SRA
Steyn Reddy Associates

**Global Leaders in Land Access & Resettlement**

AngloAmerican

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## Insight Series Compendium

# Mining, Climate Change and Land Access & Resettlement

## Background

Climate Change will have profound effects on every aspect of our society, our economy, and the ecosystems on which we depend. It will affect every aspect of the mining industry, including access to land, water and other critical resources and impact on the lives and livelihoods of the communities among whom mining companies operate. Approaches to land access, displacement and resettlement need to take account of Climate Change in determining the need for resettlement, in ensuring effective resettlement planning and implementation and securing the future sustainability of mining operations and communities.

Anglo American and Steyn Reddy Associates (SRA) believe that Climate Change is one of the defining challenges of our time. We are pleased to jointly present this Insight Series Compendium about the key considerations and practical steps mining projects and operations can take to mainstream Climate Change into their land access, displacement, and resettlement processes. Visit our website to download all of SRA's other thought leadership www.steynreddy.com.

## Climate Change Impacts

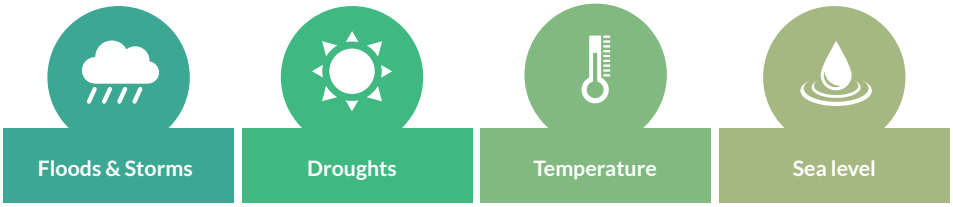
Climate Change is real and intensifying. The Earth is experiencing changes in average temperature, shifts in the seasons, increasing frequency of extreme weather events and chronic, slow onset climatic impacts.

The most significant impacts include:

- Increasing temperatures: Depending on location, global warming of 1.5°C between 2030 and 2052 may result in average local temperatures increases of between 1.5 and 5.0°C
- Extreme precipitation: The likelihood of extreme precipitation events is expected to increase more than fourfold in some regions, including parts of China, Central Africa, and the east coast of North America compared with the period 1950–81.
- Hurricanes: Although Climate Change is unlikely to change the frequency of tropical hurricanes, we are likely to witness an increase in the severity and intensity of storms and in the frequency of severe hurricanes.
- Drought: As the Earth warms, the geographical distribution and proportion of time spent in drought is projected to increase. The time spent in drought conditions is projected to increase by up to 80% by 2050 in parts of the Mediterranean, southern Africa, and Central and South America.
- Health: Increased respiratory and cardiovascular disease, changes in prevalence and distribution of food- and water-borne illnesses and other infectious diseases, injuries and premature deaths related to extreme weather events, and threats to mental health.
- Migration: Climate stressors are a critical factor in displacement of communities affected by declining crop yields and food production, rising sea-levels, coastal erosion and more frequent and intense droughts.

As Climate Change intensifies, we are witnessing substantial and non-linear increases in biophysical and socio-economic impacts.

## BIOPHYSICAL IMPACTS



**Floods & Storms**
Frequency & intensity of floods and storms

**Droughts**
Including salinization of freshwater resources

**Temperature**
Increased temperatures, heatwaves

**Sea level**
Rising sea levels

## SOCIOECONOMIC IMPACTS

**Risk to life**
Damage and risk to life from extreme and slow onset weather events (e.g. droughts, storms, floods, increased rainfall)

**Migration & Conflict**
Risk to physical security from floods, hurricanes, bushfires, etc. causing migration and conflicts over limited resources etc

**Water**
Water shortages (reduced access to drinking water) and water quality issues

**Health**
Including changes in the spread of infectious diseases and changing vectors of disease

**Infrastructure**
Damage / destruction of physical assets and infrastructure

**Nature & Livelihoods**
Reduced access to natural resources (e.g. grazing lands) and disruption of nature resource based livelihoods (e.g., agricultural production, fishing, etc.)

## SOCIOECONOMIC IMPACTS ARISING FROM BIOPHYISCAL IMPACTS DISPROPORTIONATELY IMPACT:

**Least developed countries**
Population in least developed countries, especially women

**Nature resource based livelihoods**
Rural communities dependent on agriculture, fishing, and other nature resource based livelihoods

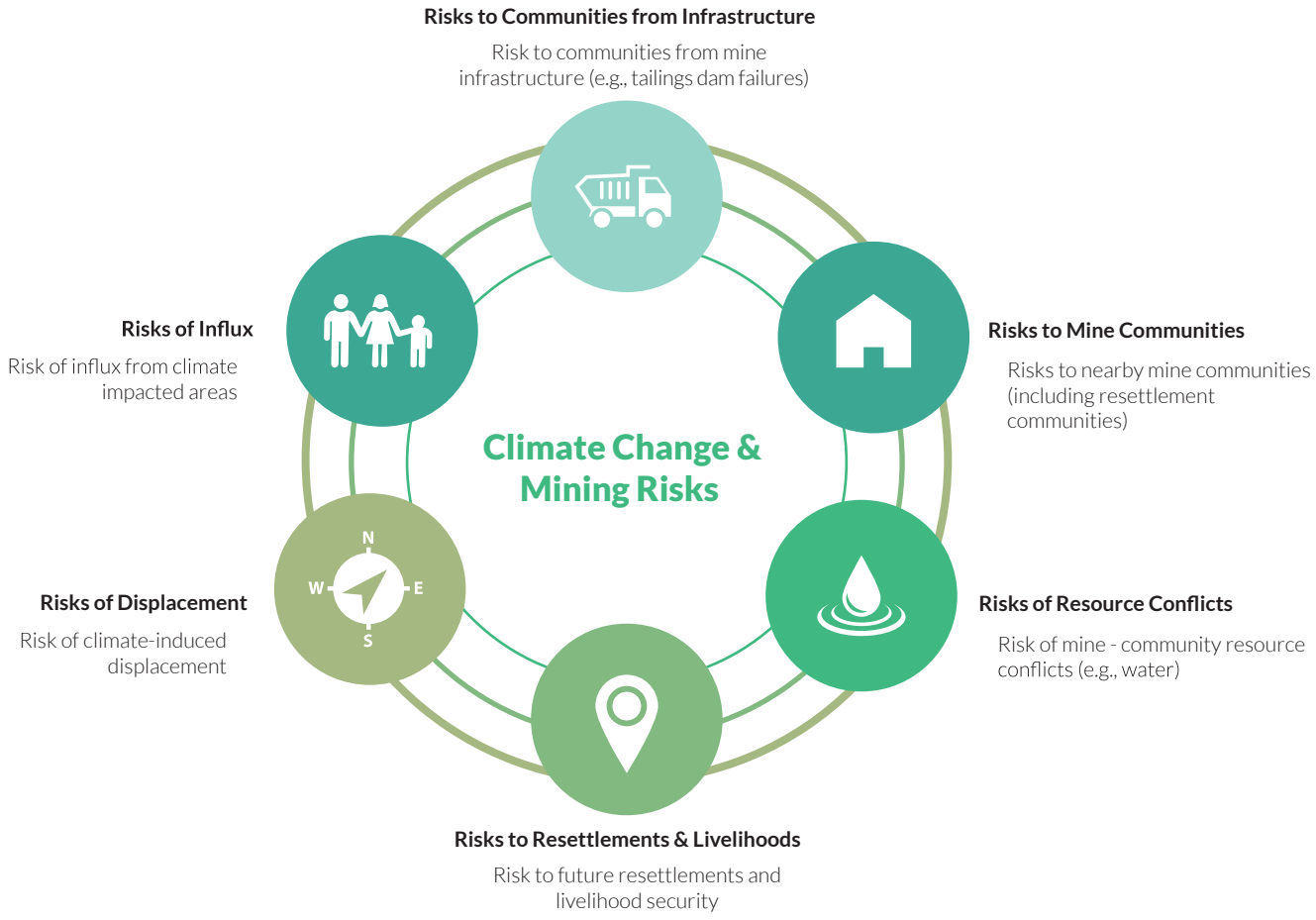
**Indigenous Peoples**
Including other groups (e.g., minorities, marginalised groups)

Climate Change will disproportionately impact disadvantaged and vulnerable populations in less developed countries, Indigenous peoples and rural communities dependent on agriculture. It will reduce their access to drinking water, their crop yields and food security and increase risks to their health and physical security.

Women and girls commonly face higher risks and greater burdens from the impacts of Climate Change in poor communities, often because of their reliance on natural resources, and lack of access to socio-economic resources, decision-making and information. For further guidance on how to integrate gender considerations in the land access and resettlement process, see the *SRA Gender Mainstreaming in Land Access and Resettlement Insight Series Compendium* available to download at www.steynreddy.com.

## Climate Risks and Resettlement Triggers

Climate Change will represent a risk to mine communities, as well as a displacement trigger.




Climate Change will impact the socio-economic conditions in which mining companies operate. It will also restrict their capacity to mitigate displacement impacts because it will significantly reduce their ability to acquire suitable land for community resettlement and livelihood restoration.

The ability to project future climate impacts – and their effect on operations' ability to meet their land access and water needs – will increasingly determine mine site design and operational planning, land management, stakeholder engagement, community investment and resettlement planning.

Increased risks to mine communities from flooding, landslides, drought, increases in vector-borne diseases etc, combined with poor national and local governance, may increase community demands for social investment and support for adaptation measures, including resettlement. At the same time, mining communities are likely to experience influx of populations displaced by Climate Change impacts and drawn to mining areas by the prospect of employment opportunities, infrastructure provision and livelihood and socio-economic development programs.

Increasing investment in human resources, physical and social infrastructure is key to building the resilience and adaptive capacities of resettled communities. The future welfare of those communities will require adaptation strategies designed specifically to reduce the vulnerability of human and natural systems, to reduce poverty and inequality, to ensure food and water security, maintain health conditions and address disaster risks.

In relation to project induced land access, displacement and resettlement, the most significant Climate Change risks and triggers include competition for water and natural resources, the physical security of neighbouring communities and the need to remediate previous resettlement processes.

## Water and Natural Resources

Competition for water resources is an existing concern for mining and is likely to increase significantly in the future. It represents a significant risk to mining operations and to mine communities, with the potential for mine / community and intra-community conflict.

Where an operation's water use significantly impacts water availability, and those impacts cannot be mitigated by, for example, reducing water consumption or sourcing water from outside the area, this may require displacement of households and/ or livelihoods. Operations will need to redouble efforts to project water resource needs for both the mine and communities and take this into account as part of long-term mine planning.

Where communities experience decline in availability of resources traditionally used for building materials, fuel, consumption or traditional medicine (e.g., timber, forage, hunting grounds, medicinal plants etc.), they may look to the mine to replace or compensate the loss of those resources.

In 2020, McKinsey reported that 30% to 50% of the world's production of copper, gold, iron ore and zinc is concentrated in areas where water stress is already high. Water-stress hot spots include Central Asia, the Chilean coast, eastern Australia, the Middle East, southern Africa, Western Australia, and the North American West. McKinsey found that 80% of Chilean copper production is in arid areas and other places with extremely high water stress; that figure is expected to reach 100% by 2040. [McKinsey Global Institute, 2020, Climate Risk and Response: Physical hazards and socioeconomic impacts (www.mckinsey.com/mgi)]

## Tailings Storage

The challenge of safely storing mine waste is growing in scale and complexity, and is further complicated by the increased severity and frequency of extreme weather events. Heavy rainfall has been identified as the trigger in 25% of global tailings dam failures.[1]

*1. Piciullo, L. et. al., 2022, A new look at the statistics of tailings dam failures, Engineering Geology 303*

As the Global Industry Standard for Tailings Management (GISTM) notes, TSFs may trigger physical or economic displacement where:

- Additional land is required to construct new facilities or expand existing ones, including the inundation zone and land required for the safety buffer zone around the TSF, and/ or
- Significant or sustained health and safety impacts may be expected as a result of potential tailings facility failure.

Based on the best available climate data and projections, mining operations should reassess the likelihood of TSF failure, map the inundation zone and estimate flood arrival times and flow depth to determine the potential impact on surrounding land and communities.

Emergency preparedness and response exercises can help to determine how likely it is that neighbouring communities – and, in particular, vulnerable community members – will be able to reach safety in the event of a TSF failure.

Where all measures to reduce the consequences of TSF failure have been exhausted, operations should consider the need for pre-emptive resettlement.

For more information on the GISTM and implications for resettlement, see the *SRA Tailings Storage Facility and Resettlement Insight Series Compendium which is available to download* www.steynreddy.com.

## Landforms

Mine site construction of roads, waste dumps or storage areas may increase communities' vulnerability to risk of flooding, erosion, landslides etc. in areas used for residential or livelihood purposes. In these areas, existing or planned mine infrastructure should be assessed against climate modelling to determine whether it can withstand extreme weather events, including heavy precipitation and soil erosion.

Households should be displaced only where all appropriate technical and design controls (including changing project design and locations) have been put in place but the level of risk to community health and safety remains unacceptable.

## Legacy Issues

Remedial action may be required where previous displacements have increased household or community vulnerability to extreme weather events or to slow onset climate impacts.

Deterioration in resettled households' living conditions or livelihoods may be identified through medium and long-term monitoring. It is preferable, however, to identify proactively the likelihood of such deterioration through projections of future Climate Change and socio-economic conditions.

## Mainstreaming Climate Considerations in Land Access & Resettlement


## Community Consultation and Consent

The point at which the decision to resettle project-affected communities is triggered is rendered even more difficult to determine when faced with projected impacts from slow-onset events such as Climate Change. The point at which climate impacts may render living conditions unsustainable can only be determined through intensive engagement and real partnership with potentially impacted communities.

It may be possible to formally agree to clear climatic 'tipping points' which would trigger a resettlement plan, the basic parameters of which could be prepared in advance. However, such 'tipping points' should be based not just on scientific measurements, but also draw on communities' own agency and understanding of their environment.

Negotiations should recognize the difficulties inherent in achieving informed consent in a context of great uncertainty and in potentially asking people to displace their homes and livelihoods on the basis of projections which may seem remote from their own lived experience. Culturally appropriate and participatory processes should enable communities to make informed choices based on data which are both credible in terms of climate science and meaningful to affected people: they are more likely to respond to information which explains changes they experience in their environmental resource base and living conditions.

Unacceptable levels of risk – such as the risk of TSF failure – should be agreed as early as possible, again in consultation with affected communities and government stakeholders.

## Resettlement Site Selection

Climate vulnerability may be exacerbated by inappropriate resettlement site selection, poor site design and inadequate housing and social infrastructure. Climate-proofing resettlement sites requires assessment of local climate trends and risks; the mitigation of those risks through site selection and design; and empowering communities to manage residual risks in the longer term. Given the likelihood of deteriorating environmental conditions and increasing competition for land and resources, site selection criteria should explicitly address the impacts of Climate Change in key areas:

- Location: Is the site in an area known to be at risk of extreme weather events which threaten the physical security of displaced households or of slow-onset climate impacts which will impact on their quality of life or livelihoods sustainability (particularly agriculture)?
- Topography: Is the site in an area at increasing risk of flooding, erosion and/or landslides?
- Livelihoods: Will the site provide continuing access to productive land, water and other resources necessary to sustain livelihoods?

It is important to recognize the increasing difficulty in identifying suitable land for development of secure housing and sustainable livelihoods, due to population pressures and the ongoing impacts of Climate Change reducing land available for settlements and agriculture. This will require innovative resettlement planning, including infill resettlement, relocation, and meeting the challenge of moves to peri-urban and urban environments for rural populations.

- Health: Is the site likely to exacerbate health risks such as those associated with water-borne (e.g., dysentery, cholera) or vector-borne (e.g., malaria) diseases?
- Heat stress: Is displacement likely to increase the population's exposure to heat stress with its associated health, livelihoods and socio-economic effects?
- Resource conflict: Is displacement from the site likely to generate conflict over resources – water, grazing lands etc. – with operations or host communities?

## Resettlement Site Layout and Design

The location and design of buildings, houses, open space and other physical features of resettlement sites may affect natural systems and ecosystem services and increase resettled communities' exposure to climate impacts. Resettlement site layout and design will have profound long-term impacts on the future security, resilience and sustainability of resettled communities.

Adaptation to Climate Change and planning for future climate projections should be central to resettlement site layout and design at the construction stage. By integrating climate projections – and taking account of local factors such as topography, vegetation and microclimate – resettlement site planning can mitigate some of the impacts of rising temperatures, floods and storm events.

Site layout and design should employ elements such as trees and other buildings to provide shading and capture and direct wind flow for natural ventilation. Depending on the location, houses and other buildings may be clustered to provide shading and mass but allow prevailing winds to flow through the cluster to provide cooling.

Increased rainfall – combined with the impermeability created by roofs, compacted roads, and other hard surfaces in resettlement sites – may contribute to increased risk of flooding, infrastructure damage and loss of lives or property. Site drainage plans should reflect projections of the maximum expected level of precipitation. Making effective use of slopes and increasing the site's vegetative and permeable areas can reduce the potential for flooding and heavy runoff due to rains. Rainwater catchment systems at the household or community level should provide water security for periods when water sources are under stress.

## Housing & Infrastructure

Well planned and managed resettlement sites can help to mitigate the worst effects of Climate Change and allow residual risks to be managed by displaced communities in the longer term. Once appropriate resettlement sites have been identified, resettlement housing and infrastructure design and provision should consider the following:

**Resettlement & Mitigation**

Resettlement site and housing design is not just an opportunity to adapt to Climate Changes, but also to contribute to climate mitigation efforts – e.g., utilizing renewable energy sources for street lighting and home energy use; building homes to passive house standards; ensuring community infrastructure is within walking distance; etc.

- Infrastructure: Are roads, bridges, energy, water, irrigation systems etc. designed, built, and operated to account for climate projections and potential disasters, as opposed to historic measurements?
- Housing & Community Infrastructure Design: Are housing, schools, clinics and social infrastructure designed to take account of future climate needs? This might include, for example, passive heating or cooling through orientation and design elements; provision of adequate insulation to avoid need for heating; utilization of sustainable energy sources (e.g., ground source heat pumps, solar panels)
- Building materials: Are all materials used disaster and climate resilient, while also having a low carbon footprint? The World Bank estimates that, for every dollar invested in disaster resilient housing, ten dollars can be saved in reconstruction.[2] By contrast, repair and retrofitting can add as much 10–50% to the original cost of construction.[3]

*2. The World Bank, 2022, Brief: Global Program for Resilient Housing*
*3. The World Bank, 2013, Building Resilience: Integrating Climate and Disaster Risk into Development*

## Livelihood Planning

Livelihoods restoration – the restoration or improvement of livelihoods displaced by mining activities – is fundamental to the land access and resettlement process. Displacement projects succeed or fail on the basis of whether they provide sufficient opportunity to households to restore or improve their quality of life and standard of living, including ensuring food security through sustainable agriculture combined with other economic opportunities and income generating activities.

Communities displaced by mining activities are typically heavily dependent on agriculture and ecosystem services and are therefore particularly vulnerable to changing and/or deteriorating environmental conditions. Climate Changes, including increased or decreased rainfall, increased or decreased temperatures, can affect the viability of existing agricultural systems and crops, or availability of natural resources (e.g., fish species). Exposure to extreme weather events can lead to crop and infrastructure losses, and increase health and safety risks.

It is imperative to plan for Climate Change in developing livelihood restoration options, which will include consideration of climate-smart approaches as well as careful consideration of livelihood alternatives. At the community level, ecosystem management strategies will be required to ensure secure and reliable access to productive land, water and biotic resources to reduce displaced communities' vulnerabilities and promote the long-term sustainability of their livelihoods. At the household level, climate-smart agricultural practices will be required, such as adoption of higher-yielding and more climate-resistant crop varieties and livestock breeds, smarter use of inputs and farming methodologies to maximize yields and minimize use of scarce resources, while increasing productivity through more intensive and climate-friendly land use.

While a shift in agricultural methodologies will be challenging for households, equally challenging may be a need for diversification of livelihoods and the development of alternative livelihoods, including non-land based livelihoods. This will be particularly important where viable resettlement options require a shift from rural to peri-urban and urban environments.

## Supporting Communities' Adaptive Capacity

Ultimately, the welfare, living conditions and livelihoods of resettled communities will depend on their resilience and capacity to adapt to external shocks and changes in their natural resource base.

Adaptive capacity enables resettled communities to identify and respond appropriately to emerging hazards. It enables local institutions, as well as social and family networks, to facilitate shared decision-making and to support households through periods of crisis. Most importantly, it enables them to take effective action through, for example, encouraging livelihood diversification; soil and water conservation; changing cropping and livestock practices; household preparation and evacuation planning etc.

Resettled communities' adaptive capacity may be enhanced through their active participation in all aspects of resettlement planning. Community participation in, for example, the design and layout of resettlement sites and housing, the introduction of climate-friendly technologies or adoption of diversified livelihoods, is the most important indicator that positive changes will be maintained in the future. Participatory resettlement monitoring and evaluation is equally important in building the capacity to learn from experience and adapt to changing conditions over time.

Resettlement managers should assess resettled communities' adaptive capacity and the degree to which they are likely to be able to manage climate risk. Where necessary, they should provide capacity building to enable them to absorb shocks to their livelihoods and living conditions. It is important to recognise, however, that adaptation is a dynamic social process. It will continue to evolve long after the resettlement process is complete. Mining operations may provide an enabling environment to develop adaptive capacities: in the longer-term, communities' security and well-being will depend on building their capacity to themselves identify and respond appropriately to change.

*For more information on the key steps to take in the Land Access and Resettlement process, see the Anglo American Social Way 3.0, and SRA's Land Access & Resettlement Insight Series Compendium.*

## Key Take-Aways

- As Climate Change intensifies, we will witness a substantial and non-linear increase in biophysical and socio-economic impacts.
- Climate Change will disproportionately impact disadvantaged and vulnerable populations in less developed countries, Indigenous peoples and rural communities dependent on agriculture.
- Climate Change is a risk to mine communities and an important displacement trigger.
- In relation to project induced land access, displacement and resettlement, the most significant Climate risks and triggers will include competition for water and natural resources, the physical security of mining communities and the need to remediate previous resettlement processes.
- Mainstreaming climate considerations in land access and resettlement requires new forms of community consultation and consent, and introduces new challenges to resettlement site selection and design, livelihood planning, and support to communities' long-term adaptive capacities.

## Want to know more?

As a responsible steward of valuable resources, and guided by our values of accountability, collaboration and innovation, Anglo American recognises the need to contribute to the global journey to address Climate Change. To remain a successful business into the future, we have a specific responsibility to take action to address the causes of Climate Change and to protect our employees, assets and host communities against its potential impacts. To find out more about Anglo American, visit: www.angloamerican.com.

# Connect with SRA

If you have a question or comment on this compendium, or anything related to land access and resettlement, please email us at info@steynreddy.com.

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# About Us

SRA helps our clients acquire the land they need – on time and on budget. We work collaboratively with our clients' teams and affected communities to identify, assess and manage displacement impacts in a practical, responsible and sustainable manner.

SRA's experienced team:

- Has managed hundreds of land access and resettlement projects around the world
- Has a track record of realising win-win-win solutions for our clients, communities, and host governments
- Applies international standards and best practices in a pragmatic, innovative and locally appropriate manner
- Is results-oriented and hands on, working largely at project sites with clients and other
- Are well recognised thought leaders in the field, co-authoring a well-known guide and publishing a popular Insight Series.

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