those municipalities that were the scene of major fighting during the war, such as Mavinga and Cuito Cuanavale. This has implied substantial delays in addressing comprehensive socio-economic plans for the region.¹⁴⁹ The battle of Cuito Cuanavale concentrated a large deployment of landmines in a scattered and unregistered form, with complex arrangements such as the combination of APMs with AVMs, explosive cases and other ordnance, resulting in the classification of Cuito Cuanavale as the most heavily mined town in Africa.¹⁵⁰

The population of Cuando Kubango is reliant on subsistence agriculture and animal husbandry. Other economic activities include basket making and fishing.¹⁵¹ The Ministry of Agriculture reports that there are an estimated 248,167 subsistence farmers which account for 40 per cent of the total population in the province.¹⁵² At the provincial level there are plans to increase the amount of farming land to 4,000 km² by 2025 through a change from manual to mechanised farming.¹⁵³

Beyond agriculture, there are plans to support a fledgling tourism industry, conservation and wildlife economy since the province hosts the largest part of the transboundary environmental project of the Okavango Basin and Delta, a UNESCO World Heritage Site.¹⁵⁴ As part of this, two new national parks have been created in the province; these are Mavinga (46,076 km²) and Luengue-Luiana (22,610 km²). Despite their high ecological value, large parts of the watershed feeding the Okavango system are inaccessible to conservationists because of landmines, and large fertile areas along the Okavango Delta in the Mavinga Valley are frequently left abandoned due to landmine contamination.¹⁵⁵ Consequently, a major conservation initiative was announced in June 2019, to clear all the remaining contaminated sites around river basins connected to the Okavango Delta.¹⁵⁶ The national government, in cooperation with The HALO Trust, has invested USD 60 million to clear landmines in Cuando Kubango and Luengue–Luiana National Parks.

The province is also rich in timber and private logging companies are reported to extract trees¹⁵⁷ for commercial purposes.¹⁵⁸ Also, the *Companhia Siderúrgica do Cuchi* (CSC) is due to start producing pig iron for export.

The province has benefited from the prioritisation of the repair, expansion and modernisation of its infrastructure which is considered as central to economic development. While transportation is generally improving, Kuando Kubango is yet to fully benefit as, for example, the only feasible transport link between Menongue and the capital Luanda is by air. However, the Moçâmedes railway line that connects the coastal town of Namibe to Menongue, has been rehabilitated. Trade and the circulation of goods have improved greatly with the connectivity providing for huge potential economic significance.¹⁵⁹ As a region, Kuando Kubango has high economic potential and as such is referred to as the “lands of progress” instead of the “lands at the end of the earth” as it was previously referred to in official discourse.¹⁶⁰

Theme 1. Impact of mine contamination

Mine contamination had a drastic effect on access to agricultural land, which in turn affected the means of living and food security of the population in Kuando Kubango during and after the conflict. Examining the impact of mine contamination is needed to fully understand the trajectory of change from contamination to clearance across different developmental areas such as agriculture and food security, infrastructure, transport and mobility, housing and energy systems, or safety and security perception.

Impact of mine contamination on agriculture

As referred to by one villager of Bairro Mavengo, “landmines were a second war for villagers”.¹⁶¹ In most of the communities visited in Kuando Kubango, AVM and mixed contamination posed limits to agricultural expansion and development. The community members shared the view that they had to go through arduous situations before clearance as movement was restricted, making cultivation challenging. Similarly, in Samaria and Shipopa,¹⁶² villagers explained that before clearance they were completely surrounded by a minefield so they could not expand their crops further to Cuito Cuanavale and engage in extensive agricultural activities as they do now.

The remaining mine contamination was mentioned as an obstacle for agriculture and development in several FDGs.¹⁶³ Livestock rearing is hindered as cattle ranchers require extensive lands for grazing and free movement, without the fear of accidents and economic losses caused by mines. In Bairro Mavengo,

a representative expressed regret that remaining contamination prevents them from accessing additional fertile land, giving the example of Sovi, a riparian area suitable for grazing which is currently inaccessible due to contamination.¹⁶⁴ Contamination of surrounding land resulted in ranchers needing to invest hours to reach areas further away.¹⁶⁵ In Shipopa, villagers are prevented from hunting and foraging and fruit gathering due to contamination.¹⁶⁶ In addition to identified contamination, suspicion or fear of contamination also prevents farmers from diversifying their crops.¹⁶⁷ Likewise, mine contamination still hinders access to water sources in several areas of the province,¹⁶⁸ and this has been especially relevant for farming communities due to the considerable impact of the drought experienced in 2018.

Impact of mine contamination on infrastructure

Mine contamination has had a significant impact on infrastructure too. After the peace agreement in 2002, only three of the nine municipalities in Kuando Kubango remained connected by road.¹⁶⁹ Contamination severely blocked roads, as during the conflict, the government forces emplaced military positions every 15 kilometres—often protected with landmines—to avoid communication and road disturbance by UNITA's mine laying, such as on the road linking the municipalities of Menongue with Cuito Cuanavale.¹⁷⁰ Landmines were also used to block bridges or to impede their destruction by UNITA, as found along the road connecting Menongue to Cuchi.¹⁷¹

Landmines were also employed as a defensive measure to enable air transport through Menongue airport, as well as municipal and communal airstrips. Today, most communal airstrips remain mined.¹⁷²

The disruption to the railway service had an appalling impact on community's lives since it blocked the movement of people and goods for trade and self-subsistence. The railroad from Cuchi to Menongue was also completely paralysed during the war,¹⁷³ since landmines were laid along the railway and its surroundings, and bridges were destroyed, impeding the railway extension.

Current contamination still presents limitations in mobility and transport. For instance, in Samaria, villagers have developed small trails or paths to avoid known contaminated areas and devised alternative ones where accidents that killed or injured community members took place.¹⁷⁴ However, villagers mentioned that they still use commercial trucks or all-terrain vehicles known as land cruiser "taxis" to visit relatives in other municipalities like Mavinga, Lupiri and Rivungo where access roads are unpaved and heavily mined. Road conditions still affect the provision of

public transport in Mavinga and Rivungo, as beyond Cuchi and Cuito Cuanavale, only vehicles such as land cruisers are able to travel, whilst in Mucundi, Lupiri and Nankova, mine contamination impedes road use altogether.¹⁷⁵



End of paved road in Cuito Cuanavale, beginning of sand road to Mavinga. The signpost denotes that the road is heavily contaminated, 1 August 2019.

Access to healthcare is still a challenge in municipalities where roads remain contaminated. According to a representative from the Ministry of Health in Menongue, there are 112 health units and some of them are remotely located. To solve accessibility constraints, they use special two or three-wheeled vehicles which allow the delivery of vaccines and drugs. However, the main problem relates to the transport of medical equipment, which requires large-scale vehicles which cannot circulate on the unpaved and/or highly mined roads.¹⁷⁶

Theme 2. Impact of mine clearance on agriculture

Regarding mine clearance's impact on agricultural development, production, crop and economic activity diversification, linkages with SDGs 1, 2 and 10 can be identified. Thanks to the increase in agricultural production, enabled by access to cleared and safe land, communities may increase their income level, and gain access to land and natural resources, key targets under SDG 1 on poverty eradication. With increases in food production, income gained through the sale of surplus, and improved nutrition due to the consumption of new, diverse crops, communities may also reduce their food insecurity, hunger and malnutrition, in line with SDG 2. Income growth through the sale of agricultural surplus also contributes to SDG 10 by reducing inequalities within the country.

Expansion of arable land

Mine clearance expanded the availability of safe and arable land suitable for agricultural use. For the representatives from the Ministry of Agriculture in Menongue, mine clearance has had a direct impact on the increase in production, income and diversification of crops.¹⁷⁷ Based on their experience, the agricultural use of cleared land starts right after clearance, which proves that access and land expansion are seen as something relevant for the communities.¹⁷⁸

In the case of Savipanda, contaminated areas were not used for agricultural activities prior to clearance in May 2013 (see Figure 9). However, in subsequent years after clearance completion, land surrounding and within the cleared area returned to agricultural use and, additionally, benefited from a new road (see Figure 9).

Agricultural production

Communities also reported that access to arable and safe land leads to increased production. As stated by a representative of the Savipanda community, "as clearance takes place, more people come to the village since they feel safe. In turn, with a greater labour force, cultivation increases and results in more food for community members."¹⁷⁹ Villagers from Samaria also stated that mine clearance enabled them to expand their land for cultivation and therefore increased production.¹⁸⁰

Beyond the increase in agricultural productivity and land use, clearance appears to have a positive impact on efficiency. Access to cleared routes has reduced the time required to get to the fields and to the bush area for hunting or getting charcoal for sale, for instance.

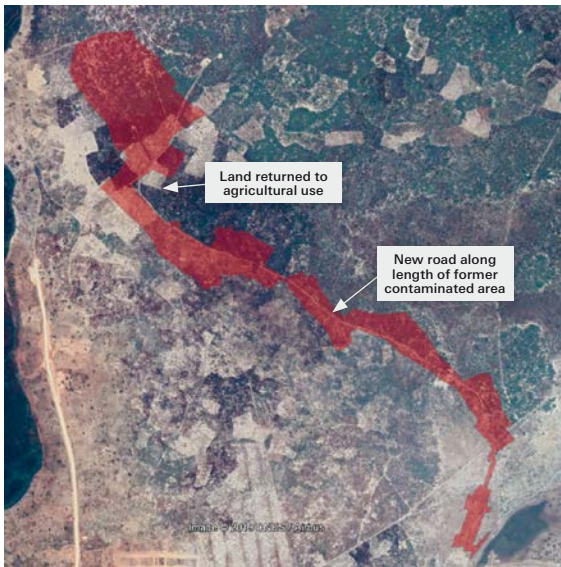
FIGURE 9

SATELLITE IMAGES OF SAVIPANDA IN 2008 AND 2018



■ Area to be cleared

6 August 2008



■ Area cleared

18 October 2018

In Senga, community members are now cultivating crops in areas close to the community that were previously mined. The proximity of arable land has implied an increase in efficiency since community members have significantly reduced the time spent on reaching the fields and the cost of transporting the crops.¹⁸¹ Moreover, two women who participated in the FGD¹⁸² mentioned that they will now be able to continue working in the field until their elderly years, since tending to their crops requires less physical effort due to the proximity and ease of access.

FIGURE 10 SATELLITE IMAGES OF SENGA IN 2013 AND 2018



■ Area cleared

12 July 2013



■ Area cleared

19 May 2018

When analysing related satellite imagery of the contaminated area close to Senga, in July 2013, during clearance, former agricultural areas close to the village were not used and were apparently overgrown with vegetation, due to prolonged lack of use. Paths surrounding the agricultural area were also not used, with signs of clearance operations visible in and surrounding the area to be cleared (see Figure 10). The agricultural use of land after clearance in 2013 is evident in Figure 10, with possible logging facilities also being established in 2018.

Agricultural mechanisation

Mechanisation often appears as a key factor in agricultural efficiency as it leads to time and energy savings. However, when investigating farming methods, clearance does not seem to have a direct impact on the tools and means to cultivate the land. Most of the communities visited rely on manual harvesting since they do not have the means to acquire more expensive tools or machinery. Some communities use cows to prepare the land for cultivation, but they do not keep the animals in the village, only in areas at distance. In some cases, as in Cambamba, a few villagers who own cows live two hours away from the community since the surrounding land does not meet the needs of the animals.¹⁸³ Some government pilot projects have been initiated to promote the use of tractors in rural communities and to enhance mechanisation.¹⁸⁴ However, these projects will require additional planning and awareness since the fear of mines still remains among the population.¹⁸⁵



Tractor on a road in Kuando Kubango, 1 August 2019.

Diversification of crops and economic activities

Crop diversification was another positive aspect highlighted by several communities as well as the Ministry of Agriculture. Before clearance, most of the communities were cultivating pumpkins, potatoes, cassava, sorghum or nuts. After mine clearance and the expansion of arable land, communities also started to cultivate rice and vegetables such as onions, tomatoes or different types of beans.¹⁸⁶ Diversification of crops is also visible in local markets where one can find a broad variety of local products that were not available before.¹⁸⁷ However, for some communities such as in Savipanda, recent drought has reduced the variety of cultivated crops.

Whilst agriculture mainly prevails as a means for self-subsistence in the communities visited,¹⁸⁸ it was observed that an increase in production after clearance also allowed for the sale of surplus or exchange of their crops for other necessary goods such as oil, salt, medicine or clothes.¹⁸⁹ When communities were directly asked about the possible linkages between mine clearance and a variation in food security, most women affirmed that thanks to the increase in production and access to local markets after clearance, food security improved at the community level.¹⁹⁰ In Senga, there was an interesting discrepancy among younger men and elder women regarding the benefits of incorporating new products brought from the city. For the latter, the health of children had worsened since the introduction of salt, oil, sugar and other artificial additives. For the young interviewees, these new products were bringing benefits for the community in terms of food habits and nutrition.

Clearance also allows for the diversification of the use of safe land for additional economic activities. Beneficiaries from Bairro Mavengo stated that mine contamination restricted their mobility so their economic activities were extremely limited.¹⁹¹ After clearance, there was an expansion in arable land and in the variety of economic activities, including beekeeping, hunting, the collection of wild fruits and herbs for traditional medicine, and other activities related to access to the bush. Clearance and improved access to these areas has also yielded time-saving benefits in hunting and access to charcoal resources. In Cuatili, the community was able to expand activities and agricultural productivity after clearance, and thus increase their resources and savings.¹⁹² Certain groups also started beekeeping activities and the sale of honey to neighbouring communities. The important constituent of young people from the village has started a new profitable brick-making business for housing in the riparian area, where access was severely restricted before mine clearance.



Bricks extracted from the riparian area by Cuatili villagers, children and local business, Cuatili, Kuando Kubango, 3 August 2019.

Theme 3: Impact of mine clearance on infrastructure

Mine clearance has been essential to developments in strategic physical infrastructure, which consequently has impacted mobility along the roads and railroads, access to social services, transport, and energy; as well as enabled trade and influenced settlements. Therefore, direct linkages can be found with SDG 3 on good health and well-being, SDG 4 on quality education, SDG 6 on clean water and sanitation, SDG 9 on innovation and infrastructure, SDG 10 on reduced inequalities, and SDG 11 on sustainable cities and communities.

Access to transport

With road and railway clearance and rehabilitation, the development of transport systems such as the Moçâmedes railway was enabled, and interprovincial and intermunicipal transportation networks were established, increasing the accessibility and affordability of transport for the movement of people and goods.

Road clearance and its subsequent rehabilitation have been found to influence transportation costs and access to products by communities, linked with increases in trade activities. Changes in prices of housing construction materials relate not only to road access which facilitates access to markets by communities, but also to the availability of materials and trade in the province. Access to diversified building materials after railroad clearance and rehabilitation has a visible impact on housing. After the usage of railroads resumed, the trade of those materials was reactivated with more companies supplying iron sheets, tiles and cement that started to be affordable for the construction or renovation of houses in surrounding communities, with Port Namibe as the principal entry point.¹⁹³

Access to diversified products and trade

Communities' access to consumer goods and construction materials, as well as the circulation of these goods through roads and railways, increases the possibility of developing resilient infrastructure and enables internal trade and the development of small-scale industrial and other enterprises, contributing to SDG 9 on industry, innovation and infrastructure. With the reduction in transportation costs, the affordability of modern construction materials increased, with their uptake becoming wider as their transportation to villages also became easier due to road clearance. For example, in Savipanda, whilst most of the construction materials were traditional in 2002, the use of modern construction materials is visible in 2018 (see Figure 11).

FIGURE 11 SATELLITE IMAGES OF SAVIPANDA IN 2002 AND 2018



15 December 2002



19 May 2018

Likewise, along the same road from Menongue to Cuito Cuanavale, a similar improvement is observed in Cuchi (see Figure 12). After clearance was completed in 2005, construction materials for houses radically changed.

FIGURE 12 SATELLITE IMAGES OF CUATILI IN 2003 AND 2017



26 May 2003



Village continues to develop with additional modern structures

1 June 2017

Railways are considered as the main driver behind trade and as a crucial component in the economic performance of several regions of the country. Increased access to diversified products, beyond construction materials, is an observed consequence of railway connections. A surge in the variety of products in the market of Menongue in recent years can also be associated with the railway connection.¹⁹⁴ For instance, corn and beans grown in Cuchi are transported via railway to Menongue, where buyers from other communities that are not well-connected can now purchase them. Clearance and rehabilitation of the railroad were the key factors that enabled these activities, facilitating a diversification of products and suppliers as well as an increase in intermunicipal trade.¹⁹⁵



Passangers and merchandise boarding on the Caminho de Ferro de Moçâmedes railway.
31 July 2019, Menongue, Kuando Kubango.

In Menongue, products such as construction goods and materials are transported via rail or by road into Kuando Kubango, from ports such as Namibe and Luanda, and from Lubango.¹⁹⁶ However, some traders mentioned they had to use trucks to transport products as Menongue is not connected with Luanda via railway—where there is greater product variety and quality. This shows the significance of railways but also the need for interprovincial road networks to continue to enable trade. For example, the railroad¹⁹⁷ that goes west-east from the port of Namibe to Menongue only reaches two out of the nine municipalities¹⁹⁸ that make up Kuando Kubango. As the railways do not reach all of the municipalities, traders are the ones that find ways to distribute the merchandise from Menongue to remote areas, and communities and traders mentioned that prices of goods are considerably higher in municipalities not connected by railroad. Additionally, until clearance and rehabilitation of the road between Menongue and Huambo,

there was no interprovincial public transport from Menongue to Bié and Huambo, due to the mine contamination and general road conditions, with the latter remaining a problem in the case of tertiary or secondary roads in some provinces.¹⁹⁹ This is an important aspect, as interprovincial buses are also used by small and medium traders.²⁰⁰

Clearance of agricultural land, combined with road clearance, rehabilitation and re-pavement, has allowed small communities to temporarily settle in new villages along the road stretching from Menongue to Cuito Cuanavale, with conditions for harvest and storage during the agricultural season having improved.²⁰¹ Additionally, small factories and farming projects have been established closer to Menongue due to the ease of access to the urban area and the availability of land.

For communities, mine clearance is mentioned as a relevant factor in the improvement of their capacity to actively participate in trade. The Shipopa community reported that nowadays they go to the market on a daily basis and that the frequency of visits to the market has particularly increased in 2019, due to the scarcity of goods, resulting from the drought.²⁰²

Clearance also enables communities to access water sources which were previously hindered by surrounding contamination, enabling time savings and, in some cases, reducing barriers to drinking water facilities, contributing to SDG 6 on access to clean water and sanitation.

Access to water

Access to water is not only a basic need for survival but a determining factor in achieving development in many ways: to ensure basic hygienic conditions, to cultivate crops, to feed livestock, to produce building materials, among others. Access to physical infrastructure such as water and sanitation systems is, however, not necessarily linked with clearance, due to communities' current living conditions. The communities visited are not equipped with sanitation systems²⁰³ and water collection remains a central activity for villagers. Some sanitation initiatives²⁰⁴ were observed during the field research but the communities interviewed still rely on water collection from the nearest rivers, which is concurrent with the fact that only 30 per cent of the population of Kuando Kubango have access to drinking water.²⁰⁵

Mine clearance does not appear to have a general impact on the gender division of labour, except that involved in water collection. In Cuatili, mothers and children used to go for water collection together before mine clearance, since there was no open access to the river due to mine contamination. The alternative paths that they used

implied risks and required additional time needed to reach both sides of the river.²⁰⁶ Once the threat posed by landmines disappeared, children started to go to the river by themselves and no accidents have been recorded since. Although impacts on these children's lives—for example for their educational opportunities—need to be further examined, it has been observed that women in the village have been freed from water collection responsibilities, usually assigned to women in the Angolan context. Furthermore, a case in Samaria shows how mine contamination—or the perception of mine contamination—impacts on community members' behaviour with regard to water collection. In Samaria, villagers recently found two AVMs on the path used to collect water. This has negatively impacted the community and they have jointly decided to only use one longer but well-known and safe path.²⁰⁷

Access to social services

Regarding access to health facilities, there has been a significant increase in the percentage of births attended by medical professionals in health facilities.²⁰⁸ Although mine clearance is not the only driving factor behind this, safe accessibility to health facilities is expected to have played a role in this increase. In one case, a health centre and hospital were built after clearance.²⁰⁹ Greater access to healthcare services and facilities may reduce infant and maternal mortality, key targets of SDG 3 on good health and well-being.

Increased access to schools as a result of improved mobility on cleared roads also facilitates SDG 4 on access to quality education. No general linkage has been found between clearance and access to education and the construction of schools. In most communities that were visited, there was at least one primary school for village children. For secondary education, teenagers usually need to move to larger villages, as the only means are walking or taking "taxis", due to the unavailability of public transport. It remains unclear if teenagers attended secondary school before clearance, but this seems unlikely considering the heavy contamination along the roads and the economic situation faced by the communities. None of the communities referred to tertiary studies.



CONCLUSION

This pilot case study on the socio-economic impact of AVM contamination and of their clearance in Angola assessed the impact of clearance on sustainable development in the medium and long term in two provinces: Huambo and Kuando Kubango.

A strong linkage between AVM clearance and the pursuit of sustainable development outcomes was identified. The use of the SDGs as an analytical framework served to underpin the conclusion that mine clearance is a direct accelerator towards the achievement of medium and long-term sustainable development goals in Angola.

Nonetheless, assessing the impact of a specific type of mine—AVM—on sustainable development is challenging due to mixed landmine contamination found in minefields and on roads. Hence, the affected communities are rarely aware of what type of device affects them. This may impact their assumptions, behaviour and perceptions of the risks associated with AVM contamination specifically. Based on this consideration, the study also contemplated mixed contamination.

Moreover, the analysis of a 16-year period encountered a lack of systematic, consistent, reliable, and disaggregated information, especially regarding socio-economic development indicators. To overcome this, the research adopted a micro-level assessment with a geographical focus on the chosen case studies, which provided a detailed analysis of the interactions seen at the community and/or provincial levels that may not be generalised into broader national or regional contexts. In addition, a community-based participatory research approach was used to gather primary data from communities on the consequences of landmine contamination and clearance in their daily lives.

The cross-referencing of secondary data on mine action operations and the primary data collected through unstructured and semi-structured interviews and focus group discussions, allowed the identification of three prominent themes against which to assess the relationship between AVMs and sustainable development in the two case studies: the impact of contamination, the impact of clearance on agriculture, and the impact of clearance on infrastructure.

Mine contamination has had a drastic impact on the possibility of access to agricultural land, affecting the livelihood and food security of involved communities, during and after conflict, hindering their prospects for development for decades.

Likewise, AVM and mixed contamination posed a great challenge to infrastructure, resulting in the total disruption of the railway service in both case studies. Considering the main role that the railway plays as the most popular means of transport for people and goods, this had a significant impact on people's lives. Moreover, blockages of roads also impeded aid delivery in the aftermath of the conflict, perpetuating humanitarian and developmental challenges for the affected communities.

Regarding the impact of mine clearance on agriculture, it appears to directly enable access to cleared and safe land, positively affecting the quantity and diversification of production, which in turn increases sales and income for the local communities, enhancing food security and improving their livelihoods. Based on the analysis, agricultural use of cleared land often starts right after clearance, which demonstrates that communities see arable land expansion as a positive and strategic change in their livelihoods. Considering that women play a significant role in generating agricultural income, the impact on women's lives have been most observable in the agricultural sector.

However, while assessing the impact of clearance on infrastructure, it became evident that the extent of its impact depends largely on its combination with additional investment factors such as rehabilitation, construction of new systems or maintenance of existing infrastructure.

Concretely, when communities have access to safe and rehabilitated infrastructure, there is a clear impact on mobility improvements and access to transportation, as well as greater participation in trade activities; these are seen with a range of positive impacts thanks to the resulting income growth. For instance, the greater access to markets combined with income growth and easier transport of goods, has allowed the incorporation of new building materials in some of the visited communities, which results in better housing and overall living conditions.

Similarly, safe and rehabilitated infrastructure has positively impacted access to social services, such as health and education, as well as access to energy, such as electricity or water. However, the observed impact of mine clearance over these sectors could be greater if accompanied by subsequent investments to rehabilitate or build infrastructure where needed and plans to sensitise communities about the developmental benefits associated with their use.

In sum, it can be stated that mine clearance has been a positive life changing process for the communities studied, especially regarding agriculture, since the expansion of agricultural fields, increased production, and diversification of crops have occurred directly after clearance and generated visible benefits in both case studies, such as improved food security and income growth.

However, the expected mechanisation of agricultural labour did not arise as a consequence of clearance and, as such, relies on further investment. Similarly, mine clearance appears to be a crucial and indispensable condition for infrastructure development, but the socio-economic impact on communities depends on the rehabilitation, construction and maintenance of much-needed physical infrastructure.

Based on its findings, this pilot study recommends further development and implementation of the proposed methodology to continue gathering evidence on the socio-economic impact of mine action in a comprehensive, interdisciplinary and participatory way. Systemic analysis of this impact will support the international community and key stakeholders in increasing cross-cutting policy coherence, evidence-based planning, reporting, and data collection to help integrate mine action activities into national SDG efforts while contributing to enhanced effectiveness in mine action.



BIBLIOGRAPHY

- African Development Bank (2018) *2018 African Economic Outlook Angola Country Note*.
- African Development Bank (2019) *African Economic Outlook (AEO) 2019*. Available from: <https://www.afdb.org/en/countries/southern-africa/angola/angola-economic-outlook>
- Angola (2011) *Presidential Decree No. 54/01*, 14 September 2001. Diário da República nº 42, Série I, pp. 765–767.
- APLC/MSP.12/2012/WP.7 (2012) *Request for an extension of the deadline for completing the destruction of anti-personnel mines in accordance with Article 5 of the Convention: Executive summary*, submitted by Angola. Meeting of the States Parties to the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction, 9 October 2012, Geneva, Switzerland.
- Bethany, L. and Gleditsch, N. (2005). Monitoring Trends in Global Combat: A New Dataset of Battle Deaths. *European Journal of Population*, pp. 145–166.
- Braun, V. and Clarke, V. (2006) Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2). pp. 77–101.
- Brinkman, I. and Alessi, S. (2003) From ‘lands at the end of the earth’ to ‘lands of progress’? Communication and mobility in South-Eastern Angola. *Communication technologies in Latin America and Africa: A multidisciplinary perspective*, Barcelona, IN3. pp. 193–220.
- Carranza, F. and Treacle, J. (2014) *Land, Territorial Development and Family Farming in Angola. A holistic approach to community-based natural resource governance: The cases of Bie, Huambo, and Huila Provinces*. Rome, FAO.
- CCW/GGE/VI/WG2/WP.11 (2003) *Field Report on Angola*, prepared by the United Nations Mine Action Service. Geneva, CCW Documentation.
- CNIDAH (2012) *Angola’s first Article 5 Extension request to the Ottawa Convention 2013–2018*.
- CNIDAH (2013) *Plano Estratégico do Sector de Acção Contra as Minas 2013–2017*.
- CNIDAH (2017) *Angola’s Second Article 5 Extension Request to the Ottawa Mine Ban Treaty 2018–2025* (revised version).
- GICHD (2004) *Humanitarian Impact from Mines other than Anti-Personnel Mines*. Geneva, GICHD.
- GICHD-SIPRI (2014) *The Humanitarian and Developmental Impact of Anti-Vehicle Mines*. Geneva, GICHD-SIPRI.

- GICHD-SIPRI (2019) *Global Mapping and Analysis of Anti-Vehicle Mine Accidents in 2018*. Geneva, GICHD-SIPRI.
- Government of the Republic of Angola (2011) *Presidential Decree No. 42*, 14 September 2001.
- Human Rights Watch (2002) *The War is Over: The Crisis of Angola's Internally Displaced Continues*. A Human Rights Watch Background Briefing Paper.
- Human Rights Watch (2003) *Landmines in Angola*. New York/Washington/ Los Angeles/London, Human Rights Watch.
- International Campaign to Ban Landmines (2004) *Landmine Monitor Report 2004: Toward a Mine-Free World*.
- IMAS (2018) *IMAS 07.11, Land Release*. First Edition, Amendment 4. Available from: https://www.mineactionstandards.org/fileadmin/user_upload/20190115_IMAS_07.11_Land_Release__Ed.1_Amendment_4__IACG.pdf
- IMAS (2019), *IMAS 04.10, Glossary of mine action terms, definitions and abbreviations*, Second Edition, Amendment 10.
- Kgathi, D. et al. (2006) "The Okavango; a river supporting its people, environment and economic development. *Journal of Hydrology*. pp. 3–17.
- Landmine Monitor (2018) "Angola Casualties", available from: <http://www.the-monitor.org/en-gb/reports/2018/angola/casualties.aspx>
- Landmine Monitor (2018b) "Angola: Support for Mine Action". Available from: <http://the-monitor.org/en-gb/reports/2019/angola/support-for-mine-action.aspx>
- Landmine Monitor (2018c) "Angola: Mine Action". Available from: <http://www.the-monitor.org/en-gb/reports/2019/angola/mine-action.aspx#ftn11>
- Mateos, O. (2005) Angola: el complejo camino hacia la paz. *Revista Nova África* [Online] 16. Available from: <https://escolapau.uab.cat/img/programas/alerta/articulos/05articulo008.pdf>
- Médecins Sans Frontières (2002) *Angola: Sacrifice of a people*.
- Mine Action Review (2018) *Clearing the Mines 2018 Report*. Available from: http://www.mineactionreview.org/assets/downloads/Angola_Clearing_the_Mines_2018.pdf
- Ministry of Economy and Planning (Angola) (2018) *Plano Nacional de Desenvolvimento 2018–2022*.

- Ministry of Finance (Angola) (2019) *Orçamento Geral do Estado*. Available from: <https://www.minfin.gov.ao/PortalMinfin/#!/materias-de-realce/orcamento-geral-do-estado/oge-do-ano-corrente>
- Ministry of Planning and Territorial Development (Angola) (2012) *Plano Nacional de Desenvolvimento 2013–2017*.
- Ministry of Planning (Angola) (2005). *Estratégia de Combate à Pobreza: Reinserção Social, Reabilitação e Reconstrução e Estabilização Económica*.
- National Statistics Institute (Angola) (2014) *Resultados definitivos recenseamento geral da população e da habitação de Angola 2014: Província do Huambo*. Luanda, INE.
- Oxfam (2003) *Angola: Construendo la paz. Retos y perspectivas tras un año de la firma de los Acuerdos*. Barcelona, Oxfam Intermón.
- Paulino, C. (2019) “Apenas 30% da população tem acesso à água potável”. *Jornal de Angola*.
- Pearsons, I. (2004) Beyond the silencing of guns: Demobilisation, disarmament and reintegration. *Accord*. [Online] 15. Available from: <https://www.c-r.org/accord/angola/beyond-silencing-guns-demobilisation-disarmament-and-reintegration>
- Porto, J. and Clover, J. (2003) “The Peace Dividend in Angola: Strategic Implications for Okavango Basin Cooperation”. In Turton, A., Aston, P. and Cloete, E. (Eds.) *Transboundary Rivers, Sovereignty and Development: Hydropolitical Drivers in the Okavango Basin*. Pretoria, Green Cross International. pp. 65–81.
- SAC (2007) *Landmine Impact Survey: Republic of Angola*.
- Sogge, D. (2011) “Angola: reinventing pasts and futures”, *Review of African Political Economy*, Vol. 38 (127), pp. 85–92.
- The HALO Trust (2019) Angola invests \$60m to clear landmines from earth’s ‘last wild place’. <https://reliefweb.int/report/angola/angola-invests-60m-clear-landmines-earth-s-last-wild-place>
- The HALO Trust (2012) “Road Use Survey: Post-Road Threat Reduction (RTR): Bié Province, Angola”.
- The HALO Trust (2015) *A perspective from the field on the clearance of MOTAPM*. MOTAPM Informal Meeting, 6 November 2015, Geneva, Switzerland.
- The Washington Post (n.d.), “The Province of Kuando Kubango: Elephant Crossing”. Available from: <https://www.washingtonpost.com/wp-adv/specialsales/spotlight/angola/article23.html>

- UN Doc. S/2002/483 (2002) *Luena Memorandum of Understanding*.
- UN OCHA (2000) "Mid-Term Review of the UN Consolidated Inter-Agency Appeal for Angola (Jan-Jun 2000)". Available from: <https://reliefweb.int/report/angola/2000-mid-term-review-un-consolidated-inter-agency-appeal-angola-jan-jun-2000>
- UN OCHA (2001) "UN Consolidated Inter-Agency Appeal for Angola 2001". Available from: <https://reliefweb.int/report/angola/un-consolidated-inter-agency-appeal-angola-2001>
- UN OCHA (2002) "Consolidated Inter-Agency Appeal for Angola 2002". Available from: <https://reliefweb.int/report/angola/consolidated-inter-agency-appeal-angola-2002>
- USAID Southern Africa Regional Environment Programme (2016), "Management Plan for the Mavinga National Park, Kuando Kubango, Angola". Available from: <http://www.the-eis.com/data/literature/Mavinga%20Management%20Plan%20rev%208%20July%202016.pdf>
- Vandome, C. (2019) "Mine Action in Angola: Clearing the Legacies of Conflict to Harness the Potential of Peace", Chatham House.
- Weinzierl, T. and Schilling, J. (2013) "On demand, development and dependence: a review of current and future implications of socioeconomic changes for integrated water resource management in the Okavango Catchment of Southern Africa". *Land*, 2(1), pp. 60–80.
- WHO/UNICEF (2019) *Progress on household drinking water, sanitation and hygiene 2000–2017. Special focus on inequalities*.
- World Bank Group (2006) *Oil, broad-based growth, and equity – country economic memorandum*.
- World Bank Group (2018) *Angola: Systematic Country Diagnostic. Creating Assets for the Poor*.



ANNEXES

ANNEX I LIST OF INTERVIEWEES

Location	Date	Organisation
Huambo	21/07/2019	Hazardous Area Life-support Organization (The HALO Trust) Huambo
		Bange village
		Liambambi village
	22/07/2019	National Intersectoral Commission for Demining and Humanitarian Assistance (Comissão Nacional Intersectorial de Desminagem e Assistência Humanitária, CNIDAH) liaison officer—Huambo operations room
		Director of tourism
	23/07/2019	Huambo vice-governor for technical services and infrastructures
		Acção para o Desenvolvimento Rural e Ambiental (ADRA) director
		World Vision Huambo representative
		Provincial director of agriculture, Directorate of Agricultural Department
		Railway company (Caminhos de Ferro de Benguela) director
		Development Workshop representative
	Luanda	24/07/2019
25/07/2019		Ministry of Transport
26/07/2019		Chamber of Commerce
		Ministry of Tourism
		Associação de Profissionais Angolanos de Acção Contra as Minas (APACOMINAS) director
		Mines Advisory Group (MAG) country director
APOPO programme manager		

Kuando Kubango, Menongue	29/07/2019	CNIDAH liaison officer—Kuando Kubango operations room
		Associação de Conservação do Ambiente e Desenvolvimento Integrado Rural (ACADIR) director
		CARITAS Diocesana
		Ministry of Agriculture
		MENTOR Initiative Menongue
	30/07/2019	Ministry of Transports
		Railway company (Caminhos de Ferro de Moçâmedes)
		Ministry of Youth, Culture and Tourism
		Ministry of Health
		Ministry of Trade and Industry
Kuando Kubango, Cuito Cuanavale municipality	31/07/2019	Cuito Cuanavale administrator
		Bairro Mavengo village
		Shipopa village
	01/08/2019	Cambamba village
		Samaria village
Kuando Kubango, Menongue municipality	02/08/2019	Senga village
		Savipanda village
		Cuatili village
		Fruits and vegetables seller, Menongue Market
		Fruit and vegetable seller, Menongue market
		Construction materials vendor, Menongue market
		Construction materials store, Menongue
Kuando Kubango, Cuchi municipality	03/08/2019	Companhia Siderúrgica do Cuchi (Iron factory) logistics manager
Luanda	05/08/2019	CNIDAH division heads and management

TABLE 1 MINE CONTAMINATION TYPE IN MINEFIELDS (AS OF 27 SEPTEMBER 2019)

		Mine contamination type in minefields											
		CHAs					SHAs					CHAs & SHAs	
		Unknown and other	Not AVM	Mixed with AVM	AVM only	Total	Unknown and other	Not AVM	Mixed with AVM	AVM only	Total	Total	
Country	Angola	Number	202	589	158	52	1,001	8	82	17	2	109	1,110
		m ²	26,069,228	42,257,659	16,529,263	4,304,443	89,160,593	711,544	9,096,146	2,515,476	87,278	12,410,444	101,571,037
Provinces in focus	Huambo	Number	–	–	–	–	–	1	–	–	–	1	1
		m ²	–	–	–	–	–	12,890	–	–	–	12,890	12,890
	Kuan-do Kubango	Number	8	134	69	25	236	–	–	–	–	0	236
		m ²	654,698	8,225,814	6,830,764	2,584,695	18,295,971	–	–	–	–	0	18,295,971

Source: National IMSMA database

TABLE 2 BLOCKAGES CAUSED BY TYPE OF MINEFIELDS (AS OF 27 SEPTEMBER 2019)

		Blockages caused by type of minefields															
		Agricultural				Roads				Water				Infrastructure			
		Total hazards		Mixed and AVM		Total hazards		Mixed and AVM		Total hazards		Mixed and AVM		Total hazards		Mixed and AVM	
		CHAs	SHAs	CHAs	SHAs	CHAs	SHAs	CHAs	SHAs	CHAs	SHAs	CHAs	SHAs	CHAs	SHAs	CHAs	SHAs
Country	Angola	571	76	156	9	118	6	53	1	88	15	15	2	105	23	27	7
Province in focus	Kuando Kubango	171	0	67	0	16	0	9	0	13	0	4	0	28	0	10	0

Source: National IMSMA database

TABLE 3 MINE CONTAMINATION TYPE ON ROADS (AS OF 27 SEPTEMBER 2019)

		Mine contamination type on roads											
		CHAs					SHAs					CHAs & SHAs	
		Unknown and other	Not AVM	Mixed with AVM	AVM only	Total	Unknown and other	Not AVM	Mixed with AVM	AVM only	Total	Total	
Country	Angola	Number	66	23	1	3	93	1	1	5	14	21	114
		Length (km)	2,578	611	0	25	3,214	0	0	33	502	535	3,748
		No. of roads w/ no length	6	10	1	1	18	1	0	3	0	4	22
Provinces in focus	Huambo	Number	–	–	–	–	–	–	–	–	–	–	0
		Length (km)	–	–	–	–	–	–	–	–	–	–	0
	Kuando Kubango	Number	23	3	–	–	26	–	–	–	–	–	26
		Length (km)	1,318	420	–	–	1,738	–	–	–	–	–	1,738

Source: National IMSMA database



ENDNOTES

- 1 Field research was also supported by the Engineering and Physical Sciences Research Council Global Challenges Research Fund (EPSRC-GCRF) project “A Clear Road Ahead (ACRA) – Developing a Combined Technological and Socio-Economic Approach to Freeing Affected Communities from Anti-Vehicle Landmines”
- 2 Barbara A. Israel, Amy J. Schulz, Edith A. Parker, and Adam B. Becker, “Review of community-based research: assessing partnership approaches to improve public health,” *Annual Review of Public Health*, 19 (1998): 178.
- 3 GICHD-SIPRI (2014) *The Humanitarian and Developmental Impact of Anti-Vehicle Mines*. Geneva, GICHD–SIPRI.
- 4 Ibid.
- 5 The latest edition of the report was published this year. GICHD-SIPRI (2019) *Global Mapping and Analysis of Anti-Vehicle Mine Accidents in 2018*. Geneva, GICHD–SIPRI. For more information on the ACRA project please see [https://kclpure.kcl.ac.uk/portal/en/projects/a-clear-road-ahead-acra--developing-a-combined-technological-and-socioeconomic-approach-to-freeing-affected-communities-from-antivehicle-landmines\(9a6d30a4-465a-48c4-b3ac-37baa7e48be7\).html](https://kclpure.kcl.ac.uk/portal/en/projects/a-clear-road-ahead-acra--developing-a-combined-technological-and-socioeconomic-approach-to-freeing-affected-communities-from-antivehicle-landmines(9a6d30a4-465a-48c4-b3ac-37baa7e48be7).html)
- 6 A Clear Road Ahead (ACRA), is a collaborative multi-disciplinary project funded by the EPSRC Global Challenges.
- 7 The term “anti-vehicle mines” (AVMs) has been chosen instead of “anti-tank” (AT) to reflect that these mines do not only target tanks, but can be triggered by other vehicles driving over or disturbing them.
- 8 GICHD-UNDP (2017) *Leaving no one Behind: Mine Action and the Sustainable Development Goals*. Geneva, GICHD-UNDP.
- 9 Traditional authorities considered to be chief of the village.
- 10 *Comissão Nacional Intersectorial de Desminagem e Assistência Humanitária*.
- 11 For a complete list of interviewees, see Annex I.
- 12 A summary of the pilot study was verbally explained to all participants and a hard copy of the project summary was shared in Portuguese and in English, to confirm participation as well as to clarify the conditions of anonymity and the opportunity to withdraw from the study.
- 13 Main bantu language in Kuando Kubango.
- 14 Main bantu language in Huambo.
- 15 Braun, V. and Clarke, V. (2006) Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2). pp. 77–101.
- 16 Mateos, O. (2005) Angola: el complejo camino hacia la paz. *Revista Nova África* [Online] 16, p. 1. Available from: <https://escolapau.uab.cat/img/programas/alerta/articulos/05articulo008.pdf>
- 17 Movimento Popular de Libertação de Angola.
- 18 Frente Nacional de Libertação de Angola.
- 19 União Nacional para a Independência Total de Angola.

- 20 Mateos (2005).
- 21 Human Rights Watch (1993) *Landmines in Angola*. New York/Washington/Los Angeles/London, Human Rights Watch.
- 22 CCW/GGE/VI/WG2/WP.11 (2003) *Field Report on Angola*, prepared by the United Nations Mine Action Service. Geneva, CCW Documentation; Human Rights Watch (2003).
- 23 Human Rights Watch (1993).
- 24 Ibid.
- 25 The HALO Trust (2015) *A perspective from the field on the clearance of MOTAPM*. MOTAPM Informal Meeting, 6 November 2015, Geneva, Switzerland.
- 26 Ibid.
- 27 Ibid.
- 28 Explosive ordnance is defined by IMAS 04.10 as “encompassing mine action’s response to the following munitions: mines; cluster munitions; unexploded ordnance, abandoned ordnance, booby traps, other devices (as defined by the CCW APII) and improvised explosive devices” IMAS (2019), *IMAS 04.10, Glossary of mine action terms, definitions and abbreviations*, Second Edition, Amendment 10.
- 29 Bethany, L. and Gleditsch, N. (2005) Monitoring Trends in Global Combat: A New Dataset of Battle Deaths. *European Journal of Population*, 21, pp. 145–166.
- 30 Sogge, D. (2011) “Angola: reinventing pasts and futures”, *Review of African Political Economy*, Vol. 38 (127), pp. 85–92.
- 31 UNOCHA (2002) “Consolidated Inter-Agency Appeal for Angola 2002”. Available from: <https://reliefweb.int/report/angola/consolidated-inter-agency-appeal-angola-2002>. See also, Human Rights Watch (2002). *The War is Over: The Crisis of Angola’s Internally Displaced Continues*. A Human Rights Watch Background Briefing Paper. Médecins Sans Frontières (2002) *Angola: Sacrifice of a people*.
- 32 Oxfam (2003) *Angola: Construyendo la Paz. Retos y Perspectivas tras un año de la firma de los Acuerdos*, pp. 4–5 Barcelona, Oxfam Intermón; Mateos, O. (2005), p. 3.
- 33 GICHD (2004) *Humanitarian Impact from mines other than Anti-Personnel Mines*. Geneva, GICHD, p. 24.
- 34 OCHA (2000) “Mid-Term Review of the UN Consolidated Inter-Agency Appeal for Angola (Jan-Jun 2000)”. Available from: <https://reliefweb.int/report/angola/2000-mid-term-review-un-consolidated-inter-agency-appeal-angola-jan-jun-2000>
- 35 Ibid.
- 36 OCHA (2001) “UN Consolidated Inter-Agency Appeal for Angola 2001”. Available from: <https://reliefweb.int/report/angola/un-consolidated-inter-agency-appeal-angola-2001>
- 37 CCW/GGE/VI/WG2/WP.11 (2003), pp. 1–2.
- 38 GICHD (2004).
- 39 The HALO Trust (2012) “Road Use Survey: Post-Road Threat Reduction (RTR): Bié Province, Angola”, p. 5.

- 40 Landmine Monitor (2018) “Angola Casualties”. Available from: <http://www.the-monitor.org/en-gb/reports/2018/angola/casualties.aspx>
- 41 In 1994, HALO, Mines Advisory Group (MAG), and NPA established mine action programmes in Huambo, Moxico, and Malanje. Subsequently, four more international NGOs set up programmes: People against Landmines (Stiftung Menschen gegen Minen, MgM) in 1996, Santa Barbara in 1997, INTERSOS in 1999, and DanChurchAid (DCA), with operations starting in Moxico province in 2005. INTERSOS closed its mine action programme in Angola at the end of 2006, and Santa Barbara in 2008. Although MgM has projects to continue operations in Angola, it is currently not active, with its last clearance task in Jamba having been completed in 2015.
- 42 APLC/MSP.12/2012/WP.7 (2012) Request for an extension of the deadline for completing the destruction of anti-personnel mines in accordance with Article 5 of the Convention: Executive summary, submitted by Angola. Meeting of the States Parties to the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction, 9 October 2012, Geneva, Switzerland.
- 43 Ministry of Planning (Angola) (2005). *Estratégia de Combate à Pobreza: Reinserção Social, Reabilitação e Reconstrução e Estabilização Económica*.
- 44 *Comissão Executiva de Desminagem*.
- 45 CED coordinates and manages the following institutions (commonly referred to as public operators): the Demining Brigades of the Security Unit of the President of the Republic, the Angolan Armed Forces (FAA), the National Demining Institute (INAD) and the Brigades of the Angola Border Guard Police. In addition to the public operators, several international non-governmental mine clearance organisations have also operated in the country, under CNIDAH’s supervision. Current demining operations are being undertaken by APOPO, Mines Advisory Group (MAG), Norwegian People’s Aid (NPA), The HALO Trust and the national NGO Associação de Profissionais Angolanos de Acção Contra as Minas (APACOMINAS).
- 46 CNIDAH (2017) *Angola’s Second Article 5 Extension Request to the Ottawa Mine Ban Treaty 2018–2025* (revised version). As of August 2019, the resurvey of the last province in Cabinda was completed by The HALO Trust.
- 47 Non-technical survey (NTS) is defined by IMAS 04.10 as “the collection and analysis of data, without the use of technical interventions, about the presence, type, distribution and surrounding environment of explosive ordnance contamination” and it helps define the presence of EO contamination, support land release prioritisation and decision-making processes. IMAS (2009).
- 48 CNIDAH (2013) *Plano Estratégico do Sector de Acção Contra as Minas 2013–2017*.
- 49 SAC (2007) *Landmine Impact Survey: Republic of Angola*, p. 7.
- 50 This is not unusual for Angola and several Landmine Impact Surveys (LIS) undertaken suffered similar challenges, raising several issues with the validity of data and the determination of the extent of the contamination problem. The LIS in Angola, for example, did not cover some communes in the provinces

- of Malanje and Lunda Norte due to inaccessibility. Since it was also based largely on community perception rather than evidence, the LIS was also not set up to identify contamination on roads or other infrastructure, that was not directly associated with communities. It resulted in the exaggerated recording of SHAs, as well as the number of mine-impacted communities.
- 51 CNIDAH (2013).
 - 52 Article 5 of the APMBC states that States Parties of the Convention are required to identify and clear all known or suspected mine contamination within 10 years of the entry into force of the Convention for that party. CNIDAH (2012) *Angola's first Article 5 Extension request to the Ottawa Convention 2013–2018*.
 - 53 CNIDAH (2017). This second extension request prolongs Angola's Article 5 obligations to 2025.
 - 54 Unexploded ordnance (UXO) is defined by IMAS 04.10 as "explosive ordnance that has been primed, fuzed, armed or otherwise prepared for use or used", which "remains unexploded either through malfunction or design or for any other reason". IMAS (2009).
 - 55 There are significant limitations to presenting latest clearance data, disaggregated by cancellation, reduction and clearance due to gaps in the hazard reduction database. Due to the long-term and complex nature of contamination in Angola, many closed hazardous areas entered into the database did not contain information which is standard in current IMSMA forms, such as the entry date of the CHA/SHA, status change date from open to closed (when cancelled, reduced or cleared). This poses limitations in analysing clearance data for the 2002–2019 period.
 - 56 Ministry of Planning and Territorial Development (Angola) (2012) *Plano Nacional de Desenvolvimento 2013–2017*.
 - 57 Ministry of Economy and Planning (Angola) (2018) *Plano Nacional de Desenvolvimento 2018–2022*.
 - 58 This means that reporting tools and forms have been harmonised, in terms of reflecting operators' own individual databases, and that errors in historical database entries have been addressed.
 - 59 Mine Action Review (2018) *Clearing the Mines 2018 Report*. Available from: http://www.mineactionreview.org/assets/downloads/Angola_Clearing_the_Mines_2018.pdf.
Land release is defined by IMAS 07.11 as "...the process of applying all reasonable effort to identify, define, and remove all presence and suspicion of EO through non-technical survey, technical survey and/or clearance. The criteria for 'all reasonable effort' shall be defined by the NMAA. (...) Land release is an evidence-based decision-making process that helps determine with confidence which land needs further action and which does not. It involves the identification of hazardous areas, the cancellation of land through non-technical survey, the reduction of land through technical survey and the clearance of land with actual EO contamination." IMAS 07.11 also defines hazardous areas as being divided into suspected hazardous areas (SHA) and confirmed hazardous areas (CHA) based

on the availability and reliability of information and whether evidence is indirect or direct for each hazard. Areas presenting only indirect evidence of the presence of EO should be classified as suspected hazardous areas (SHA). Areas presenting direct evidence of the presence of EO should be classified as confirmed hazardous areas (CHA) IMAS (2018) IMAS 07.11, *Land Release*. First Edition, 4th Amendment. Available from: https://www.mineactionstandards.org/fileadmin/user_upload/20190115_IMAS_07.11_Land_Release__Ed.1_Amendment_4__IACG.pdf

- 60 Ministry of Finance (Angola) (2019) *Orçamento Geral do Estado*. Available from: <https://www.minfin.gov.ao/PortalMinfin/#!/materias-de-realce/orcamento-geral-do-estado/oge-do-ano-corrente>
- 61 Landmine Monitor (2018c) “Angola: Mine Action”. Available from: <http://www.the-monitor.org/en-gb/reports/2019/angola/mine-action.aspx#ftn11>
- 62 African Development Bank (2019) *African Economic Outlook (AEO) 2019*. Available from: <https://www.afdb.org/en/countries/southern-africa/angola/angola-economic-outlook>
- 63 E-mail from Loren Persi Vicentic (ICBL-CMC), 14 June 2019. Angola does not have a national casualty surveillance system and, as such, there is a lack of clarity on the total number of EO casualties, with differing sources reporting different figures. The above-cited data is as provided by CNIDAH to the ICBL-CMC as of mid-2019.
- 64 In particular in 2016, while there were 2 APM casualties recorded, a total of 14 casualties were recorded to be from AVM incidents.
- 65 GICHD-SIPRI AVM database. The report based on the database is available from: https://www.gichd.org/fileadmin/GICHD-resources/rec-documents/AVM-Incident-Report-2018_web.pdf
- 66 The Information Management System for Mine Action (IMSMA) is the software designed to support the needs of the mine action community for decision support, monitoring and reporting. First released in 1998, IMSMA is now the primary software in mine action and is installed in 47 countries. Available from: http://mwiki.gichd.org:8090/IM/Main_Page, accessed on 14 October 2019.
- 67 Data drawn from the national database provided by CNIDAH to the GICHD on 27 September 2019.
- 68 For this calculation of the total area in square metres, roads were excluded, as many road CHAs and SHAs have not been entered into the database as measured in square metres.
- 69 Areas in which no hazard type was entered into the database.
- 70 Data presented is, as such, dependent on information provided in the IMSMA forms to the national authority. Blockages caused by contaminated roads were not analysed as the database does not contain sufficient disaggregation for road CHAs and SHAs.
- 71 World Bank Group (2018) Angola: *Systematic Country Diagnostic. Creating Assets for the Poor*.

- 72 World Bank Group (2006) *Oil, broad-based growth, and equity—country economic memorandum*, p. 97.
- 73 This figure only covers roads for which extension has been entered into the database, hence excluding 22 roads for which only square metres have been entered. The preference for selecting roads with a measure of extension (km) for contaminated roads is due to it being more commonly entered than square metres (m²).
- 74 Ibid.
- 75 Interview with Ministry of Transport, Luanda, 25 July 2019.
- 76 Angola was ranked 161 upon achieving peace in 2002; UNDP (2019) “Human Development reports”. Available from: <http://hdr.undp.org/en/countries/profiles/AGO>
- 77 UNDESA (2017).
- 78 UNDESA (2017) “World Population Prospects”. Available from: <http://esa.un.org/unpd/wpp/>
- 79 Ibid.
- 80 ILO (2019) *KILM Database*. Available from: <http://datatopics.worldbank.org/jobs/country/angola>
- 81 FAOSTAT (2019). Available from: www.fao.org/faostat/en/
- 82 Ibid.
- 83 Global Forest Watch (2018) “Angola Dashboard” Available from: <http://bit.ly/35JcYJA>
- 84 UNICEF (2019) “Country profiles”. Available from: <https://data.unicef.org/country/ago/>
- 85 WHO (2015) *Angola 2015–16 Multiple Indicator and Health Survey (IHMS)*
- 86 Ibid.
- 87 UNDP (2019) “Human Development Reports” Available from: <http://hdr.undp.org/en/countries/profiles/AGO>
- 88 UNICEF (2019).
- 89 African Development Bank (2018) *2018 African Economic Outlook Angola Country Note*, p. 9.
- 90 Ibid.
- 91 World Bank Group (2018).
- 92 Global Health Observatory (2015) “Data repository”. Available from: <http://apps.who.int/gho/data/node.country.country-AGO?lang=en>
- 93 WHO/UNICEF. (2019) *Progress on household drinking water, sanitation and hygiene 2000–2017. Special focus on inequalities*.
- 94 Ministry of Planning (Angola) (2005). *Estratégia de Combate à Pobreza: Reinserção Social, Reabilitação e Reconstrução e Estabilização Económica*.

- 95 National Statistics Institute (Angola) (2014) *Resultados definitivos recenseamento geral da população e da habitação de Angola 2014: Província do Huambo*. Luanda, INE.
- 96 Carranza, F. and Treakle, J. (2014) *Land, Territorial Development and Family Farming in Angola. A holistic approach to community-based natural resource governance: The cases of Bie, Huambo, and Huila Provinces*. Rome, FAO.
- 97 Pre-FGD briefing from HALO Trust employee, 22 July, 2019.
- 98 Interview with vice governor, Huambo Province, Huambo, 23 July 2019; Interview with railway corporation, Huambo, 23 July 2019.
- 99 FGD Liambambi, Huambo, 22 July 2019.
- 100 Interview with the CNIDAH, Huambo, 23 July 2019.
- 101 FGD Bange, 21 July 2019; FGD Liambambi, Huambo, 22 July 2019.
- 102 Indicator 16.1.4: Proportion of population that feel safe walking alone around the area they live.
- 103 Pre-FGD briefing from interview with HALO Trust employee, 22 July, 2019.
- 104 Interview ADRA, Huambo, 23 July 2019; Interview Directorate of Agricultural Department, Huambo, 23 July 2019; FGD Bange, 21 July 2019.
- 105 FGD Liambambi, Huambo, 22 July 2019; Interview Directorate of Agricultural Department, Huambo, 23 July 2019; Interview ADRA, Huambo, 23 July 2019.
- 106 Interview with railway corporation, Huambo, 23 July 2019.
- 107 Interview with railway corporation, Huambo, 23 July 2019.
- 108 Interview with Development Workshop, 23 July 2019.
- 109 Interview with vice governor, Huambo Province, Huambo, 23 July 2019.
- 110 Interview with Development Workshop, 23 July 2019.
- 111 Interview ADRA, Huambo, 23 July 2019; FGD Liambambi, Huambo, 22 July 2019.
- 112 Interview ADRA, Huambo, 23 July 2019.
- 113 FGD Bange, 21 July 2019; FGD Liambambi, Huambo, 22 July 2019; site visit observations 21–24 July 2019; Interview Directorate of Agricultural Department, Huambo, 23 July 2019.
- 114 FGD Bange, 21 July 2019.
- 115 Interview with INAD, Luanda, 24 July 2019.
- 116 FGD Bange, 21 July 2019; FGD Liambambi, Huambo, 22 July 2019.
- 117 Interview Directorate of Agricultural Department, Huambo, 23 July 2019.
- 118 Interview Directorate of Agricultural Department, Huambo, 23 July 2019; Interview with Development Workshop, 23 July 2019.
- 119 Interview ADRA, Huambo, 23 July 2019.
- 120 Interview ADRA, Huambo, 23 July 2019.

- 121 Interview Directorate of Agricultural Department, Huambo, 23 July 2019.
- 122 Interview ADRA, Huambo, 23 July 2019.
- 123 Interview ADRA, Huambo, 23 July 2019; Interview Directorate of Agricultural Department, Huambo, 23 July 2019.
- 124 Interview ADRA, Huambo, 23 July 2019.
- 125 Interview ADRA, Huambo, 23 July 2019.
- 126 FGD Liambambi, Huambo, 22 July 2019.
- 127 FGD Liambambi, Huambo, 22 July 2019; Interview ADRA, Huambo, 23 July 2019; FGD Bange, 21 July 2019.
- 128 FGD Liambambi, Huambo, 22 July 2019.
- 129 FGD Bange, 21 July 2019.
- 130 Interview ADRA, Huambo, 23 July 2019.
- 131 Interview Directorate of Agricultural Department, Huambo, 23 July 2019.
- 132 Interview ADRA, Huambo, 23 July 2019.
- 133 Interview CNIDAH, Huambo, 22 July 2019.
- 134 Interview CNIDAH, Huambo, 22 July 2019.
- 135 Interview with railway corporation, Huambo, 23 July 2019.
- 136 Interview with railway corporation, Huambo, 23 July 2019.
- 137 Interview with railway corporation, Huambo, 23 July 2019.
- 138 Interview with railway corporation, Huambo, 23 July 2019.
- 139 Interview Directorate of Agricultural Department, Huambo, 23 July 2019.
- 140 Interview ADRA, Huambo, 23 July 2019.
- 141 FGD Bange, 21 July 2019.
- 142 Interview with INAD, Luanda, 24 July 2019; Interview with vice governor, Huambo Province, Huambo, 23 July 2019.
- 143 Interview with vice governor, Huambo Province, Huambo, 23 July 2019; Interview CNIDAH, Huambo, 22 July 2019.
- 144 FGD Liambambi, Huambo, 22 July 2019; Interview with vice governor, Huambo Province, Huambo, 23 July 2019.
- 145 FGD Liambambi, Huambo, 22 July 2019.
- 146 https://www.citypopulation.de/en/angola/admin/13__cuando_cubango/ citing Instituto Nacional de Estatística, República de Angola.
- 147 The Washington Post (n.d.), "The Province of Kuando Kubango: Elephant Crossing". Available from: <https://www.washingtonpost.com/wp-adv/specialsales/spotlight/angola/article23.html>
- 148 Calai, Cuangar, Cuchi, Cuito Cuanavale, Dirico, Mavinga, Menongue, Nancova and Rivungo.

- 149 Porto, J. and Clover, J. (2003) “The Peace Dividend in Angola: Strategic Implications for Okavango Basin Cooperation”. In Turton, A., Ashton, P. and Cloete, E. (Eds.) *Transboundary Rivers, Sovereignty and Development: Hydropolitical Drivers in the Okavango Basin*. Pretoria, Green Cross International. pp. 65–81.
- 150 Vandome, C. (2019) “Mine Action in Angola: Clearing the Legacies of Conflict to Harness the Potential of Peace”, Chatham House.
- 151 Kgathi, D. et al. (2006) “The Okavango; a river supporting its people, environment and economic development”. *Journal of Hydrology*. pp. 3–17.
- 152 Interview with Ministry of Agriculture, 29 July 2019, Menongue, Kuando Kubango.
- 153 Interview with Ministry of Agriculture, 29 July 2019, Menongue, Kuando Kubango.
- 154 The HALO Trust. (2019) Angola invests \$60m to clear landmines from earth’s ‘last wild place’. Available from: <https://reliefweb.int/report/angola/angola-invests-60m-clear-landmines-earth-s-last-wild-place>
- 155 Weinzierl, T. and Schilling, J. (2013) “On demand, development and dependence: a review of current and future implications of socioeconomic changes for integrated water resource management in the Okavango Catchment of Southern Africa”. *Land*, 2(1). Pp. 60–80.
- 156 The HALO Trust. (2019).
- 157 Mainly *Baikiaea plurijuga*, *Burkea africana*, and *Pterocarpus angolensis* species.
- 158 See USAID Southern Africa Regional Environment Programme (2016), “Management Plan Mavinga National Park, Kuando Kubango, Angola”. Available from: <http://www.the-eis.com/data/literature/Mavinga%20Management%20Plan%20rev%208%20July%202016.pdf>
- 159 Interview with deputy director, railways, 29 July 2019, Menongue, Kuando Kubango. International Campaign to Ban Landmines (2004) *Landmine Monitor Report 2004: Toward a Mine-Free World*.
- 160 Brinkman, I. and Alessi, S. (2003) “From ‘lands at the end of the earth’ to ‘lands of progress’? Communication and mobility in South-Eastern Angola”. *Communication technologies in Latin America and Africa: A multidisciplinary perspective*, Barcelona, IN3. pp. 193–220.
- 161 FGD Bairro Mavengo, Kuando Kubango, 31 July 2019.
- 162 FGD Samaria, Kuando Kubango, 1 August 2019.
- 163 FGD Bairro Mavengo, Kuando Kubango, 31 July 2019; FGD Samaria, Kuando Kubango, 1 August 2019, and FGD Shipopa, Kuando Kubango, 31 July 2019.
- 164 FGD Bairro Mavengo, Kuando Kubango, 31 July 2019.
- 165 FGD Samaria, Kuando Kubango, 1 August 2019.
- 166 FGD Shipopa, Kuando Kubango, 31 July 2019.
- 167 Interview with a Ministry of Transport representative in Menongue, Kuando Kubango, 30 July 2019.

- 168 Meeting with the Ministry of Transport, 1 August 2019.
- 169 Interview with CNIDAH representative, Kuando Kubango, 29 July 2019.
- 170 Briefing with HALO staff member, Kuando Kubango, 31 July 2019.
- 171 Briefing with HALO staff member, Kuando Kubango, 3 August 2019.
- 172 Interview with CNIDAH representative, Kuando Kubango, 29 July 2019.
- 173 Interview with Companhia de Ferro de Moçâmedes, Kuando Kubango, 30 July 2019.
- 174 FGD Samaria, Kuando Kubango, 1 August 2019.
- 175 Interview with the Ministry of Transport, Kuando Kubango, 30 July 2019.
- 176 Interview with the Ministry of Health, Kuando Kubango, 30 July 2019.
- 177 Interview with the Ministry of Agriculture, Kuando Kubango, 29 July 2019.
- 178 Interview with the Ministry of Agriculture, Kuando Kubango, 29 July 2019.
- 179 FGD Savipanda, Kuando Kubango, 2 August 2019.
- 180 FGD Samaria, Kuando Kubango, 1 August 2019.
- 181 FGD Senga, Kuando Kubango, 2 August 2019.
- 182 FGD Senga, Kuando Kubango, 2 August 2019.
- 183 FGD Cambamba, Kuando Kubango, 1 August 2019.
- 184 Interview with the Ministry of Agriculture, Kuando Kubango, 29 July 2019.
- 185 FGD Cuatili, Kuando Kubango, 3 August 2019.
- 186 Interview with the Ministry of Agriculture, Kuando Kubango, 29 July 2019; FGD Bairro Mavengo, Kuando Kubango, 31 July 2019; FGD Shipopa, Kuando Kubango, 31 July 2019; FGD Savipanda, 2 August 2019.
- 187 Interview with the Ministry of Agriculture, Kuando Kubango, 29 July 2019.
- 188 FGD Bairro Mavengo, Kuando Kubango, 31 July 2019.
- 189 FGD Bairro Mavengo, Kuando Kubango, 31 July 2019; FGD Shipopa, Kuando Kubango, 31 July 2019; FGD Samaria, Kuando Kubango, 1 August 2019.
- 190 FGD Cambamba and FGD Samaria, Kuando Kubango, 1 August 2019.
- 191 FGD Bairro Mavengo, Kuando Kubango, 31 July 2019.
- 192 FGD Cuatili, Kuando Kubango, 2 August 2019.
- 193 Interview with railway company (Caminhos de Ferro de Moçâmedes), 30 July 2019.
- 194 Interviews with construction materials vendor, Menongue, Kuando Kubango, 2 August 2019.
- 195 Interview with the Ministry of Transport, Kuando Kubango, 30 July 2019; interview with the Ministry of Trade and Industry, Kuando Kubango, 30 July 2019.
- 196 Interviews with construction materials vendor, Menongue, Kuando Kubango, 2 August 2019.

- 197 Caminho de Ferro de Moçâmedes.
- 198 The nine provinces are Calai, Cuangar, Cuchi, Cuito Cuanavale, Dirico, Mavinga, Menongue, Nancova, and Rivungo.
- 199 Interview with the Ministry of Transport, Kuando Kubango, 30 July 2019.
- 200 Interview with construction materials vendor, Menongue, Kuando Kubango, 2 August 2019.
- 201 Based on observations of cleared road task EKK003 and EKK004.
- 202 FGD Shipopa, Kuando Kubango, 31 July 2019.
- 203 Some had sanitation and piped drinking water systems but these were not working.
- 204 Such as the Owini Project. See <https://www.owini-water.com/home-1.html> for more information.
- 205 Paulino, C. (2019) “Apenas 30% da população tem acesso à água potável”. *Jornal de Angola*.
- 206 FGD Cuatili, Kuando Kubango, 2 August 2019.
- 207 FGD Senga, Kuando Kubango, 2 August 2019.
- 208 Interview with the Ministry of Health, Kuando Kubango, 30 July 2019.
- 209 Interview with the Ministry of Health, Kuando Kubango, 30 July 2019.

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Published with the kind contribution of Irish Aid, Department of Foreign Affairs and Trade of Ireland.



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