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# CUMULATIVE IMPACTS ASSESSMENT OF THE NACALA CORRIDOR UNDER THE SOUTHERN AFRICA TRADE AND CONNECTIVITY PROJECT (MOZAMBIQUE AND MALAWI)

**Supporting material for public consultation**

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## List of acronyms

AfDB – African Development Bank

AOM – Airports of Mozambique

ASWAp-SP – Agriculture Sector Wide Approach Support Project

CEAR – Central East African Railway

CIA – Cumulative Impact Assessment

CIMP – Cumulative Impact Management Plan

DINAB – National Directorate of the Environment (*Direcção Nacional do Ambiente*)

DNDT – National Directorate of Land and Territorial Development (*Direcção Nacional de Terras e Desenvolvimento Territorial*)

EPIAS – Economic Policies, International Agreements and Support

FAO – Food and Agriculture Organization

GBV – Gender-based Violence

HIV – Human Immunodeficiency Virus

IDP – Internally Displaced Persons

IFAD – International Fund for Agricultural Development

JICA – Japan International Cooperation Agency

LPD – Land Productivity Dynamics

MEF – Ministry of Economy and Finance

MHPL – Mpatamanga Hydro Power Limited

MRT – Mozambique Railway Tracks

NBESD – National Bank for Economic and Social Development

NDC – Nationally Determined Contribution

NDCMC – Nacala Development Corridor Management Committee

NDVI – Normalized Difference Vegetation Index

NFSD – National Fund for Sustainable Development

NGO – Non-governmental Organization

NMP – Most Probable Number (*Número Mais Provável*)

NRA – National Road Administration

NTU – Nephelometric Turbidity Unit

OPEC – Organization of the Petroleum Exporting Countries

OSBP – One Stop Border Posts

PAP – Project Affected Person(s)

PEPFAR – President's Emergency Plan for AIDS Relief

PIPG – Project Integrated Poles of Growth

RCRP – Regional Climate Resilience Program

RWA – Regional Water Administration

SADC – Southern African Development Community

SATCP – Southern Africa Trade and Connectivity Project

SEA – Sexual Exploitation and Abuse

STI – Sexually Transmitted Infections

UNICEF – United Nations International Children's Emergency Fund

USD – United State Dollar

WFP – World Food Programme

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# 1. Cumulative Impacts Assessment of the Nacala Corridor

## 1.1. Context

Malawi and Mozambique have requested support from the World Bank through the Southern African Trade and Connectivity Project (SATCP) to facilitate and develop the beneficiary countries' trade links by reducing trade costs, improving roads and transport and increasing public and private investment.

This project includes specific improvements along the Nacala and Beira corridors, as well as the Ponta do Ouro border post with South Africa on the Maputo corridor, and broader trade-related reforms related to trade and accessibility.

The project's impacts are expected to lead to wider economic benefits, such as income growth, job creation, greater resilience, as well as spillovers to other countries in the region.

The project supports Mozambique's potential to become a trade and logistics centre in the region and strengthens Malawi's trade and transport network.

The simplification of procedures, together with investments in infrastructure and improved corridor performance, is expected to improve the reliability of supply chains for traders, producers and consumers, as well as their ability to choose more efficient transport routes.

As part of the SATCP preparation phase, an Environmental and Social Management Framework (ESMF) was prepared for each country - Malawi and Mozambique - in which it was recommended that an assessment of cumulative impacts be carried out.

## 1.2. Objective

The overall objective of the Nacala Corridor Cumulative Impact Assessment under the Southern Africa Trade and Connectivity Project (SATCP) is to assess the cumulative and synergistic effects between the investments implemented under the Project and "other projects" in various sectors of activity (see Table 1).

Cumulative impacts are those resulting from successive, incremental and/or combined effects of an action, project or activity when added to existing, planned and/or anticipated

ones. The identification and management of impacts is limited to effects recognized as important based on scientific concerns and/or concerns of affected communities (IFC, 2013).

The cumulative impacts can be positive and negative, varying in intensity as well as spatial and temporal extent. They may result from the aggregation and interaction of direct or indirect impacts.

### 1.3. Phases

The Cumulative Impact Assessment of the Nacala Corridor covers the following **phases**:

- Phase 1 – Planning;
- Phase 2 – Scope definition;
- Phase 3 – Data collection and condition of factors;
- Phase 4 – Cumulative Impact Assessment;
- Phase 5 – Assessment of carrying capacity and significance of cumulative impacts;
- Phase 6 – Analysis of results and database;
- Phase 7 – Presentation of final results.

## 2. Scope definition

In Phase 2, the scope of the cumulative impact assessment was defined and validated. To this end, **Workshop 1** was held on 27 June 2025 in the city of Tete, Mozambique. Following Workshop 1, the Preliminary Scope Definition Report (July 2025) was delivered, which included the Workshop Report as an annex.

In September 2025, **field visits and meetings** were held with stakeholders and resettled communities (in Mozambique and Malawi), which confirmed that the selected factors are the most relevant for the cumulative impact assessment. Subsequently, the **Final Scope Definition Report** (October 2025) was produced. This report included:

- The spatial and temporal scope of the analysis;
- The environmental and social factors to be analysed in the CIA;
- The main stressors influencing the condition of environmental and social factors, including the set of projects to be assessed;
- The indicators and methods for assessing cumulative impacts.

The **temporal scope** for the cumulative impact assessment covers the period from 2015 to 2035 (approximately 10 years in the past and 10 years in the future).

The **spatial scope** of the cumulative impact assessment corresponds to the Nacala Corridor in Mozambique and Malawi (Zambia is not included in the contractual scope of this assessment) and is spatialised in **Design PRJ1**.

The **factors** analysed in the cumulative impact assessment of the Nacala Corridor are as follows:

1. Food security;
2. Health;
3. Connectivity;
4. Land use conflicts/land loss;
5. Vegetation;
6. Soil conservation;
7. Surface water resources;
8. Climate resilience.

**Thirty** projects were identified as targets for evaluation, including the Southern Africa Trade and Connectivity Project:

**Table 1 – Projects targeted by the cumulative impact assessment**

| # | ID | Designation | Country | Primary funder | Executing agency | Environmental category |
|---|---|---|---|---|---|---|
| 1 | P164847 | Southern Africa Trade and Connectivity Project | Mozambique and Malawi | World Bank Group | Ministry of Transport and Logistics of Mozambique, Roads Authority, Republic of Malawi, Ministry of Transport and Public Works, Republic of Malawi | A[1] |
| 2 | P127303 | Project Integrated Poles of Growth (PIPG) | Mozambique | World Bank Group | Ministry of Economy and Finance-MEF | B |
| 3 | P158231 | Integrated access road development project - Mozambique | Mozambique | World Bank Group | National Road Administration, NRA | N/A |
| 4 | P171093 | Additional funding for the integrated access road development project - Mozambique | Mozambique | World Bank Group | National Road Administration, NRA | B |
| 5 | P164354 | Mozambique-Malawi Regional Interconnection Project | Mozambique and Malawi | World Bank Group | Ministry of Finance, Economic Planning and Development | A |
| 6 | 46002-P-Z1-DB0-039 | Nacala Road Corridor - Phase I | Mozambique and Malawi | African Development Fund | National Road Administration, NRA | [1] High risk[2] |

[1] Category A: Projects likely to cause significant adverse environmental impacts. These impacts can affect an area larger than the project site.

[2] Category 1 (high risk): Projects with significant adverse environmental and/or social impacts.

| # | ID | Designation | Country | Primary funder | Executing agency | Environmental category |
|---|---|---|---|---|---|---|
| 7 | 46002-P-MZ-DB0-012 | Nacala Road Corridor - Phase III | Mozambique | African Development Fund | National Road Administration, NRA | [1] High risk |
| 8 | 46002-P-Z1-DB0-084 | Nacala Road Corridor - Phase IV | Malawi | African Development Bank (AfDB) | National Roads Authority | [1] High risk |
| 9 | 46002-P-Z1-DB0-202 | Nacala Road Corridor - Phase V | Malawi | African Development Bank (AfDB) | National Road Authority | [1] High risk |
| 10 | No ID | Expansion of Nacala airport | Mozambique | National Bank for Economic and Social Development (NBESD) | Airports of Mozambique (AOM) E.P | No information |
| 11 | P-Z1-D00-032 | Nacala Railway and Port Project | Mozambique and Malawi | African Development Bank (AfDB) | Ministry of Finance | [1] High risk |
| 12 | No ID | Nacala Port Development Project Phases I and II | Mozambique | JICA | Ministry of Transport and Logistics | B |
| 13 | No ID | Moatize Coal Mine | Mozambique | Vale (until 2021)/Vulcan (after 2021) | Vale (until 2021)/Vulcan (after 2021) | No information |
| 14 | P158805 | Shire Valley Transformation Program - Phase 1 | Malawi | World Bank Group | Ministry of Agriculture, Irrigation and Water Development | A |
| 15 | P176575 | Shire Valley Transformation Program - Phase 2 | Malawi | World Bank Group | Ministry of Agriculture | N/A |
| 16 | No ID | Lurio Sustainable Forest Project | Mozambique | African Development Bank (AfDB) (29% of the total project's cost); Equity (50.6%) | Lurio Green Resources | No information |

| # | ID | Designation | Country | Primary funder | Executing agency | Environmental category |
|---|---|---|---|---|---|---|
| 17 | No ID | Program PROMOVE Transportation | Mozambique | European Union | National Road Authority | N/A |
| 18 | No ID | Program PROMOVE Agribiz | Mozambique | European Union | National Fund for Sustainable Development (NFSD); Ministry of Agriculture; Ministry of Industry and Trade; provincial governments and districts of Nampula and Zambezia | N/A |
| 19 | P174002 | Sustainable Rural Economy Program (MOZRURAL) | Mozambique | World Bank | ProAzul Blue Economy Development Fund, National Sustainable Development Fund (NFSD), BIOFUND | N/A |
| 20 | P145566 | Southern Africa Trade and Transport Facilitation Program - Phase 2 | Malawi | World Bank Group | Roads Authority, Ministry of Transport and Public Works | B[3] |
| 21 | No ID | Rehabilitation of the Nkaya-Mchinji railway line | Malawi | CEAR, Government of Malawi | CEAR | N/A |
| 22 | No ID | Rehabilitation of the Thyolo-Makwasa-Thekerani-Muona-Makhanga road (S151) | Malawi | OPEC Fund for International Development; Arab Bank for Economic Development in Africa; Kuwait Fund for Arab Economic Development | Malawi Road Authority | N/A |
| 23 | No ID | Rehabilitation of the Ntcheu-Tsangano-Neno-Mwanza Road | Malawi | Government of Malawi | Malawi Road Authority | N/A |

[3] Category B: Projects that are likely to have adverse environmental impacts, but those impacts can be avoided or mitigated with the adoption of appropriate safeguards. The level of environmental assessment depends on the nature and magnitude of potential impacts.

| # | ID | Designation | Country | Primary funder | Executing agency | Environmental category |
|---|---|---|---|---|---|---|
| 24 | No ID | Mangochi-Makangira road project | Malawi | OPEC Fund for International Development; Saudi Fund for Development | Malawi Road Authority | N/A |
| 25 | P165704 | Mpatamanga hydroelectric project | Malawi | World Bank | Mpatamanga Hydro Power Limited (MHPL), Ministry of Energy of Malawi | N/A |
| 26 | 1100001670 | Rural Irrigation Development Program | Malawi | International Fund for Agricultural Development (IFAD) | Malawi Ministry of Agriculture | N/A |
| 27 | No ID | Mchinji border market | Malawi | European Development Fund | Ministry of Industry and Trade | N/A |
| 28 | P164445 | Agricultural Sector II Comprehensive Approach Project (ASWAp-SP II) | Malawi | World Bank | Malawi Road Authority and Ministry of Agriculture | B |
| 29 | P181308 | Regional climate resilience programme for the Eastern and Southern Africa 2 project (RCRP2) | Malawi | World Bank | Commission of the African Union, Ministry of Finance and Economic Affairs | B |
| 30 | EU: DCI-ENV/2015/359-831<br><br>FAO: GCP/MLW/067/EC | Strengthen resilience to climate change and protect livelihoods | Malawi | European Union | FAO, Ministry of Finance and Economic Affairs | N/A |

# 3. Condition of Factors and Assessment of Cumulative Impacts

## 3.1. Methodological note

The **characterization of the condition** of each factor is based on a set of variables identified in Phase 2. In Phase 3, the aim was to understand the evolution of the variables between 2015 and 2025 and identify the main stressors that justified the trajectory from the past to the current condition.

The information collected at this stage covered the following sources:

- Surveys and field visits;
- Contacts and meetings with affected entities and communities;
- Studies, reports, plans and programs related to the management of the territory under analysis;
- Socio-economic and environmental databases;
- Scientific articles and literature;
- Legislation;
- Open sources of information.

In addition to the analysis of primary and secondary information, the main methodologies used were trend analysis and overlapping maps and analyses using Geographic Information Systems.

After characterizing the condition of the factors in the period 2015-2025, a **prospective analysis** was carried out, seeking to define future trends (2025-2035) for each of the selected factors. Then, at Phase 4, the **cumulative impacts** within the Southern Africa Trade and Connectivity Project were identified on the one hand (i.e., the combined effects of the various sub-projects that integrate it), and on the other hand, the cumulative impacts of this project with the other projects targeted by the cumulative impact assessment.

The **assessment of cumulative impacts** was based on the nature and significance criteria.

The **nature** component of a cumulative impact identifies its direction (positive, negative or neutral). The classification options of a cumulative impact in this component are presented in Table 2.

**Table 2 - Cumulative impact assessment component: Nature**

| Classification | Definition |
|---|---|
| Positive | Cumulative impact that benefits the environmental or social factor |
| Neutral | Cumulative impact that does not alter the environmental or social factor |
| Negative | Cumulative impact that damages the environmental or social factor |

The **significance of expected cumulative impacts** is assessed (at Phase 5) using the concept of change limits (limits beyond which changes resulting from cumulative impacts become a cause for concern):

**Table 3 - Cumulative impact assessment component: Significance**

| Classification | Definition |
|---|---|
| Insignificant | The factor has no noticeable changes |
| Moderate | The factor has changes (positive or negative), but within its natural variation |
| Significant | The factor has negative changes, and approaches change limits / The factor has positive changes, and moves away from critical thresholds, even if it does not completely reverse pre-existing negative trends |
| Very significant | The factor has negative changes beyond the change limits / The factor has positive changes staying at a level above the desirable limit; negative cumulative trends are reversed or structural resilience is strengthened |

The characterization of the condition of each factor and the preliminary assessment of cumulative impacts (Phases 3, 4 and 5) were presented in the Factors Condition Report and in the First Preliminary Cumulative Impact Assessment Report, submitted in November 2025.

The content of these reports was presented and discussed at **Workshop 2**, held on 4 December 2025 in Salima, Malawi. The report of this event was submitted in December 2025.

## 3.2. Food security

### 3.2.1. Past and present condition

The concept of food security is multidimensional and covers four interdependent dimensions: availability (supply of food), access (economic and physical conditions of acquisition), use (nutritional quality and health safety) and stability (continuity and predictability in time) (WFP, 2025a)

In terms of availability, the study area recorded an increase in agricultural and livestock production. However, the sustainability of this growth is limited by soil degradation, loss of productive land, use of inefficient agricultural technologies and increasing occurrence of extreme weather events. Despite agricultural diversification and increased production, dependence on imports of basic food products remains high, reflecting insufficient productive capacity, potential inadequate management of resources and a structural vulnerability of local economies.

As for access to food, the variation and increase in agricultural prices, combined with inflation levels, undermine household purchasing power and limit the regularity of consumption. Partial improvements in transport infrastructure and the expansion of market networks have contributed to easier physical access; however, significant constraints persist, notably poverty, limited availability of transport, inadequate food preservation, and fragile distribution chains.

The use of food continues to be shaped by dietary and cultural practices that restrict nutritional diversity, with diets predominantly based on products of low protein value. This pattern contributes to the persistence of high levels of malnutrition, particularly among children, exacerbated by poor sanitary conditions and limited access to safe drinking water.

Finally, the stability of food security remains fragile due to strong dependence on external factors and the recurring occurrence of climatic and economic shocks. Gender inequalities further exacerbate this vulnerability, as women continue to face restrictions in access to land, water, seeds and agricultural support programs, thereby undermining the resilience of rural households.

The main stressors influencing food security, beyond the projects under analysis, were extreme climatic events, population dynamics, commodity prices, economic policies, international agreements and aid, and the conflicts in Cabo Delgado.

The following table presents the evolution of the food security factor, based on the variables considered.

**Table 4 – Food security factor: evolution of variables**

| Variable | Past condition (Year) | Current condition (year) | Evolution | Legal limits exceeded in the current condition? | Main stressors |
|---|---|---|---|---|---|
| Percentage of people with food insecurity by district in the Nacala Corridor | 4% (Jun/Jul. 2017 to Mar. 2018) | 28% (Oct. 2024 to Mar. 2025) | Increased | No defined legal limits | • Projects<br>• Extreme weather events<br>• Population dynamics<br>• Commodity prices<br>• International policies, agreements and support<br>• Conflicts in Cabo Delgado |
| Agricultural production of rice and maize in Malawi and Mozambican provinces | 3,300,651 tons (2015) | 4,788,793 tons (2023) | Increased | | |
| Food imports in the countries | 1,150,696 billion USD (2015) | 1 466 450 billion USD (2023) | Increased | | |
| Average number of districts of the Nacala Corridor in critical agricultural situation (in May and December) due to water balance deficit and low biomass | 11 districts (2015) | 8 districts (2024) | Decreased | | |
| Selling price of maize in the study area in Malawi and Mozambique | 135.27 kwacha/kg; 10.21 meticais/kg (2015) | 294.42 kwacha/kg; 21.25 meticais/kg (2023) | Increased | | |
| Selling price of rice in the study area in Malawi and Mozambique | 402.49 kwacha/kg; 28.74 meticais/kg (2015) | 741.59 kwacha/kg; 1 593.65 meticais/kg (2021) | Increased | | |

| Variable | Past condition (Year) | Current condition (year) | Evolution | Legal limits exceeded in the current condition? | Main stressors |
|---|---|---|---|---|---|
| Average index of poverty in the regions of Malawi and Mozambican provinces | 57% (2014/2017) | 62%(2019/2020) | Increased | | |
| Average time to the market | Decreased (On average, accessible area increased by 33% for the same commuting time intervals between 2017 and 2025) | | | | |
| Women's access to productive resources | Qualitative analysis | | No major changes | | |

### 3.2.2. Cumulative impacts

The cumulative impacts of the projects under analysis in the Nacala Corridor on the food security factor are summarized in the following table.

**Table 5 – Cumulative impacts of the SATCP with other projects on the "Food Security" factor**

| Cumulative impacts of the SATCP with other projects | Projects Involved[4] | Justification | Influence of other stressors | Temporal cumulativeness | Spatial cumulativeness |
|---|---|---|---|---|---|
| Reduced food security | 16 projects (53%) - 1, 5, 6, 7, 8, 9, 11, 13, 14, 15, 19, 20, 25, 26, 27 and 29. | Allocation of agricultural areas during construction:<br>• The simultaneous construction of several infrastructures (roads, railways, ports, transmission lines, dams) results in land use conversion. This causes the loss of agricultural areas and restricted access to plots, leading to temporary changes in the availability of local food products.<br>• The loss of available fertile land is intensified by the existing trend of disorderly urban growth and the pressure of natural resources.<br>• The analysis of land use demonstrates a trend of intensification of land use and expansion of artificial areas. | • Weather events: The intensification and increased frequency of extreme weather events, such as prolonged droughts, floods, and cyclones, tends to reduce food security by causing significant losses in agricultural production, destruction of rural infrastructure, and land degradation.<br>• Population dynamics: Rapid population growth, coupled with migration flows and internal displacement, can reduce food security by increasing pressure on local production systems, natural resources, and food markets.<br>• Commodity prices: Volatility and rising prices of agricultural commodities tend to reduce food security by limiting households' economic access to staple foods. In a trend scenario with shocks in international markets, dependence on imports and inflation, there is an increase in the cost of living, a decrease in the purchasing power of families and a worsening of food security.<br>• Economic Policies, Agreements and International Support: Restrictive economic policies, unfavorable trade agreements, and the reduction of international support can contribute to | • It manifests itself mainly during the construction phase and is generally considered temporary and punctual in the construction area<br>• The execution period of most of the large linear infrastructure works (road, rail, energy and mining) and road rehabilitation is concentrated between 2021 and 2027. | • Concentration in districts with more than three projects associated with this impact: Lilongwe (1, 6, 20, 29), Mchinji (1, 8, 27, 29), Ntcheu (1, 8, 20, 29), Balaka (1, 5, 8, 9, 11, 20, 29), Blantyre (1, 20, 25, 29), Chikwawa (11, 14, 15, 29), Machinga (1, 8, 9, 11, 26, 29), Mangochi (1, 8, 9, 29), Mwanza (5, 11, 20, 29), Neno (5, 11, 25, 29), Cidade de Nampula (1, 6, 11, 19), Ribaue (1, 6, 11, 19), Cuamba (1, 6, 11, 19) and Moatize (1, 5, 11, 13). |

[4] The numbering of the projects is as shown in Table 1.

| Cumulative impacts of the SATCP with other projects | Projects Involved[4] | Justification | Influence of other stressors | Temporal cumulativeness | Spatial cumulativeness |
|---|---|---|---|---|---|
| | | | the decrease in food security by limiting investment in the agricultural sector, increasing dependence on imports, weakening national productive capacity, reducing support for small producers, and making the food system more vulnerable to external shocks.<br>• Conflicts in Cabo Delgado: Persistent conflicts significantly reduce food security by causing population displacement, abandonment of agricultural land and disruption of supply chains. | | |
| Increased food security | 14 projects (47%) - 1, 2, 3, 4, 6, 7, 8, 9, 17, 19, 20, 21, 27, 28 | Reduced time to the markets:<br>• The overlapping of 14 projects aimed at the construction/rehabilitation of roads and railways and trade facilitation increases logistical efficiency.<br>• Road rehabilitation significantly reduces travel times, as in project 6, where the Nampula-Cuamba route goes from 9 hours to 5.3 hours, and in project 7, where the Cuamba-Lichinga route goes from 6 hours to 2.5 hours. This reduction improves population mobility and daily access to markets and agricultural inputs.<br>• The coordinated implementation of OSBPs (1, 8, 9) and trade digitalization (1) reduce border processing time by up to 75%, improving the reliability of supply | • Commodity Prices: In an optimistic scenario, the stability of commodity prices, associated with the strengthening of local production and market regulation mechanisms, contributes to improving access to food. Predictable prices encourage agricultural production, increase producer incomes, and strengthen local markets, promoting greater food security along the supply chain.<br>• Economic Policies, Agreements and International Support: In an optimistic scenario, inclusive economic policies, favorable international agreements and financial support directed to rural development and family farming strengthen national production. Aligning these policies with food security programs improves the resilience of production systems, increases food | • Operation phase, that is, after the completion of infrastructure and trade facilitation works. | • Concentration in districts with more than three projects associated with this impact: Dedza (1, 20, 21, 28), Lilongwe (1, 6, 20, 21, 28), Mchinji (1, 8, 21, 27, 28), Ntcheu (1, 8, 20, 21, 28), Balaka (1, 8, 9, 20, 21), Meconta (1, 2, 17, 19), Monapo (2, 3, 4, 19), Ribaue (1, 2, 6, 19) and Cuamba (1, 2, 6, 19). |

| Cumulative impacts of the SATCP with other projects | Projects Involved[4] | Justification | Influence of other stressors | Temporal cumulativeness | Spatial cumulativeness |
|---|---|---|---|---|---|
| | | chains for traders, producers and consumers. | availability, and contributes to the stability and sustainability of food security.<br>• Conflicts in Cabo Delgado: In an optimistic scenario, the improvement of security conditions and the stabilization of the region allow the progressive return of displaced populations and the resumption of agricultural activities. In conjunction with economic recovery projects and support for livelihoods, these conditions favor the reactivation of local food systems, contributing to increased production, access to food and regional food security. | | |

### 3.2.3. Assessment of cumulative impacts

The following table provides a summary of the change limits and the assessment of cumulative impacts.

**Table 6 – Change limits and assessment of cumulative impacts on food security**

| Change limit | | Cumulative impact | Impact assessment | |
|---|---|---|---|---|
| **Variable** | **Acceptable limit** | | **Nature** | **Significance** |
| Percentage of households experiencing food insecurity | 10% | Changing food safety | Positive | Significant |

The main cumulative impact on the factor was identified as the "**change in food security**", resulting mainly from the combination of two types of actions: on the one hand, the allocation of agricultural areas for construction (negative action) and, on the other hand, the reduction of the time of access to the markets (positive action).

The integrated analysis of these actions shows that, although local and temporary pressures on agricultural land remain, the structural gains brought about by modernizing transport infrastructure, increasing productivity and facilitating agricultural outlets tend to prevail over the time horizon. Thus, the classification of impacts in terms of nature is positive.

The significance of the impact is determined based on the proposed change limit and considering the systemic cumulative impact from economic development.

It is verified that most of the districts (about 77%) present a significance classified between moderate and significant:

- "Significant" impacts for the districts of Cidade de Nampula, Meconta, Mecuburi, Mossuril, Muecate, Nacala, Nacala-a-Velha, Rapale, Ribaue, Cidade de Lichinga, Cuamba, Mandimba, Mecanhelas, Metarica, Milange.
- "Moderate" impacts for Dedza, Dowa, Ntcheu, Malema, Monapo, Chimbonila, N'gauma, and Moatize districts.

- "Insignificant" impacts for the Lilongwe, Mchinji, Salima, Ntcheu, Balaka, Blantyre, Chiradzulu, Chikwawa, Machinga, Mangochi, Mulanje, Mwanza, Neno, Nsanje, Phalombe, Thyolo, and Zomba districts.

Due to the depth and persistence of structural factors that condition food security, which may not be fully overcome through project interventions alone, the impact achieved is limited. Among these elements, the following stand out:

- poverty and climate events, as structural and multidimensional determinants of food insecurity;
- macroeconomic vulnerabilities arising from the national economic situation and the specific conditions of each community;
- institutional capacity and the quality of governance, which influence the effectiveness of public policies, social protection mechanisms and territorial management.

It is therefore concluded that the limited significance of the impact is not due to the ineffectiveness of the projects, but rather to the fact that the changes needed to keep food security within the established limits require additional measures, aimed at strengthening economic resilience, improving governance and strengthening social protection systems. These dimensions, complementary to investment in infrastructure and agriculture, are crucial to ensure sustained improvements in the medium and long term.

## 3.3. Health

### 3.3.1. Past and current condition

The main trends observed in the health sector in the period 2015–2025 were as follows:

- **Health services** (infrastructure and accessibility): there has been an increase in the number of health facilities in Mozambique and Malawi. However, the analysis of the relative capacity of hospitalization in both countries shows that the expansion of supply did not follow the population growth, resulting in a stagnation or reduction of hospital coverage. In both countries, barriers to physical access to healthcare persist, with long travel times, especially in rural and remote areas.
- **Water- and vector-borne diseases** (cholera and malaria): after a period of relative stability, Mozambique and Malawi recorded a significant increase in cholera cases in 2022/2023, associated with extreme weather events and structural weaknesses in access to drinking water and sanitation. In turn, the incidence of malaria showed a general downward trend in both countries, reflecting improvements in prevention, diagnosis and treatment programs. Even so, in Mozambique, this evolution is marked by territorial asymmetries, with local foci of high transmission persisting - such as the district of Milange, in Zambezia.
- **Respiratory diseases**: between 2015 and 2019 there was a decrease in mortality from respiratory infections, but the trend reversed sharply from 2020 onwards. Despite the slight reduction in mortality associated with air pollution, the burden of respiratory diseases increased in the period analyzed.
- **HIV prevalence**: National prevalence has declined in both Mozambique and Malawi, reflecting advances in controlling the epidemic. However, in Mozambique, the provincial analysis reveals increases in prevalence, with emphasis on Nampula and Zambezia. This disparity shows that, despite national progress, the Corridor maintains areas of greater epidemiological vulnerability.
- **Gender-Based Violence (GBV):** national data show a slight reduction in the prevalence of GBV in both Mozambique and Malawi. However, at the district level in Mozambique (Niassa and Zambezia), GBV records show an increasing trend in recent years. This shows that, despite the favorable

evolution in global terms, district contexts persist where women's vulnerability is more pronounced.

The evolution of the Health factor along the Nacala Corridor in the period between 2015 and 2025 was influenced by a set of environmental, demographic, institutional and social stressors, whose cumulative action shaped the indicators analyzed.

Some of these stressors result from long-term structural dynamics, such as poverty, limited institutional capacity or climate vulnerability.

Thus, the current condition is characterized by a sector in the process of expansion, but still unable to fully respond to the needs of the populations of the Corridor.

The support of international partners – such as the World Bank, Global Fund, JICA, PEPFAR, UNICEF, WHO and the European Union – has played an important role in strengthening health systems in Mozambique and Malawi.

Table 7 presents the evolution of the health factor, based on the variables considered.

**Table 7 – Health factor: evolution of variables**

| Variable | Past Condition (Year) | Current condition (year) | Evolution | Legal limits exceeded in the current condition? | Main Stressors |
|---|---|---|---|---|---|
| Number of health facilities in the provinces considered in Mozambique | 742 (2014) | 898 (2023) | Increased | Absence of defined legal limits | • Population dynamics<br>• Institutional capacity and governance<br>• Poverty and socio-economic vulnerability<br>• Weather events<br>• Water and sanitation infrastructure<br>• Gender-Based Violence (GBV)<br>• International policies, agreements and support |
| Number of health facilities in central and southern Malawi | 887 (2014) | 1397 (2025) | Increased | | |
| Average number of beds per 1,000 inhabitants in the provinces considered in Mozambique | 0,63 (2014) | 0,60 (2024) | Decreased | | |
| Average number of beds per 1 000 inhabitants in Malawi | 0,99 (2019) | 0,60 (2024 | Decreased | | |
| Number of cholera cases in Mozambique | 8 835 (2015) | 39 109 (2023) | Increased | | |
| Number of cholera cases in Malawi | 693 (2015) | 36 943 (2022) | Increased | | |
| Malaria incidence per 1,000 inhabitants in Mozambique | 353.6 Cases (2015) | 275.2 Cases (2023) | Decreased | | |

| Variable | Past Condition (Year) | Current condition (year) | Evolution | Legal limits exceeded in the current condition? | Main Stressors |
|---|---|---|---|---|---|
| Average annual rate of malaria cases per 1,000 inhabitants in the provinces considered in Mozambique | 310.9 cases (2018) | 330.3 cases (2024) | Increased | | • Projects under analysis |
| Malaria incidence per 1,000 population in Malawi | 239 cases (2015) | 227.9 cases (2023) | Decreased | | |
| Mortality rate from respiratory infections per 100,000 people in Mozambique | 144.4 (2015) | 226.4 (2021) | Increased | | |
| Mortality rate from respiratory infections per 100,000 people in Malawi | 110.4 (2015) | 238.2 (2021) | Increased | | |
| HIV prevalence in Mozambique | 12.6% (2015) | 11.5% (2023) | Decreased | | |
| Average HIV prevalence in the provinces considered in Mozambique | 8.45% (2015) | 11.1% (2021) | Increased | | |
| HIV prevalence in Malawi | 9.80% (2015) | 6.70% (2023) | Decreased | | |
| Average HIV prevalence in central and southern Malawi | 11.9% (2015) | 8.9% (2021) | Decreased | | |
| Number of cases of Gender-Based Violence (GBV) in Mozambique | 28,556 (2018) | 21,140 (2022) | Decreased | | |
| Number of cases of GBV in Malawi | 13,056 (2021) | 12,000 (2024) | Decreased | | |

### 3.3.2. Cumulative impacts

The cumulative impacts of the projects under analysis in the Nacala Corridor on the health factor are summarized in the following table.

**Table 8 - Cumulative impacts of the SATCP with other projects on the "Health" factor**

| Cumulative impacts of the SATCP with other projects | Projects involved[5] | Justification | Influence of other stressors | Temporary Cumulativeness | Space Cumulativeness |
|---|---|---|---|---|---|
| Improving access and health mobility | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 17, 20, 21, 22, 23, 24, 25, 27, 29. Total: 22 projects (73% of the total). | The implementation of 22 projects associated with the transport sector contributes cumulatively to the strengthening of the regional mobility network, through the paving and rehabilitation of roads, expansion and modernization of railway infrastructure, improvement of port and airport infrastructures, as well as the modernization of cross-border posts. These interventions translate into reduced travel times, improved medical evacuation conditions, more efficient transport of medicines and health supplies, and increased access to basic and emergency health services for populations — particularly isolated rural and peri-urban communities —. | • Institutional capacity and governance: limited institutional capacity in territorial planning, infrastructure management and intersectoral coordination (transport-health) has conditioned the effectiveness of investments in accessibility, reducing gains in access to health services. In an optimistic scenario, the institutional reinforcement, induced by the SATCP and other sectoral programs, may enhance the articulation between the improvement of the road network and the operation of health units, amplifying the positive impact on health mobility.<br>• Poverty and socio-economic vulnerability: this stressor limits the ability of populations to fully enjoy improvements in physical accessibility, due to the difficulty in supporting transport costs and dependence on informal means. In the context of the economic development expected for the region, this negative influence may be partially reduced by increasing the economic capacity of households, allowing more populations to benefit from improved health mobility. | • Structural, with progressive cumulative effects between 2015 and 2027 and consolidation of benefits during the operation phase | Concentration in districts with three (3) or more projects:<br>• Mozambique: Nampula, Rapale, Ribáue, Cuamba, Mandimba, Milange<br>• Malawi: Lilongwe, Dedza, Mchinji, Ntcheu, Balaka, Machinga, Mangochi, Mwanza, Neno, Blantyre |

[5] The numbering of the projects is as shown in Table 1

| Cumulative impacts of the SATCP with other projects | Projects involved[5] | Justification | Influence of other stressors | Temporary Cumulativeness | Space Cumulativeness |
|---|---|---|---|---|---|
| | | | • Climatic events: the occurrence of floods, cyclones and heavy rainfall is a stressor of a negative nature, as it can damage or interrupt the functionality of road infrastructures, compromising the continuity of access and health mobility, especially in rural and isolated areas. However, drainage and slope stabilization improvements, associated with the SATCP and other infrastructure projects, will mitigate the negative influence of this stressor, contributing to enhancing the reliability of access to health services. | | |
| Reduction of vector-borne and water-borne diseases (malaria, cholera) | 1, 3, 4, 6, 7, 8, 9, 14, 15, 17, 22, 23, 24, 26, 29, 30<br>Total: 16 projects (53.3% of total) | The combination of interventions in drainage, irrigation, sanitation, watershed management and road improvement contributes cumulatively to reducing the accumulation of stagnant water, improving surface runoff and reducing the exposure of populations to sources of contamination. These effects are particularly relevant in districts structurally vulnerable to climatic events, such as Meconta, Monapo and Nacala in Mozambique, and Chikwawa, Zomba and Machinga in Malawi. | • Poverty and socio-economic vulnerability: they amplify the epidemiological impact, by limiting the ability of populations to adopt preventive behaviors and access health care in a timely manner. In a scenario of progressive reduction in social and nutritional vulnerability, it reduces the susceptibility of populations to infectious diseases, allowing the benefits of health interventions to translate into effective health gains.<br>• Climatic events: floods, heavy rains and cyclones constitute a structural stressor that favors the proliferation of vectors and the contamination of water sources, conditioning the sustained reduction of diseases such as malaria and cholera. The reduction of recurrent exposure to floods, associated with the improvement of drainage and territorial protection conditions, contributes to reducing | • Cumulative positive effects mainly from 2028 onwards (after stabilization of the construction), progressively consolidating throughout the operation phase until 2035 | Concentration in districts with three (3) or more projects:<br>• Mozambique: Nampula, Cuamba, Ribáue, Monapo, Milange<br>• Malawi: Chikwawa, Machinga, Mangochi, Nsanje, Zomba |

| Cumulative impacts of the SATCP with other projects | Projects involved[5] | Justification | Influence of other stressors | Temporary Cumulativeness | Space Cumulativeness |
|---|---|---|---|---|---|
| | | | the pressure exerted by this stressor on the health of populations.<br>• Water and sanitation infrastructure: weaknesses in the coverage, operation and maintenance of water and sanitation infrastructure are a determining stressor for water diseases, by increasing the direct exposure of populations to contaminated water and pathogens. The progressive improvement in the reliability of these systems reduces the direct mechanisms of transmission, resulting in a more consistent decrease in the risk of cholera outbreaks and diarrheal diseases. | | |
| Increased incidence of HIV and sexually transmitted infections (STIs) | 1, 2, 3, 4, 6, 7, 8, 9, 11, 12, 13, 14, 15, 17, 18, 19, 20, 22, 23, 24, 26, 27, 28<br><br>Total: 24 projects (80% of the total) | Cross-border and labor mobility induced by road and rail corridors, frontier markets and logistics hubs increases occasional interactions and exposure to risky practices. These dynamics contribute to the increase in epidemiological vulnerabilities to HIV and other STIs, especially in areas with weak prevention and response capacity in sexual and reproductive health. | • Population dynamics: labor and cross-border mobility and temporary migration associated with transport corridors, border markets and logistics platforms intensify sexual contact networks, increase occasional interactions and hinder the continuity of prevention and treatment, increasing the risk of HIV and STI transmission.<br>• Institutional capacity and governance: Limitations in the institutional capacity of health services, particularly in the prevention, testing, treatment, follow-up and epidemiological surveillance of HIV/STIs, constitute a central stressor. Weaknesses in intersectoral and cross-border coordination reduce the effectiveness of sexual and reproductive health | • Intensified impact between 2025–2030, associated with the peak of labor mobility, followed by a progressive downward trend until 2035, due to the implementation of prevention and awareness programs. | Concentration in districts with three (3) or more projects:<br>• Mozambique: Nampula, Cuamba, Mandimba, Milange, Nacala, Tete/Moatize<br>• Malawi: Lilongwe, Blantyre, Dedza, Mchinji, Mangochi, Zomba, Phalombe, Nsanje, Chikwawa |

| Cumulative impacts of the SATCP with other projects | Projects involved[5] | Justification | Influence of other stressors | Temporary Cumulativeness | Space Cumulativeness |
|---|---|---|---|---|---|
| | | | responses, amplifying the effects of increased population mobility.<br>• Poverty and socio-economic vulnerability: acts as an amplifying stressor, by increasing exposure to risk behaviors and limiting regular access to prevention and treatment services. These factors reinforce structural inequalities, including gender inequalities, that exacerbate vulnerability to HIV and STIs. | | |
| Increasing incidence of gender-based violence, sexual exploitation and abuse (GBV/SEA) | 1, 3, 4, 6, 7, 8, 9, 11, 12, 13, 14, 15, 17, 20, 22, 23, 24, 25, 26<br>Total: 19 projects (63.3% of total) | Large-scale construction intensifies labour mobility. It is estimated that more than 20,000 workers will be mobilized throughout the construction period of the projects, including international, temporary and intra-district teams.<br>The high concentration of labor, the installation of temporary camps, the growth of informal markets and the daily movement between localities create environments leading to increased risks of GBV, with a greater incidence in peri-urban and border areas. | • Population dynamics: labour and cross-border mobility, the temporary presence of large contingents of workers and the high population turnover associated with construction sites and transport corridors change local social dynamics, increase occasional interactions and create contexts of increased risk for GBV/SEA, especially in peri-urban areas, informal markets and border areas.<br>• Institutional capacity and governance: Constraints in the institutional capacity of health, social, law enforcement, and judicial services are a critical stressor, compromising the prevention, reporting, investigation, and proper referral of GBV/SAE victims. Weaknesses in response and protection mechanisms contribute to the underreporting of cases and the persistence of risk, especially in contexts of high labor mobility.<br>• Gender-based violence (GBV): The prior existence of unequal social norms and high | • Impact with intensification between 2025 and 2030, associated with the overlap of road, rail and irrigation works. Beginning of a progressive reduction from 2028, as some work fronts are closed and mitigation measures begin to take effect, extending this trend until 2035. | Concentration in districts with three (3) or more projects:<br>• Mozambique: Nampula, Nacala, Cuamba, Tete/Moatize<br>• Malawi: Blantyre, Dedza, Mchinji, Machinga, Mangochi, Chikwawa, Nsanje, Zomba, Phalombe |

| Cumulative impacts of the SATCP with other projects | Projects involved[5] | Justification | Influence of other stressors | Temporary Cumulativeness | Space Cumulativeness |
|---|---|---|---|---|---|
| | | | levels of GBV is a structural stressor, creating a context of normalisation of violence that facilitates its reproduction and worsening in periods of social, economic and demographic pressure associated with projects. | | |

### 3.3.3. Assessment of cumulative impacts

The following table provides a summary of the change limits and the assessment of cumulative impacts.

**Table 9 – Assessment of cumulative impacts on the health factor**

| Change limit | | Cumulative impact | Impact assessment | |
|---|---|---|---|---|
| **Variable** | **Acceptable limit** | | **Nature** | **Significance** |
| Access to health facilities (% of population with functional access ≤2h) | 60%-80% | Improved accessibility and health mobility | Positive | Significant |
| Prevalence of Cholera (cases/year) | Mozambique: 19,000 - 24,000<br>Malawi: 18,000–23,000 | Reduction of vector and water diseases (malaria, cholera) | Positive | Significant |
| Incidence of malaria (cases per 1 000 inhabitants) | Mozambique ≤130-180<br>Malawi: ≤100-150 | | | |
| Reducing HIV prevalence | Mozambique: ≤9%<br>Malawi: ≤4% | Increased prevalence of HIV and sexually transmitted infections (STIs) | Negative | Moderate |
| Incidence of gender-based violence, sexual exploitation and abuse (GBV/SEA) | Downward trend | Increased incidence of gender-based violence and sexual exploitation and abuse (GBV/SEA) | Negative | Moderate |

For the Health factor, four (4) main cumulative impacts were identified:

- Improving access and health mobility;
- Reduction in the incidence of vector and water diseases, namely malaria and cholera;
- Increased risk of HIV transmission and sexually transmitted infections (STIs);
- Higher incidence of gender-based violence (GBV) and sexual exploitation and abuse (SEA).

The results of the evaluation demonstrate that the positive impacts of a structural nature - improvement of sanitary accessibility and reduction of environmental epidemiological risks - have greater weight and persistence in the territory, being classified as significant, while the negative impacts associated with social and epidemiological vulnerabilities, although relevant, have moderate significance, due to its limited duration, mitigation ability and dependence on temporary labour mobility flows. This distinction shows that, as a whole, the assessment of the cumulative impacts of the Nacala Corridor tends to produce lasting positive effects on the health system, without neglecting the social and epidemiological risks that require continuous management measures and enhanced surveillance throughout the implementation period.

## 3.4. Connectivity

### 3.4.1. Past and current condition

The analysis of past trends and the current condition of connectivity in the Nacala Corridor demonstrates structural advances, but also challenges that limit the full territorial, economic and social integration of the study area.

An expansion of the road and rail network is observed, accompanied by an increase in the proportion of covered roads and the rehabilitation of strategic sections. These improvements have resulted in greater territorial accessibility and a reduction in average travel times, especially in urban areas and along the main axes. However, territorial asymmetries persist, with rural areas still marked by poor road coverage and poor road quality.

Individual mobility remains heavily dependent on non-motorized means, namely cycling, whose use, although dominant, has decreased. The use of motorbikes and other motor vehicles remains limited, reflecting economic constraints and unequal access to transport. In the field of road safety, there is a trend of improvement, although weaknesses related to signage and supervision coexist.

Women's mobility remains constrained by structural inequalities, reflected in longer travel times and less access to safe and affordable transport.

The implementation of the One-Stop Border Posts (OSBPs) within the scope of the projects under study represents a significant advance in facilitating cross-border trade and improving logistics efficiency. However, many of these posts remain in the consolidation phase or still under technical consideration, limiting the full operationalisation of the system.

The main stressors that influenced connectivity in addition to the projects under analysis were extreme weather events, population dynamics and economic policies, international agreements and support.

The following table shows the evolution of the connectivity factor, based on the variables considered.

**Table 10 – Connectivity factor: evolution of variables**

| Variable | Past condition (Year) | Current condition (year) | Evolution | Legal limits exceeded in the current condition? | Main stressors |
|---|---|---|---|---|---|
| Average percentage of households / population owning motor vehicles and motorcycles | 5.8% (2008/2015) | 3.5% (2018/2022) | Decreased | No legal limits defined | • Projects<br>• Extremes Weather events<br>• Population dynamics<br>• Economic policies, agreements and international support |
| Average percentage of households / population owning bicycles | 44.8% (2008/2015) | 34.6% (2018/2022) | Decreased | | |
| Average percentage of households / population owning oxcarts | 1.4% (2008/2015) | 1.5% (2018/2022) | Increased (slightly) | | |
| Extension of unpaved roads | 28 197 km (2017) | 60 663 km (2025) | Increased | | |
| Extension of coated roads | 11,557 km (2017) | 51,391 km (2025) | Increased | | |
| Density of roads covered by population | 7.2 km/10,000 inhabitants (2017) | 19.8 km/10,000 inhabitants (2025) | Increased | | |
| Number of road accidents in Mozambican provinces | 545 (2015) | 149 (2024) | Decreased | | |
| Number of road accidents in Malawi's districts | 5 759 (2016) | - | National downward trend | | |
| Average Customs Clearance/Border Processing Time | 8 days | 48 hours | Decrease in OSBP Mwami-Mchinji | | |
| | Analysis based on the P164847 project | | No changes in the remaining stations | | |
| Average access and travel time (reduction of travel time) | Decreased (On average, accessible area increased by 12% for the same commuting time intervals between 2017 and 2025) | | | | |
| Logistics performance index | 3.5 | 2.1 | Decreased | | |
| Women's mobility and accessibility | Qualitative analysis | | No major changes | | |

### 3.4.2. Cumulative impacts

The cumulative impacts of the projects under analysis in the Nacala Corridor on the connectivity factor are summarized in the following table.

**Table 11 – Cumulative impacts of the SATCP with other projects on the "Connectivity" factor**

| Cumulative impacts of the SATCP with other projects | Projects Involved[6] | Justification | Influence of other stressors | Temporal cumulativeness | Spatial cumulativeness |
|---|---|---|---|---|---|
| Increased connectivity | 20 projects (67%) - 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 14, 15, 17, 20, 21, 22, 23, 24, 25, 29 | Road and railway rehabilitation/construction: Increased connectivity through the expansion and qualitative improvement of the road and rail network, strengthening mobility, trade and territorial integration due to:<br>• Improvement of the main road corridors with a direct view of increasing the length of existing roads (1, 6, 7, 8, 9 and 20).<br>• Improvement of local accessibility, namely of secondary, rural and urban accesses, more associated with projects 2, 3, 4, 17, 22, 23 and 24.<br>• Improved connectivity due to projects such as 5, 14, 15, 25 and 29 which, even though they are not focused on transport, contribute to the construction of access and service roads.<br>• The rail investment (11, 21) consolidates the capacity of the Corridor for the transport of large volumes (coal and freight) between Moatize, Malawi and the Port of Nacala-a-Velha. | • Climatic events: negatively affects the condition, functionality and resilience of rehabilitated or constructed road, rail and logistics infrastructure. The increased frequency and intensity of floods, cyclones, droughts, and landslides result in recurrent damage to roads, bridges, railway lines, and border facilities, as evidenced in the 2024–2025 rainy and cyclonic season, when more than 480 km of roads were destroyed or damaged and several bridges collapsed. These occurrences reduce seasonal accessibility, increase travel times, disrupt logistics chains and compromise the flow of production, limiting cumulative gains in connectivity and spatial efficiency along the Nacala Corridor.<br>• Population Dynamics: acts as a negative stressor when rapid population growth and rapid urbanization outpace the capacity for planning and expansion of existing infrastructure. There is increased pressure on the road | • Although the impact is permanent, it accumulates and manifests itself with greater intensity in the operation phase, coinciding with the completion and operationalization phase of major road and rail projects. | • Concentration in districts with more than three projects associated with this impact or more than 150 kilometers rehabilitated/built: Balaka (1, 5, 8, 9, 11, 21, 25); Chikwawa (11, 14, 15); Cuamba (1, 6, 7, 11); Malema (6, 11); Moatize (5, 11); Monapo (3, 4, 11); Mossuril (3, 4, 11); Mwanza (5, 11, 23, 25); Neno (5, 11, 23, 25); Rapale (1, 6, 11); Ribaue (1, 6, 11). |
| | 22 projects (73%) - 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 14, 15, 17, | Reduced travel time and border processing:<br>• Reduction of waiting times and bureaucracy at borders and logistics *hubs* through: modernization of OSBPs in Calóme–Dedza, Muloza–Milange and Zobue–Mwanza, as well as the introduction of the "e-pass" by the SATCP; the construction of the OSBP in | | • Although some projects (7, 8, 11, 12, 20) have been implemented or closed by 2024/2025, the maximum cumulative effect is felt when ongoing projects (1, 6, 9, among others) | • Concentration in the districts with the most projects associated with this impact: Lilongwe, Balaka, Mwanza, Nampula City, Ribaue, Cuamba. Other districts also to consider are: |

[6] The numbering of the projects is as shown in Table 1

| Cumulative impacts of the SATCP with other projects | Projects Involved[6] | Justification | Influence of other stressors | Temporal cumulativeness | Spatial cumulativeness |
|---|---|---|---|---|---|
| | 20, 21, 22, 23, 24, 25, 29 | Mchinji (8); trade facilitation through interventions in the OSBP of Chiponde (9); the expansion of the Mwanza border post and modernization and simplification of cross-border procedures (20); and the increase in handling productivity of cargo from the Port of Nacala (12), measures that together make it possible to significantly reduce processing time and movement along the corridor. The reduction in the average waiting time of trucks at the Mchinji OSBP has been significantly reduced, from 8 to 3 hours. For the other OSBPs, it is expected to achieve a 20% reduction in the average border processing time at the Calóme–Dedza, Muloza–Milange and Zobue–Mwanza posts by 2027, as well as a reduction in the time for dispatching goods at the OSBP in Chiponde, from 24 to about 6 hours.<br>• Accumulated rehabilitation of roads that allows significant gains in spatial efficiency, with reductions in travel time that are expected to be between 40% and 60%, in projects such as 6, 7, 8 and 9.<br>• The construction and rehabilitation of the railway (1, 21) and the improvement of ports (12) ensure that long-distance transport to and from the *hinterland* is faster and more predictable. | and rail network, increased traffic, congestion and road degradation, which overwhelm logistical and border services. Informal urbanization and the disorderly expansion of urban centres create accessibility asymmetries, limiting the benefits of connectivity and reducing the operational efficiency of infrastructures along the corridor. However, population dynamics work as a strategic driver for increasing connectivity, by justifying and guiding structuring investments in transport and logistics infrastructures.<br>• Economic policies, international agreements and support (EAEPs) can influence connectivity positively or negatively, depending on their implementation and coordination. When well-articulated, they contribute positively, promoting structuring investments in road, rail and port infrastructures, facilitating cross-border integration, reducing travel times and improving logistics efficiency. On the other hand, its | achieve their logistical and infrastructure efficiency targets, concentrating the greatest intensity of positive impact in the period after 2027. | Dedza, Mchinji, Ntcheu, Mangochi, Neno, Malema, Mecuburi, Monapo, Mossuril, Rapale, Moatize. |

| Cumulative impacts of the SATCP with other projects | Projects Involved[6] | Justification | Influence of other stressors | Temporal cumulativeness | Spatial cumulativeness |
|---|---|---|---|---|---|
| | | A complementary analysis was carried out in order to introduce a general assessment of the impact of the projects on travel time between strategic points of the Nacala Corridor. This approach aims to measure the efficiency resulting from the interventions, comparing the average travel time before and after the implementation of the projects.<br>Five strategic sections have been selected, representative of economic and territorial integration. The calculation considered the total distance and average circulation speeds adjusted to the type of road/railway.<br>The estimated variation in travel time before and after projects is as follows:<br>• Nacala – Moatize (railway) = -29%<br>• Cuamba – Nacala (railway) = -25%<br>• Nsanje – Mchinji (railway) = -15%<br>• Cuamba – Lichinga (highway): -43%<br>• Nacala – Nampula City (highway) = -12% | partial, uncoordinated or late implementation can limit the creation of synergies between projects, delay connectivity gains and reduce the operational efficiency of the infrastructure, mitigating the expected effects on the corridor. Thus, the positive influence of the EPIAS is related to their harmonised implementation and the ability to articulate the different projects and interventions in the territory. | | |
| | 20 projects corresponding to the rehabilitation/construction of roads and railways (although it is worth highlighting 6 of them (20%) – 1, 6, 7, 8, 9 and 20 | Improved road safety:<br>• The SATCP (1) complements the actions of the Road Corridor projects (6, 7, 8, 9) by funding road safety awareness campaigns and road safety audits, which aim to combat speeding and non-compliance with traffic rules. Project 20 supports the improvement of health services and emergency response in the event of road accidents, mitigating the severity of accidents that occur despite improved infrastructure.<br>• It should be noted that project 20 aims to reduce accidents on the M1 corridor by an average of 47.9% and projects 1 and 8 aim to reduce road accidents by 20%. | | • Period from 2024 to 2027 and after 2027, with the highest time cumulativeness being when investment in road engineering (which in itself reduces hazardous conditions) overlaps with the financing and implementation of non-structural measures (awareness-raising, | • Concentration in the districts with the most projects associated with this impact: Lilongwe, Ntcheu, Balaka, Machinga, Mangochi, Neno and Cuamba. |

| Cumulative impacts of the SATCP with other projects | Projects Involved[6] | Justification | Influence of other stressors | Temporal cumulativeness | Spatial cumulativeness |
|---|---|---|---|---|---|
| | | • Although only 6 projects refer to the implementation of specific road safety measures, it should be noted that it is considered that all projects with road rehabilitation/construction contribute to the improvement of road safety since the rehabilitation and construction of roads reduces dangerous conditions, namely potholes and lack of drainage (corresponding, therefore, to the implementation of road safety). to 20 projects). | | audits and emergency response). | |

### 3.4.3. Assessment of cumulative impacts

The following table provides a summary of the limits of change and the assessment of cumulative impacts.

**Table 12 – Change limits and assessment of cumulative impacts on the connectivity factor**

| Change limit | | Cumulative impact | Impact assessment | |
|---|---|---|---|---|
| **Variable** | **Acceptable limit** | | **Nature** | **Significance** |
| Extension of roads built or rehabilitated | Increase equal to or greater than 50% in each district | Improved connectivity | Positive | Moderate to very significant depending on the district |
| Extension of railways built or rehabilitated | Increase of more than 50 km in length per district | | | |
| Density of roads covered per 10000 inhabitants | Increase of 50% or more in the ratio | | | |
| Average cross-border processing time | Reduction of more than 40% of the average time of each district | | | |
| Average access and travel time (travel time) | Reduction of more than 40% in the average travel time of each district | | | |

The main cumulative impact on the factor was "**improved connectivity**". This impact is considered to be of a positive nature, as it results from the strengthening of transport infrastructures and greater efficiency in the movement of people, goods and goods along the Nacala Corridor.

This impact is mainly due to the synergy between the rehabilitation and construction of roads and railways and the reduction of travel and border processing times, translating into a real improvement in the economic and logistical integration of the study area.

At the same time, the reduction of travel time and improvements in border processing, promoted by the One-Stop Border Posts, have increased the operational efficiency of the corridor. The significant decrease in waiting times, as well as the increase in the area accessible in the same travel interval, strengthen regional competitiveness and increase connectivity.

The significance of the impact is determined based on the defined change thresholds and, considering the optimistic scenario associated with the systemic cumulative impact of economic development, most districts (about 87%) have a significance classified between significant and very significant:

- "Very significant" impacts for the districts Balaka, Chikwawa, Nampula City, Cuamba, Dowa, Lilongwe, Machinga, Malema, Mandimba, Mangochi, Mchinji, Mecanhelas, Meconta, Milange, Moatize, Monapo, Mwanza, Neno, Ngauma, Ntcheu, Rapale, Ribaue, Salima (for exceeding the change limit).
- "Significant" impacts for the districts Blantyre, Chimbonila, Chiradzulu, City of Lichinga, Dedza, Mecuburi, Mossuril, Muecate, Phalombe, Thyolo, Zomba.
- "Moderate" impacts for the districts of Metarica, Mulanje, Nacala, Nacala-a-Velha, Nsanje.

## 3.5. Land use conflicts / land loss

### 3.5.1. Past and current condition

The evolution of land use between 2013 and 2024 allowed the identification of the conversion of a study area dominated by bushes, meadows and savannas and agricultural areas (associated with the use of the rural population) and areas of tree cover to a more significant artificialization situation (12-fold increase from 334 $km^2$ to 4,540 $km^2$, 3.3% of the study area) with an increase of 22% in bushes, meadows and savannas (to 66% of the study area), generally obtained by reducing agricultural areas and tree cover. In local terms, new areas of agriculture stand out in practically all districts of Malawi and border districts of Mozambique, as well as new areas of tree cover, with a special focus on the inland districts of Mozambique.

The availability of average agricultural area per person decreased by -60% from 2013 to 2024, although with divergent trends in the study area. In 2024, all provinces/regions in the study area have values below the average value of 0.07 ha/person, with the exceptions of Zambezia (0.13 ha/person) and Central Malawi (0.11 ha/person), demonstrating the increasingly preponderant role of these areas in agricultural production.

Between 2013 and 2024 there was a generalized expansion of artificialized areas, in particular in all districts studied in Malawi and in districts with a relevant artificialized component in Mozambique. In general, artificializations since 2013 have occurred primarily in areas previously occupied by bushes, meadows and savannahs and agricultural areas.

The artificialized area relative to the total area has increased asymmetrically across the districts of the study area, with the Malawian districts (in particular Blantyre, Chiradzulu and Mulanje) and the urban Mozambican districts (Cidade de Lichinga, Cidade de Nampula and Nacala) having significant artificialized areas (above 15% of the total area in 2024).

In terms of usable area, with the exclusion of unavailable and/or environmentally sensitive areas, there was some saturation in the Malawian districts in general, with emphasis (>15% of the usable area artificialized in 2024) for Blantyre, Chiradzulu, Mulanje, Nsanje, Phalombe and Zomba and in the Mozambican districts of Cidade de Lichinga, Cidade de Nampula and Nacala.

The study area faces recurrent and fluctuating scale impacts of climate change, especially floods and tropical cyclones, as well as social tensions, expansion of major development projects (e.g. Nacala Road Corridor, rehabilitation of the railway line in Mozambique, Moatize Coal Mine and the Shire Valley Transformation Program) and regional conflicts. Growing population dynamics and weak institutional capacity also contribute to accentuating pressures on land use.

In the analysed spatial scope, there were 35,648 internally displaced people in Mozambique in 2023 (with a particular concentration in Nampula province) and 89,320 internally displaced people in the southern region of Malawi in 2024 due to drought. In the context of the Nacala Corridor, where logistics infrastructure, mining, agro-industry and energy projects coexist, among others, resettlements are directly related to land use and tenure conflicts, as the region is marked by customary occupations.(Kato, 2019)

Based on the resettlement instruments made available, 98,103 individuals were accounted for affected by physical and/or economic displacement as a result of the implementation of the projects under evaluation under the CIA (between 2015 and 2024). This figure is underestimated as it was not possible to find information available on resettlement for 42% of the projects in which resettlements took place. An estimate of the total number of individuals affected in the period 2015-2024 points to a figure of around 121,443.

In Table 13 the evolution of the land use/loss conflicts factor is presented, based on the variables considered.

**Table 13 – Land use conflicts/land loss factor: evolution of variables**

| Variable | Past condition (Year) | Current condition (year) | Evolution | Legal limits exceeded in the current condition? | Main stressors |
|---|---|---|---|---|---|
| Agricultural area *per capita* (ha/person) | 0.18 (0.39 in Niassa; 2013) | 0.07 (0.13 in Zambezia and 0.11 in the Central region; 2024) | Decreases overall (increases in some provinces/regions) | Not applicable | - Weather events<br>- Population dynamics<br>- Institutional capacity and governance |
| Expansion of artificial areas (km2) | 334 (2013) | 4.540 (2024) | Significant increase | Not applicable | - Projects implemented and under implementation<br>- Population dynamics<br>- Institutional capacity and governance<br>- Increased water and electricity infrastructure<br>- Conflicts in Cabo Delgado |
| Artificial area relative to total area (%) | 0.24% (2013) | 3.31% (2024) | Significant increase | Not applicable | |
| Artificial area relative to usable area (%) | 0.36% (2013) | 4.83% (2024) | Significant increase | Not applicable | |
| Number of individuals affected by projects (*) | 121,443 (2015-2024) | | - | Not applicable | - Projects implemented and under implementation |
| Number of internally displaced persons (**) | - | > 125,000 (2023/2024) | - | Not applicable | - Natural events<br>- Conflict in Cabo Delgado |

(*) Estimate of the total number of individuals affected in the period 2015-2024 considering the 24 projects with resettlements.
(**) In Malawi, only IDPs due to droughts are counted; areas considered: Mangochi, Balaka, Machinga, Neno, Blantyre, Phalombe, Chiradzulu, Mulanje, Chiwawa, Nsanje

### 3.5.2. Cumulative impacts

The cumulative impacts of the projects under analysis in the Nacala Corridor on the land use/loss conflicts factor are summarized in the following table.

**Table 14 – Cumulative impacts of the SATCP with other projects on the "Land use conflicts/land loss" factor**

| Cumulative impacts of the SATCP with other projects | Projects Involved[7] | Justification | Influence of other stressors | Temporal cumulativeness | Spatial cumulativeness |
|---|---|---|---|---|---|
| Expansion of artificial areas | 26 projects (87%) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27, 29 | • The physical implementation of the projects implies the occupation of land, with conversion from the original uses to uses that tend to be artificialized. This conversion may in part result in the loss of agricultural areas, adding pressure on the food security of local populations.<br>• Works to rehabilitate and maintain roads can cause the loss of agricultural areas temporarily or permanently and may affect the availability of food.<br>• Some agricultural development projects will allow for the recovery of agricultural areas, although still below the *per capita* value for the study area | • Institutional capacity and governance: weak management and effectiveness of resettlement plans limit conflict resolution<br>• Increased water and electricity services: increased risk of further artificialisation of marginal land<br>• Conflict in Cabo Delgado: has resulted in mass displacement and subsequent unscheduled resettlements, which results in the artificialization of areas and loss of agricultural areas | • 2015-2035: direct impacts start in the construction phase and consolidate in the operation phase, with the evolution of the associated indirect impacts | • Area of focus of the projects, particularly in Mozambique |

[7] The numbering of the projects is as shown in Table 1

| Cumulative impacts of the SATCP with other projects | Projects Involved[7] | Justification | Influence of other stressors | Temporal cumulativeness | Spatial cumulativeness |
|---|---|---|---|---|---|
| Physical and/or economic displacement | 24 projects - 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 22, 23, 24, 25, 26, 29 | The physical implementation of the projects will involve the occupation of land, with potential allocation of housing and livelihoods of local populations and giving rise to physical and/or economic displacement needs | • Weather events: the number of displaced people is aggravated by the occurrence of extreme events<br>• Institutional capacity and governance: Weakness in resettlement management limits conflict resolution<br>• Conflict in Cabo Delgado: has resulted in mass displacements and subsequent unscheduled resettlements | • Period 2018-2035 | • Mozambique (Cuamba; Nampula; Meconta; Ribaue, Rapale, Nacala, Nacala-a-Velha, Moatize, Malema, Monapo, Mossuril),<br>• Malawi (Lilongwe, Mwanza, Neno Balaka, Mangochi, Ntcheu, Machinga, Chikwawa, Nsanje) |

### 3.5.3. Assessment of cumulative impacts

No limits were identified that could be applicable to land use/loss conflicts. Thus, the evaluation of the impacts focused on the analysis of trends and the participation obtained in the process of interviews and visits to the resettled communities.

The following table provides an overview of the cumulative impact assessment.

**Table 15 – Assessment of cumulative impacts on land use/loss conflicts**

| Cumulative impact | Impact assessment | |
|---|---|---|
| | Nature | Significance |
| Loss of agricultural areas | Negative | Significant |
| Expansion of artificial areas | Negative | Not very significant |
| Physical and/or economic displacement | Negative | Significant |

The availability of agricultural area *per capita* presents values much lower than those recorded in the past condition (from 0.18/ha/person in 2013 to 0.07 ha/person in 2024 and 0.05 ha/person in 2035), suggesting an increase in the scarcity of the resource, although there are districts (such as Chikwawa and Nsanje) where the trend of increasing this variable through investments and agricultural enterprises may continue. At the same time, various stressors such as the lack of institutional capacity and governance, increased infrastructure or the conflict in Cabo Delgado contribute to intensifying conflicts of use. The cumulative impact of **the loss of agricultural land** is assessed as negative and significant.

In the case of the artificialization of the study area, the trend is not so relevant, in some cases because there is an already significant artificialization of the useful area of the districts (in the more urbanized cases such as Mulanje, Nampula, Lichinga and Nacala), and in others because it still represents a small part of the affected districts (in most Mozambican districts). The cumulative impact of the **expansion of artificial areas is evaluated** as negative and not very significant.

Regarding physical **and/or economic displacement**, the cumulative impact is assessed based on the qualitative assessment resulting from the process of interviews and visits carried out to the resettled communities within the scope of the railway construction and rehabilitation project (namely in the districts of Rapale and Mecuburi, in

Mozambique), and the rehabilitation project of the M1 Road-Mtengowanthenga-Njale Section, in Lilongwe District, Malawi).

Resettled people report problems with construction (poor quality of materials; insufficient size; maintenance needs) and location (resettlement site without shade and no fruit trees; difficulties in accessing public services compared to the situation before resettlement; fewer opportunities for income generation). These reports are consistent with the cumulative issues identified between SATCP sub-projects and with other projects, in the context of the related stressors.

During interviews, injustices are pointed out in the compensation for the loss of land, delivery of replacement land with poor soil quality and difficulties in accessing water, lack of consideration of cultural aspects, delays in the delivery of compensation. The lack of transparency and the lack of institutional capacity for the management of resettlement processes was also mentioned.

Thus, the cumulative impact of the physical and/or economic displacement is classified as negative and significant.

## 3.6. Vegetation

### 3.6.1. Past and current condition

The characterization of the past and current condition of the factor confirmed the trend of deforestation and forest degradation documented in the literature, both at the level of the study area and at the level of nature conservation areas.

Forest degradation was evidenced in the gains of non-forest vegetation at the expense of forest areas.

There was also an apparent gain in non-forest vegetation from the conversion of agricultural areas, which may be due, in part, to the abandonment of agricultural land and the consequent recovery of the original ecosystem, since studies focused on the recovery of miombo in abandoned agricultural areas showed a rapid recovery of this ecosystem. On the other hand, it is also not ruled out the possibility that, at least part of the gain verified, is due to errors in the interpretation of remote sensing, due to an inherent limitation of the methodology of geographic information analysis, in which areas of "bushes, meadows and savannahs" have been recognized differently in the two periods of analysis.

In the evolution of tree cover, the conservation of about half of the original forested areas in nature conservation areas (49%) and in the study area (43%), between 2013 and 2024, should be noted. The remaining areas were converted predominantly into areas of "bushes, meadows and savannahs" in the nature conservation areas and in the study area.

The gross annual deforestation rates calculated for the study area and for nature conservation areas were around 2.1%, which seems to be in line with the data in the literature, in the studies that used the same calculation methodology: for Malawi, rates between 0.5% and 1.94% (depending on the area and period considered); and for Mozambique, between 0.7% and 1.6%.

In Malawi, the rate of deforestation in nature conservation areas is 0.8%, rising to 2.4% when referring to the study area included in the country. In Mozambique, the deforestation rate in nature conservation areas is 4.9%, reducing to 2.0% when referring to the study area included in the country.

The suppression of vegetation can result not only from the direct action of the implementation and operation of the projects under analysis, but also from its indirect

action, caused by multiple constraints and/or actors. Other stressors that also act on vegetation include: population dynamics, the absence of formal management plans for conservation areas, the conflict in Cabo Delgado and the increase in forest area due to reforestation actions.

In Table 16 the evolution of the vegetation factor is presented, quantitatively, in regards to the respective indicators. Note the positive/negative sign indicating the positive/negative nature of the development, i.e. whether there was a gain or loss of vegetation in the considered period.

**Table 16 – Vegetation factor: evolution of the variable**

| Variable | Past condition (2013) | Current condition (2024) | Evolution | Legal limits exceeded in the current condition? | Main stressors |
|---|---|---|---|---|---|
| Total area occupied by non-forest vegetation in the existing nature conservation areas in the study area | 7,344 km$^2$ | 8,417 km$^2$ | Increased (+) 1,073 km$^2$ | Not applicable | • Projects implemented and under implementation<br>• Population dynamics<br>• Lack of management plans for conservation areas and other areas of ecological value<br>• Reforestation<br>• Conflict in Cabo Delgado |
| Total area occupied by the forest in the existing nature conservation areas in the study area | 5,220 km$^2$ | 4,157 km$^2$ | Decreased (-) 1 063 km$^2$ | Not applicable | |
| Area of non-forest vegetation in the study area | 75,848 km$^2$ | 91,922 km$^2$ | Increased (+) 16,074 km$^2$ | Not applicable | |
| Forest area in the study area | 29,639 km$^2$ | 23,525 km$^2$ | Decreased (-) 6 114 km$^2$ | Not applicable | |

### 3.6.2. Cumulative impacts

The cumulative impacts of the projects under analysis in the Nacala Corridor on the vegetation factor are summarized in the following table.

**Table 17 – Cumulative impacts of the SATCP with other projects on the "Vegetation" factor**

| Cumulative impacts of the SATCP with other projects | Projects Involved[8] | Justification | Influence of other stressors | Temporal cumulativeness | Spatial cumulativeness |
|---|---|---|---|---|---|
| Vegetation degradation/suppression | 23 projects (77%) – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27 | • The physical implementation of infrastructures requires the occupation of land, with conversion of the original uses. This land use conversion can result in the potential loss of areas of natural vegetation, with the consequent impact on the ecosystem services provided.<br>• The accumulated rehabilitation of roads and the construction and rehabilitation of the railway may imply the occupation of areas bordering the existing infrastructures. This occupation, even if temporary, will lead to the conversion of the original uses, and may result in the potential loss or impairment of areas of natural vegetation, for example, through the opportunistic establishment by exotic species.<br>• The improvement of the main road corridors, the improvement of local accessibility (secondary, rural and urban accesses), the rehabilitation of the railway and the improvement of ports facilitate the illegal exploitation and trafficking of timber resources.<br>• The concentration of labour increases informal trade and the need for temporary accommodation, increasing the pressure on resources such as space, coal and firewood, leading to the loss or allocation of areas of | • Population dynamics: aggravates pressure on resources and acts in the conversion of areas of natural vegetation<br>• Management plans for conservation areas and other areas of ecological value: the absence of these plans makes conservation areas more vulnerable to anthropogenic pressure, compromising their natural values<br>• Conflict in Cabo Delgado: has resulted in mass displacements and subsequent unscheduled resettlements, resulting in the overexploitation of natural resources in the receiving areas<br>• Reforestation: Planting new forest areas helps reverse the degradation of some areas and increase the climate | • 2015-2035: the direct impact starts in the construction phase and consolidates in the operation phase, with the evolution of the various associated indirect impacts | • Direct impact: area of focus of the projects<br>• Indirect impacts: go beyond the strict area of focus of the projects |

[8] The numbering of the projects is as shown in Table 1

| Cumulative impacts of the SATCP with other projects | Projects Involved[8] | Justification | Influence of other stressors | Temporal cumulativeness | Spatial cumulativeness |
|---|---|---|---|---|---|
| | | natural vegetation in the areas of greatest concentration.<br>• Reforestation with monocultures of exotic species can conflict with the conservation of native biodiversity and alienate the objectives of sustainable forest management and compatibility with the conservation of natural forests and original values. | resilience of communities and resources | | |

### 3.6.3. Assessment of cumulative impacts

The following table provides a summary of the change limits and the assessment of cumulative impacts.

**Table 18 – Change limits and assessment of cumulative impacts on the vegetation factor**

| Change limit | | Cumulative impact | Impact assessment | |
|---|---|---|---|---|
| **Variable** | **Acceptable limit** | | **Nature** | **Significance** |
| • Total area of non-forest vegetation in nature conservation areas<br>• Total forest area in nature conservation areas | There is no loss of natural vegetation area (forest and non-forest) in nature conservation areas | Suppression/ Vegetation degradation | Negative | Very significant |
| • Total area of non-forest vegetation in the study area<br>• Total forest area in the study area | Restoration/gain of at least 30% of natural vegetation areas (forest and non-forest) affected by the implementation of the projects | | | |

The cumulative impact of "**vegetation suppression/degradation**", associated with the implementation of the set of projects under analysis, is classified as negative and very significant.

The negative nature is because it represents a harmful change in vegetation – its loss and/or degradation.

As for significance, according to the criteria established for its evaluation, once the limits of change established for the factor have been reached and exceeded, the cumulative impacts of the loss and/or degradation of vegetation are classified as very significant.

This assessment validates the fact that, due to the historical deforestation rates recorded for the area following the identified stressors, any loss of additional vegetation could lead to the surpassing of the resilience points of vegetation and ecosystems, which justifies the high significance of the associated impact.

## 3.7. Soil conservation

### 3.7.1. Past and current condition

The following variables were determined as indicators of the factor's condition:

- Annual soil productivity;
- Soil loss;
- Organic carbon content in the soil.

**Soil productivity** is the biological productive capacity of the soil, which is reflected in the productivity of the vegetation. Changes in soil productivity, which can reflect rapid changes in soil natural capital, signal changes in soil health and productive capacity and reflect the resulting effect of changes in ecosystem functioning on plant growth and biomass (above-ground productivity). (Sims, et al., 2021)

A common way to monitor soil productivity is through the *Normalized Difference Vegetation Index* (NDVI), a dimensionless index (between -1 and 1) of the photosynthetic activity potential of plants. This index has a consistent correlation with biomass and vegetation dynamics in various ecosystems globally (Grinand, Bégué, Montfort, Leroux, & Randrianarivo, 2019), with higher values indicating higher levels of green biomass and/or greater plant growth vigor (Sims, et al., 2021). NDVI is calculated from reflectance measured by remote sensing (Sims, et al., 2021).

Results of soil productivity dynamics (LPD), a measure of the evolution of NDVI ranging from 1 – decline to 5 – increase), for the spatial coverage area for the period 2013-2022 (Li, et al., 2025) indicate an average value (2.48) indicative of the first signs of decline in soil productivity. In the districts of Cidade de Nampula and Cidade de Lichinga there are the lowest values, already approaching the decline value. On the other hand, in the districts of Tete and the southern and central regions of Malawi, higher values are reached, indicating a stable but disturbing trend.

These results agree with the information collected in interviews that highlight in the spatial coverage area the districts of the provinces of Nampula and Niassa as most affected by the loss of productive capacity, indicating that there has been a loss of soil fertility in the spatial coverage area in the last 10 years.

**Soil loss or erosion** is defined as the removal of cover soil from the surface of the earth through the action of water, wind or tillage. In this context, soil loss is triggered by erosion agents such as wind, runoff, gravity, and influenced by factors such as soil management, land use management, topography, and soil type. (Omuto & Vargas, 2019)

In cropland, the average value of soil loss in the spatial coverage area is 32.84 t/ha.year (2019), with a maximum of 86.79 t/ha.year in Tyolo district (Southern Region of Malawi) and a minimum of 12.88 t/ha.year in Balaka district (Southern Region of Malawi) (Borrelli, Ballabio, Yang, Robinson, & Panagos, 2022) (via ESDAC). Higher values above the average value tend to be seen in the districts of the Central and, mainly, Southern regions of Malawi, as well as occasionally in the provinces of Niassa and Nampula.

For the Nacala Corridor area, in 2012, there was an average value of soil loss, referring to all land uses, of 10.54 t/ha.year (Borrelli, et al., 2017), which exceeds the tolerable erosion limit value of 10 t/ha.year, growing since 2001, a trend that extends to the present moment according to information collected in interviews for this evaluation.

It was not possible to estimate the evolution of soil loss in the period 2015-2025, due to the unavailability of comparable data regarding the same land uses at the beginning and end of the period.

**Organic carbon content in soil** is the amount of organic carbon stored in a hectare, being the main component of soil organic matter; Their persistence reflects the biochemical functioning of the ecosystem. It is an indicator of overall soil quality associated with nutrient cycles and soil stability and structure, with direct implications for water infiltration, soil biodiversity, vulnerability to erosion, and for the productivity of vegetation and crops (United Nations, 2024). Change in soil organic carbon content is a variable that reflects slow changes in soil natural capital (Sims, et al., 2021).

Considering the change in land use between 2013 and 2024 (MDA; ESRI, 2016, 2017)(Karra & al., 2021), it can be seen that the estimated variation of soil organic carbon content (IPCC methodology) for the Nacala Corridor area, in the period 2013-2024, is negative, but very small (-0.6%). Considering that soil degradation occurs when the estimated reduction of organic carbon in the soil is greater than 10%, some districts in the southern region of Malawi (Machinga, Phalombe and Zomba) where the reduction is close to this value (between 5% and 9%) stand out.

The main stressors of projects in the soil conservation factor are deforestation/deforestation and resettlements, as they cause the removal of vegetation cover and land use change, which contributes to the risk of soil erosion and to the alteration of the organic carbon content in the soil. In addition to the projects, the condition variables are also influenced by deforestation at the district level, the general effect of the increase in population density, the occasional occurrence of reforestation and the occurrence of floods.

The following table shows the evolution of the soil conservation factor, considering the indicator variables analysed.

**Table 19 – Soil conservation factor: evolution of variables**

| Variable | Past condition (Year) | Current condition (year) | Evolution | Legal limits exceeded in the current condition? | Main stressors |
|---|---|---|---|---|---|
| Soil productivity | NDVI = 0.553* (2015) | NDVI = 0.544* (2024)<br>LPD = 2.48 (2013-2022) | Reduced | There are no legal limits | •Deforestation/deforestation<br>• Resettlements<br>• Population dynamics<br>• Reforestation<br>• Floods |
| Soil loss (t/ha.year) | 10.24 All Land Uses (2012)<br>No information for crop soils | No information for all types of soil<br>32.84 cultivation soil<br>(2019) | No information | There are no legal limits | |
| Soil organic carbon content (t C/ha) | 30,18 (2013) | 29,91 (2024) | Reduced | There are no legal limits | |

Note: * average of regional/provincial values.

### 3.7.2. Cumulative impacts

The following table shows how the combination between the SATCP project and the other projects targeted by the CIA influences the soil conservation factor.

**Table 20 – Cumulative impacts of the SATCP with other projects on the "Soil conservation" factor**

| Cumulative impacts of the CACAP with other projects | Projects involved | Justification | Influence of other stressors | Temporal cumulativeness | Spatial cumulativeness |
|---|---|---|---|---|---|
| Increased risk of soil erosion | 18 projects (62%) – [2], [5], [6], [7], [8], [9], 11], [13], [16], [17], [20], [21], [23], [24], [25], [26], [27], [29] | • The projects generate at least one of the main stressors: resettlements and deforestation/deforestation associated with the impact. | • Climatic events: the occurrence of floods and cyclones can potentiate or aggravate soil erosion.<br>• Population dynamics: population growth aggravates pressure on the soil and is associated with land use change, enhancing soil erosion.<br>• New agricultural areas: can potentiate soil erosion, if soil conservation practices are not accompanied.<br>• Action on soil protection and erosion prevention (provided for in the NDCs of Mozambique and Malawi): measures for the adoption of agricultural practices that promote soil conservation and measures for the protection of vegetation cover, act to reduce soil erosion. | • Impact limited to the construction phase.<br>• Forecast in the period from 2015 to 2035. | • Mozambique: Moatize, Milange, Chimbonila, Mandimba, Cuamba, Mecanhelas, Ribaué, Cidade de Nampula, Meconta, Mecuburi.<br>• Malawi: Ntcheu, Dedza, Lilongwe, Mchinji, Mangochi, Blantyre, Balaka, Zomba, Machinga, Mulanje |
| Alteration of soil organic carbon content | 18 projects (62%) - [2], [5], [6], [7], [8], [9], 11], [13], [16], [17], [20], [21], [23], [24], [25], [26], [27], [29] | • The projects generate at least one of the main stressors: resettlements and deforestation/deforestation associated with the impact. | • Population dynamics: population growth aggravates pressure on the soil and is associated with land use change, enhancing the alteration of the organic carbon content of the soil.<br>• Action in soil protection (provided for in the NDCs of Mozambique and Malawi): measures for the protection of vegetation cover, act to reduce the change in the organic carbon content of the soil. | • Impact limited to the construction phase.<br>• Forecast in the period from 2015 to 2035. | • Mozambique: Moatize, Milange, Cuamba, Ribaué, Nampula City, Meconta<br>• Malawi: Ntcheu, Dedza, Lilongwe, Mchinji, Mangochi, Blantyre, Balaka, Zomba, Machinga, Mulanje |

### 3.7.3. Assessment of cumulative impacts

The following table provides a summary of the change limits and the assessment of cumulative impacts.

**Table 21 – Change limits and assessment of cumulative impacts on the soil conservation factor**

| Change limit | | Cumulative impact | Impact assessment | |
|---|---|---|---|---|
| **Variable** | **Acceptable limit** | | **Nature** | **Significance** |
| • Soil productivity | LPD value of 4 (stable and undisturbed level) or NDVI on cropland corresponding in each district to the 2015 value (undetermined value) | Increased risk of soil erosion | Negative | Very Significant |
| • Soil organic carbon content | Variation in soil organic carbon content up to 10% more than in 2015, adopting as representative for the spatial coverage area the values calculated for 2013 | Alteration of soil organic carbon content | Negative | Significant |

LPD - *Land productivity Dynamics*
NDVI - *Normalized Difference Vegetation Index*

The main cumulative impacts generated by the projects under evaluation were identified for the soil conservation factor:

- Increased risk of soil erosion;
- Alteration of the organic carbon content of the soil.

The impacts promote the degradation of the condition of the factor in the area of spatial coverage, since they contribute to the reduction of soil productivity and soil organic carbon content. The classification of impacts in terms of nature is therefore negative.

Under the current condition, the change limit for soil productivity is exceeded and the change limit for soil organic carbon content is respected. It is expected that the cumulative impacts of the projects will lead in the future to an increase in the exceedance of the change limit for soil productivity and to an approach to the change limit for soil organic carbon content.

In this context, the cumulative impact of changing the organic carbon content of the soil is considered to be significant and the cumulative impact of increasing the risk of soil erosion is considered very significant.

## 3.8. Surface water resources

### 3.8.1. Past and current condition

The following variables were determined as indicators of the factor's condition:

- Concentration of faecal coliforms;
- Turbidity;
- Nitrate concentration;
- Ratio between water abstraction and water availability.

**Faecal coliform** bacteria are excreted in the faeces of humans and warm-blooded animals and are able to multiply in water and soil. Their presence is an indication that pathogenic bacteria from the intestinal tract that are more difficult to detect may also be present, which may cause diseases such as typhoid, dysentery, hepatitis A and cholera.

The concentration of faecal coliforms showed an average value in the period 2018-2022 in rivers in Mozambique of 28 NMP/100 ml, higher in the districts of Mandimba and Lichinga, and an average value in 2024 in rivers and lakes in Malawi of 226 CFU/100 ml, higher in the districts of Salima, Dedza and Chikwawa. In Mozambique, there is a general upward trend in the concentration of faecal coliforms, accompanied by an increase in exceedances of the legal limit values for human and livestock consumption[9].

**Turbidity** is a physical characteristic of water that results from the presence of suspended substances, chemical precipitates, organic particles and organisms (WHO, 2017). This indicator allows us to quantify the change in the transparency characteristics of the water, degrading the appearance and making it difficult to disinfect (WHO, 2017), and can also indicate the presence of viruses, bacteria and toxic chemicals such as heavy metals (Nkawnda, Feyisa, Zewge, & Makwinja, 2021).

The average turbidity value in the period 2015-2024 in rivers in Mozambique is 244 NTU, higher in the districts of Milange, Moatize and Mandimba. For rivers and lakes in Malawi, an average value of 121 NTU is obtained for 2024, higher in the districts of Neno and Chikwawa. In general, over the period 2015-2024 in Mozambique, there has been an increase in the average concentration of districts, but a reduction in exceedances of the legal limit value for the protection of human consumption.

[9] For Malawi, this analysis was not possible, as only data for the year 2024 were available.

The excessive presence of **nitrates** in water can be harmful to human health, by reducing the concentration of oxygen in the blood (when reduced to nitrite) and can cause negative effects on the thyroid. (WHO, 2017)

The average value of nitrate concentration in rivers in Mozambique in the period 2015-2025 is 12 mg/l, higher in the districts of Nacala-a-Velha, Moatize and Monapo. In rivers and lakes in Malawi there is an average value of less than 1 mg/l, relatively higher in Dedza and Lilongwe. In Mozambique, there is a trend towards a reduction in concentration, with the maintenance of exceedances of the legal limit values for the protection of human consumption and use for irrigation.

**Ratio between water abstraction and availability** indicates the degree of water scarcity in a basin. The abstraction for the various uses can be accounted for in total values, assuming the designation of water stress.(Kuzman, et al., 2023)

The values obtained for the spatial coverage area in the period 2015-2019 are generally less than 5%, characterizing low water stress, but Lilongwe and Mchinji are already in water stress considered as medium to high and low to medium, respectively. In general, there is a downward trend over the period (from 2% to 1%), related to the increase in surface water availability that is more accentuated than the increase in abstractions.

The main stressors of projects on surface water resources are deforestation, resettlements and the promotion of agricultural fertilization, with effects on turbidity and nitrate concentration. In addition to these stressors, the evolution of the condition variables seems to be mainly related to local pollution sources, seeming to be greatly influenced by river flow conditions.

The projects do not have a major influence on the concentration of faecal coliforms. The evolution of this condition variable is mainly related to the evolution of population density and the poor coverage of sanitation services in the study area.

Projects do not have a major influence on the ratio of abstraction to water availability, as surface water abstraction is associated with only a small part of the projects.

The following table shows the evolution of the surface water resources factor, considering the indicator variables analysed.

**Table 22 – Surface water resources factor: evolution of variables**

| Variable | Past condition (Year) | Current condition (year) | Evolution | Legal limits exceeded in the current condition? | Main stressors |
|---|---|---|---|---|---|
| Faecal coliform concentration | Mozambique: 11 NMP/ 100 ml (2019) | Mozambique: 29 NMP/ 100 ml (2022) Total: 218 NMP/ 100 ml (2022/2024) | Increased | Yes (human consumption and livestock use) | •Deforestation/deforestation • Resettlements •Promotion of agricultural fertilization •Population dynamics •Coverage of sanitation services |
| Turbidity | Mozambique: 97 NTU (2019) | Mozambique: 158 NTU (2022) Total: 130 NTU (2022/2024) | Increased | Yes | |
| Nitrate concentration (mg/l) | Mozambique: 36 mg/l (2019) | Mozambique: 3 mg/l (2022) Total: 1.5 mg/l (2022-2024) | Reduced | No | |

### 3.8.2. Cumulative impacts

Or Table 23 The following shows how the combination of the SATCP project and the other projects targeted by the CIA influences the surface water resources factor.

**Table 23 – Cumulative impacts of the SATCP with other projects on the "Surface water resources" factor**

| Cumulative impacts of the CACAP with other projects | Projects involved | Justification | Influence of other stressors | Temporal cumulativeness | Spatial cumulativeness |
|---|---|---|---|---|---|
| Alteration of water quality | 14 projects (48%) - [5], [6], [9], [13], [14], [15], [17], [18], [19], [21], [23], [24], [27], [29]. | • The projects generate at least one of the main stressors: resettlements, deforestation/deforestation and promotion of agricultural fertilization associated with the impact. | • Climatic events: the occurrence of droughts can increase the degradation of water quality.<br>• Population dynamics: population growth aggravates the pressure on surface water resources, enhancing the activity of pollution sources.<br>• Action in the protection of surface water resources (provided for in the NDCs of Mozambique and Malawi): measures to improve sanitation, soil conservation, vegetation protection and monitoring of water quality, act to reduce the degradation of water quality. | • Impact on the construction phase (resettlement actions and deforestation/deforestation) and operation (action promotion of agricultural fertilization).<br>• Forecast in the period 2025 to 2035. | • Mozambique: Moatize, Milange, Chimbonila, Cuamba, Mecanhelas, Ribaué, Cidade de Nampula, Rapale, Meconta.<br>• Malawi: Chikwawa, Ntcheu, Dedza, Lilongwe, Mchinji, Mangochi, Blantyre, Balaka, Zomba, Machinga, Mulanje.<br>• Watersheds: Revuboé, Shire, Lake Chilwa, Lúrio and Monapo rivers. |

### 3.8.3. Assessment of cumulative impacts

The following table provides a summary of the change limits and the assessment of cumulative impacts.

**Table 24 – Change limits and assessment of cumulative impacts on the surface water resources factor**

| Change limit | | Cumulative impact | Impact assessment | |
|---|---|---|---|---|
| **Variable** | **Acceptable limit** | | **Nature** | **Significance** |
| • Turbidity | 5 NTU | Alteration of water quality | Significant (may be Very Significant in some districts) | Negative |
| • Nitrate concentration | 10 mg/l | | | |

The impact "**Alteration of water quality**" promotes the degradation of the condition of the factor in the area of spatial coverage, since it contributes to the increase of turbidity and the increase of nitrate concentration. The classification of the impact in terms of nature is therefore negative.

The change limit for turbidity is currently exceeded in 33% of the districts (Rapale, Moatize, Mchinji, Lilongwe, Dedza, Machinga, Zomba, Neno, Blantyre, Chikwawa, Nsanje, Monapo and Nacala-a-Velha) and the change limit for nitrate concentration is exceeded for 7% of the districts (Monapo, Nacala-a-Velha and Moatize). It is expected that in the future the cumulative impacts of the projects will promote the maintenance or increase of exceedances of the change limits for turbidity and nitrate concentration.

In this context, the cumulative impact of water quality change is considered generally significant and may be very significant in the districts of Rapale, Moatize, Lilongwe, Machinga, Zomba, Neno, Blantyre, Chikwawa, Nsanje, Monapo and Nacala-a-Velha (25% of the districts).

At the river basin level, the impact could be very significant in the basins of the Bua, Lilongwe, Nkulumadzi, Revuboé, Shire, Mwanza, Lake Chilwa, Lúrio, Monapo and Muécula rivers.

## 3.9. Climate resilience

### 3.9.1. Past and current condition

The following variables were determined as indicators of the condition of the factor for the area of coverage:

- Roads and bridges affected by flooding;
- Flooded houses;
- People affected by floods;
- Houses destroyed by cyclones;
- Area of cultivated land affected by drought;
- Ratio between storage capacity and water abstraction.

In the variables related to the effect on disasters, it is noted that in the period 2015-2025 there were five cyclones that caused damage to roads, bridges and houses: Tropical Cyclone Kenneth (2018-2019, April 2019), Tropical Cyclone Gombe (2021-2022, March 2022), Cyclone Chido (2024-2025, December 2024), Cyclone Dikeledi (2024-2025, January 2025), Tropical Cyclone Jude (2024-2025, March 2025). In the period, there was also a widespread flooding event in Mozambique in 2022-2023.

In general, for the values of roads and bridges destroyed by floods, flooded houses, houses destroyed by floods (available only for Mozambique) there is an upward trend over the period 2015-2025. For people affected by floods, there is a reduction in the period between 2018 and 2023 in the entire spatial coverage area (in Mozambique and Malawi), which may be related to the fact that the seasons of cyclones Chido, Dikeledi and Jude, from 2023-2024 to 2024-2025, are not covered in this total. Districts in Mozambique's Nampula province and southern Malawi tend to be relatively more affected.

Also in the period 2015-2024 there is an upward trend in the area of cultivated land affected by severe or extreme drought, on average from 16% to 42%, mainly determined by the intensification of drought in Central Malawi and Niassa province.(FAO, 2025)

In the ratio between storage capacity and water abstraction, there was a downward trend between 2015 and 2019, from 21% to 13% considering the entire spatial coverage area.

The main stressors of the projects on the climate resilience factor are resettlements and investment in road rehabilitation, with effects on roads destroyed by floods, people

affected by floods and houses destroyed by cyclones, by a tendency to improve the conservation and structural conditions of roads and houses. In addition to these stressors, these condition variables are mainly affected by the local governance of the territory, planning and design of roads and the risk of flooding and by the persistence of cyclone incidence, and population dynamics may also be relevant in the future.

The projects do not have a major influence on the area of drought-affected cropland and the ratio between water storage and abstraction capacity, since stressful actions that may affect these variables, namely investment for climate resilience of agriculture and investment in water storage, are generated by only a small part of the projects.

The following table shows the evolution of the climate resilience factor, considering the main indicator variables analysed.

**Table 25 – Climate resilience factor: evolution of variables**

| Variable | Past condition (Year) | Current condition (year) | Evolution | Legal limits exceeded in the current condition? | Main stressors |
|---|---|---|---|---|---|
| Roads destroyed by floods | 0 (2018-2019 season)* | 250 km (2024-2025 season)* | Increased | There are no legal limits | •Resettlements<br>•Investment in road rehabilitation<br>•Local governance<br>•Floods<br>•Cyclones |
| People affected by floods | 829,068 (2018-2019 season) | 589,335 (2022-2023 season) | Reduced | There are no legal limits | |
| Houses destroyed by cyclones | 406 houses destroyed (2018-2019 season)* | 85,270 homes destroyed (2024-2025 season)* | Increased | There are no legal limits | |

Note: * values for spatial coverage area in Mozambique.

### 3.9.2. Cumulative impacts

The following table shows how the combination of the SATCP project and the other projects targeted by the CIA influences the climate resilience factor.

**Table 26 – Cumulative impacts of the SATCP with other projects on the "Climate Resilience" factor**

| Cumulative impacts of the CACAP with other projects | Projects involved | Justification | Influence of other stressors | Temporal cumulativeness | Spatial cumulativeness |
|---|---|---|---|---|---|
| Improved resilience | 13 projects (45%) - [2], [6], [7], [8], [11], [13], [16], [17], [19], [20], [23], [26], [29]. | • The projects generate the main stressful actions: resettlements and investment in road rehabilitation associated with the impact. | • Climatic events: the change in the occurrence of floods and cyclones can affect climate resilience.<br>• Population dynamics: Vigorous population growth tends to reduce the effectiveness of planned adaptation measures.<br>• Climate change adaptation action (provided for in the Mozambique and Malawi NDCs): measures for early warning systems (enhanced by the expansion of the electricity grid) and for flood management and planning for climate risks. | • Impact on the operation phase.<br>• Forecast in the period from 2015 to 2035. | • Mozambique: Moatize, Milange, Chimbonila, Mandimba, Cuamba, Mecanhelas, Ribaué, Cidade de Nampula, Rapale, Meconta, Mecuburi.<br>• Malawi: Ntcheu, Lilongwe, Mchinji, Balaka, Machinga, Zomba. |

### 3.9.3. Assessment of cumulative impacts

The following table provides a summary of the change limits and the assessment of cumulative impacts.

**Table 27 – Change limits and assessment of cumulative impacts on the surface water resources factor**

| Change limit | | Cumulative impact | Impact assessment | |
|---|---|---|---|---|
| **Variable** | **Acceptable limit** | | **Nature** | **Significance** |
| • People affected by floods | 10% of the total inhabitants of each district | Improved resilience | Positive | Significant |
| • Roads destroyed by floods | 10% of the total length of roads in each district | | | |
| • Houses destroyed by cyclones | 10% of the total number of houses in each district | | | |

The "improved resilience" impact promotes the good condition of the factor, as it will contribute to the reduction of the recorded values of people affected by floods and roads destroyed by floods, by road rehabilitation interventions, and of houses destroyed by cyclones, by resettlements. The classification of the impact in terms of nature is therefore positive.

Under the current condition, the change limit for people affected by floods is exceeded in 12% of the districts (Chikwawa, Zomba, Machinga, Meconta and Monapo) and the change limits for roads destroyed by floods and houses destroyed by cyclones are exceeded in only one district (Nacala and Monapo, respectively). According to information gathered in an interview, it is expected that the value of houses destroyed by cyclones could be equally important in Zomba and Machinga. It is expected that the cumulative impact of the projects will in the future contribute to reducing or avoiding situations of exceedances of the change limits.

In this context, the cumulative impact of improving resilience is considered significant.

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# 4. Cumulative Impact Management Plan

## 4.1. Objective

The main **objective** of the Nacala Corridor Cumulative Impact Management Plan (CIMP) (Phase 6 of the cumulative impact assessment) is to manage the cumulative impacts arising from the projects being implemented and to be implemented in the Nacala Corridor.

It provides a strategic and regional instrument to mitigate cumulative negative impacts and enhance positive impacts and strengthen cooperation between Mozambique and Malawi.

Since cumulative impacts result from the actions of several stakeholders, the responsibility for mitigating and managing these impacts is collective, requiring articulation between several entities.

The cumulative impacts management plan was presented in the **Second Preliminary Report on Cumulative Impact Assessment** (submitted in January 2026) and discussed at **Workshop 3**, held on February 19, 2026, in Blantyre, Malawi.

## 4.2. Axes and interventions

To achieve the objectives identified above, a set of interventions and recommendations is proposed, organized in the **following strategic axes**:

- Axis 1 – Sustainable production systems;
- Axis 2 – Public health and social welfare;
- Axis 3 – Connectivity;
- Axis 4 – Management of land use conflicts;
- Axis 5 – Protection of vegetation;
- Axis 6 – Sustainable management of soil and surface water resources;
- Axis 7 – Climate resilience and risk management.

Three **periods of implementation of** the Cumulative Impact Management Plan are considered: short-term (2026-2027), medium-term (2028-2031) and long-term (2032-2035).

In the CIMP, each of the proposed interventions is characterized in a form containing the following items: description; objectives; activities; location; implementation period; goal; implementation indicators; entities involved.

Interventions are classified into three **priority levels**, depending on the significance of the cumulative impacts they address:

- Priority: interventions targeting significant and very significant cumulative negative impacts;
- Relevant: interventions targeting low or moderate cumulative negative impacts;
- Complementary: aimed at enhancing positive cumulative impacts.

The following table lists the interventions proposed in each intervention axis, cumulative impacts to which they are directed, level of priority, implementation period, goals to be achieved and entities to be involved.

**Table 28 – Summary of proposed interventions by axis and their level of priority**

| Axes | Proposed interventions | Cumulative impact to be mitigated/enhanced | Priority Level | Implementation period | Goals | Entities to be involved |
|---|---|---|---|---|---|---|
| 1- Sustainable production systems | 1.1 - Safeguarding strategic agricultural areas | • Loss of agricultural areas (with pressure on food security) (significant negative impact)<br>• Changing food safety (positive impact) | • Priority | • Short, medium and long term | • Delimit and protect 100% of the identified strategic agricultural areas. | • Ministries of Agriculture;<br>• Territorial Planning Services;<br>• District and municipal governments;<br>• Rural extension agencies;<br>• Community representatives. |
| | 1.2 - Infrastructures to support production and marketing | • Changing food safety (positive impact) | • Complementary | • Short and medium term | • Reduce post-harvest losses by 30% in priority districts.<br>• Create at least 10 fully operational infrastructures.<br>• Increase by 20% the volume of agricultural products shipped through the Nacala Corridor | • Ministries of Agriculture and Transport.<br>• District and municipal governments.<br>• Rail and port operators;<br>• Agricultural cooperatives and the private sector. |
| | 1.3 - Community grain banks and local reserve management | • Changing food safety (positive impact) | • Complementary | • Short, medium and long term | • Reduce seasonal price volatility by up to 40%.<br>• Decrease post-harvest losses by 25%.<br>• Directly benefit 500,000 people. | • Ministries of Agriculture and Rural Development.<br>• Local governments and district authorities.<br>• Agricultural cooperatives and producer associations.<br>• NGOs specializing in food safety and community management. |
| 2- Public health and social welfare | 2.1 - Coordination mechanism in public health and social welfare | • Improved access and health mobility<br>• Reduction of vector and water diseases (malaria, cholera) (positive impacts) | • Complementary | • Medium term | • Formally constituted and in regular operation | • Representatives of the Ministry of Health, namely of the relevant national directorates or programs, in liaison with the health services with jurisdiction over the areas of the Nacala Corridor;<br>• Representatives of the social protection sector for matters related to GBV/SEA;<br>• Relevant technical partners (e.g. civil society organizations or health programs active in the corridor). |
| | 2.2 - Integrated Health Program for HIV/STI and GBV/SEA prevention and community education | • Increased prevalence of HIV and sexually transmitted infections (STIs)<br>• Increased incidence of gender-based violence and exploitation and abuse (GBV/SEA) (moderate negative impacts) | • Relevant | • Short and medium term | • Reduction of cumulative risks associated with HIV/STIs and GBV/AEs along the Nacala Corridor | • District and provincial health and social protection services;<br>• Civil society organizations and technical partners specialized in HIV/STIs and GBV/SEA. |

| Axes | Proposed interventions | Cumulative impact to be mitigated/enhanced | Priority Level | Implementation period | Goals | Entities to be involved |
|---|---|---|---|---|---|---|
| 3- Connectivity | 3.1 - Integrated planning of road and rail infrastructures with human settlements | • Expansion of areas artificialized (negligible negative impact)<br>• Improved connectivity (positive impact) | • Relevant | • Short and medium term | • Integrate 100% of the new road and rail projects into the updated spatial planning instruments.<br>• Reduce disorderly urban sprawl in critical areas of the corridor by 40%.<br>• Ensure that 80% of the districts have an urban structure plan aligned with the corridor. | • Nacala Development Corridor Management Committee<br>• Ministry of Spatial Planning, Transport, Public Works and Local Administration of Mozambique, *Ministry of Lands, Ministry of Transport and Public Works* of Malawi;<br>• Regional/provincial, municipal and district governments along the corridor;<br>• MRT/CDN, *Malawi Railways, Zambia Railways*;<br>• Traditional and customary authorities. |
| | 3.2 - Reinforcement and expansion of the Trilateral Observatory of Corridor Data | • Improved connectivity (positive impact) | • Complementary | • Short and medium term | • Operational database.<br>• Update data annually.<br>• 100% of key institutions have access to the platform. | • Nacala Development Corridor Management Committee<br>• Ministries of Transport of Mozambique and Malawi.<br>• Nacala Port Authority.<br>• Local governments and district authorities.<br>• Railway operators (e.g. MRT, Malawi Railways).<br>• National institutes of statistics and cartography. |
| 4- Management of land use conflicts | 4.1 - Preparation of a guiding document for resettlement and compensation processes in the Nacala Corridor | • Physical and/or economic displacement (significant negative impact) | • Priority | • Short and medium term | • 100% of the Resettlement Action Plans developed in the Nacala Corridor with effective integration of the guidelines provided for in the guiding document<br>• Within 3 years of resettlement, at least 90% of resettled households must have an average income higher than the pre-resettlement situation | • Southern African Development Community (SADC)<br>• Ministries/Secretariats of the Environment, Agriculture and Transport<br>• Local/District/Provincial Government<br>• Community representatives<br>• NGO<br>• Development partners |
| | 4.2 - Information system on resettlements in the Nacala Corridor | • Physical and/or economic displacement (significant negative impact) | • Priority | • Short and medium term | • Operational resettlement information system<br>• Monthly data update<br>• 100% of entities with resettlement skills with access to the platform | • Southern African Development Community (SADC)<br>• Regional/provincial and district governments<br>• Environmental Impact Assessment Authorities<br>• Development partners |
| 5- Protection of vegetation | 5.1 – Ecosystem Rehabilitation Program | • Suppression/ Vegetation degradation (very significant negative impact) | • Priority | • Medium term | • Total area targeted for rehabilitation/restoration equal to or greater than the natural area affected by the projects | • Cumulative Impact Management Plan Monitoring Working Group<br>• Local/district/provincial governance<br>• Ministries/Secretariats of the Environment<br>• Academic institutions<br>• Community representatives |

| Axes | Proposed interventions | Cumulative impact to be mitigated/enhanced | Priority Level | Implementation period | Goals | Entities to be involved |
|---|---|---|---|---|---|---|
| 6- Sustainable management of soil and surface water resources | 6.1 - Strengthening the monitoring of soil and surface water resources | • Increased risk of soil erosion (very significant negative impact)<br>• Alteration of soil organic carbon content (significant negative impact)<br>• Alteration of water quality (significant negative impact, which may be very significant in some districts) | • Priority | • Short and medium term | • Expansion of the water quality monitoring network in 4 stations;<br>• Regular monitoring of soil condition (productivity, erosion and organic carbon content) and water quality (turbidity, nitrate concentration, faecal coliform concentration) in the locations with the greatest potential for cumulative impact of the project and dissemination of data for studies and decision support;<br>• Nacala Corridor Soil Loss Atlas published | • Ministry of Agriculture (Mozambique)/ Ministry of Agriculture (Malawi)<br>• RWA Norte, I.P. (Mozambique)<br>• RWA Centro, I.P. (Mozambique)<br>• Ministry of Water and Sanitation (Malawi)<br>• Universities<br>• Proponents of Projects focusing on the Nacala Corridor<br>• Community representatives<br>• NGO |
| | 6.2 - Strengthening the governance of soil and surface water resources | • Increased risk of soil erosion (very significant negative impact)<br>• Alteration of soil organic carbon content (significant negative impact)<br>• Alteration of water quality (significant negative impact, which may be very significant in some districts) | • Priority | • Long-term | • 100% of rural communities with campaigns for sustainable use of fertilizers;<br>• 100% of rural communities with campaigns for soil and water conservation;<br>• 50% of springs and riverside areas used by communities protected from pressures arising from urban and industrial development. | • Ministry of Agriculture (Mozambique)/ Ministry of Agriculture (Malawi)<br>• RWA Norte, I.P. (Mozambique)<br>• RWA Centro, I.P. (Mozambique)<br>• Ministry of Water and Sanitation (Malawi)<br>• Universities<br>• Community representatives<br>• NGO<br>• District authorities |
| 7 – Climate resilience and risk management | 7.1 - Consolidation of the monitoring of the impact of climate disasters | • Improvement of resilience (positive impact) | • Complementary | • Short and medium term | • Regular monitoring of climate risk allocation;<br>• Mapping of flood risk zones in all districts;<br>• Training in key affected communities in all districts in flood and cyclone early warning systems and continuous participatory monitoring of climate disaster impact;<br>• Early warning of climate risks covering all sectors relevant to disaster monitoring and allocation (agriculture, transport, health). | • National Institute for Disaster Risk Reduction (Mozambique) / Department of Disaster Management Affairs (Malawi)<br>• District authorities<br>• Sectors affected by disasters (agriculture, transport, health, social protection)<br>• Community representatives |

| Axes | Proposed interventions | Cumulative impact to be mitigated/enhanced | Priority Level | Implementation period | Goals | Entities to be involved |
|---|---|---|---|---|---|---|
| | 7.2 - Strengthening the capacity to adapt to climate change | • Improvement of resilience (positive impact) | • Complementary | • Short, medium and long term | • Climate fund financing climate resilience projects in the Nacala Corridor;<br>• 75% of rural communities with communication/technical assistance campaigns for resilient homes;<br>• All road, rail, water supply and sanitation infrastructure built before 2015 audited for climate resilience by 2031. | • National Directorate of the Environment (DINAB; Mozambique) / Malawi Environment Protection Authority<br>• National Institute for Disaster Risk Reduction (Mozambique) / Department of Disaster Management Affairs (Malawi)<br>• National Directorate of Land and Territorial Development (DNDT; Mozambique) / Ministry of Lands (Malawi)<br>• National Roads Administration (Mozambique) / Roads Authority (Malawi)<br>• Mozambique Railways / Malawi Railways<br>• District authorities<br>• NGO<br>• Community representatives |

## 4.3. Recommendations for follow-up and monitoring of the plan's implementation

### 4.3.1. Creation of the responsible structure

For the follow-up and monitoring of the Cumulative Impact Management Plan, it is proposed to create a **working group**.

The working group would be an extension of the existing Nacala Development Corridor Management Committee (NDCMC) (oriented towards trade and connectivity issues), additionally integrating representatives from the Ministry of Environment of Mozambique and Malawi and the provinces (Mozambique) / regions (Malawi) of the Corridor, to consider environmental and social safeguard issues.

It is proposed that the working group should have the following tasks:

- Supervise, streamline, monitor and monitor the execution of the Cumulative Impact Management Plan;
- Collect the available information to support the implementation and fulfilment of the objectives of the Cumulative Impact Management Plan;
- Define the planning of the work to be developed and respective priorities;
- Disseminate and articulate the actions aimed at the promotion and consolidation of this instrument with the respective intervening entities;
- Promote the participation of other entities that can facilitate its mission or provide complementary information for the calculation of indicators;
- Evaluate the degree of success in the implementation considering the defined criteria and targets, presenting, if applicable, proposals for adequacy.

In addition, if deemed necessary, the group may include representatives of other entities who can facilitate or provide additional information for the calculation of the indicators defined in the Cumulative Impact Management Plan. The participation of these other entities is carried out by invitation, and there is no executive or deliberative power for these entities.

It is proposed that the monitoring and monitoring working group of the cumulative impact management plan meet at least once every two months.

### 4.3.2. Monitoring and dissemination of results

As part of the monitoring of the cumulative impact management plan, the annual calculation of indicators for the implementation of the planned actions is foreseen, and their comparison with targets defined for each action. The results must be publicly disclosed on the SATCP websites (https://satcp.mw; http://SATCP.gov.mz).

Following the analysis of the indicators, there should be a need to update the work plan, indicators, activities, schedule and resources.

### 4.3.3. Financing of monitoring

Part of the amount needed to monitor the CIMP may be funded by the budget of the ministries of transport and environment (supporting the costs of career staff allocated to the project, computer equipment) and another by additional funding, to cover non-current expenses (costs with accommodation, rental of spaces, communication and dissemination of data, independent monitoring).

For this additional funding, an annual amount of USD 100,000 is estimated for Mozambique and USD 100,000 for Malawi.

### 4.3.4. Review and update

The plan is to be reviewed at least at the end of each implementation period (i.e. in 2027 and 2031), and whenever the monitoring working group considers it justifiable, given the results of the indicators and/or the evolution of factor conditions in the Corridor.

# ANNEX – Drawing PRJ1 – Spatial Scope

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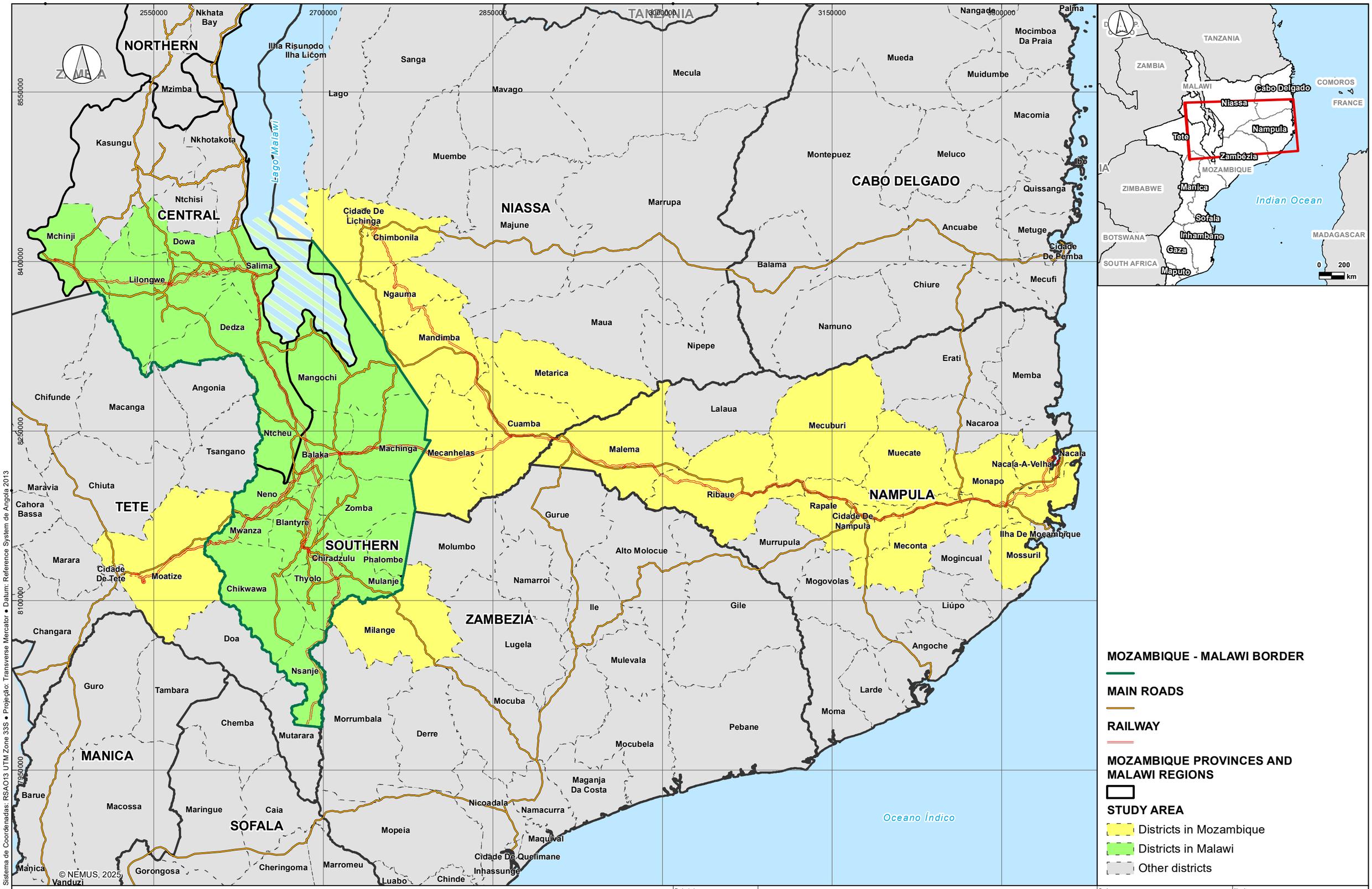


Sistema de Coordenadas: RSAO13 UTM Zone 33S • Projeção: Transverse Mercator • Datum: Reference System de Angola 2013

**MOZAMBIQUE - MALAWI BORDER**

**MAIN ROADS**

**RAILWAY**

**MOZAMBIQUE PROVINCES AND MALAWI REGIONS**

**STUDY AREA**

- Districts in Mozambique
- Districts in Malawi
- Other districts

nemus empowering sustainability

nemus Africa

| | |
|---|---|
| Projected | Cláudia Fulgêncio |
| Verified | Cláudia Fulgêncio |
| Designed | João Fernandes |
| Approved | Pedro Bettencourt |

**CUMULATIVE IMPACT ASSESSMENT OF THE NACALA CORRIDOR WITHIN THE SCOPE OF THE SOUTHERN AFRICA TRADE AND CONNECTIVITY PROJECT (MOZAMBIQUE AND MALAWI)**

**Spatial scope**

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