

THEME 2:

Direct private sector engagement in landscape restoration



TOPIC:

Indigenous pasture and fodder tree restoration in dryland ecosystems

Presenter: Teddy Kinyanjui, Seedballs Kenya





Seedballs Kenya promotes landscape scale restoration using direct seeding of indigenous tree and grass species across East Africa





We have been focused on bringing a business approach to linking various partners together to rehabilitate old charcoal burning areas and other degraded sites with useful indigenous fodder and woodfuel species chosen by the local communities.





We currently stock a wide array of certified indigenous tree seeds from the Kenya Forest Research Institute (KEFRI) and certified indigenous grass seeds from the REA Trust, Baringo that we have used to make more than 15 million biochar coated seedballs to date.





The Need for Seed – Forests are more than just trees and savannahs are more than just grasses

There are more than 6,000+ species of plants in Kenya and in order to achieve our National restoration and biodiversity goals, the need for assorted understory shrub, wildflower, liana, forb and other types of Native Seeds provides an opportunity for creating thousands of 'green collar' jobs and millions of Ksh in economic opportunities.



TOPIC:

The Importance of Soil Microbiology and Processes of Natural Succession in Restoration Projects; With a Key Focus on Profitable Agroforestry

Presenter: Sven Verwiel, Linking Environment
Agribusiness & Forestry L.E.A.F Africa



The Importance of Soil Microbiology and Processes of Natural Succession in Restoration Projects; With a Key Focus on Profitable Agroforestry

Sven Verwiel



What is the world's largest organism?



Soil



- Soil microbiology builds structure which holds and stores nutrients and water
- Soil Microbiology in turn cleans the water
- Bacteria create alkaline glues (pH>7) and fungi create acids (pH<7) - influencing soil structure

Soil Microbiology includes;

- Bacteria
- Fungi
- Protozoa
- Nematodes
- Micro/macro arthropods
- Earthworms and other insects

VS.

Dirt



- No structure, no soil microbiology
- Water carries nutrients with it as it moves through the soil
- No cleaning
- Leaching, runoff, and erosion

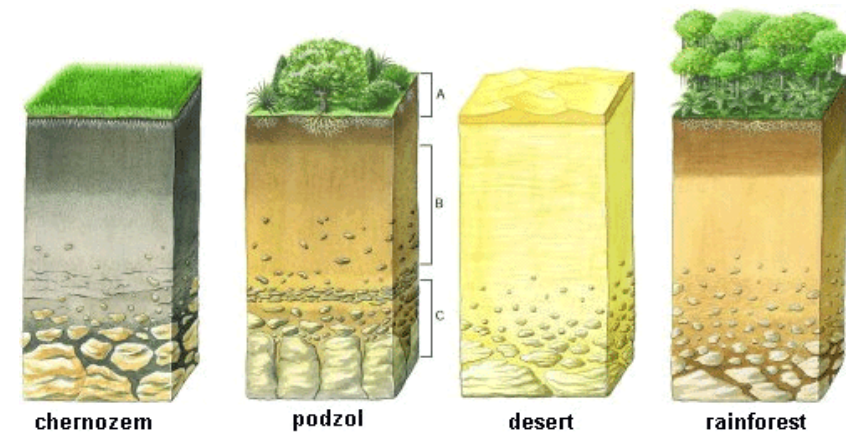
Plants get ALL their nutrients except sunlight and CO2 from the soils.

Plants feed microbes sugars and in turn the soil food web turns nutrients from soils into plant available forms.

Natural Succession



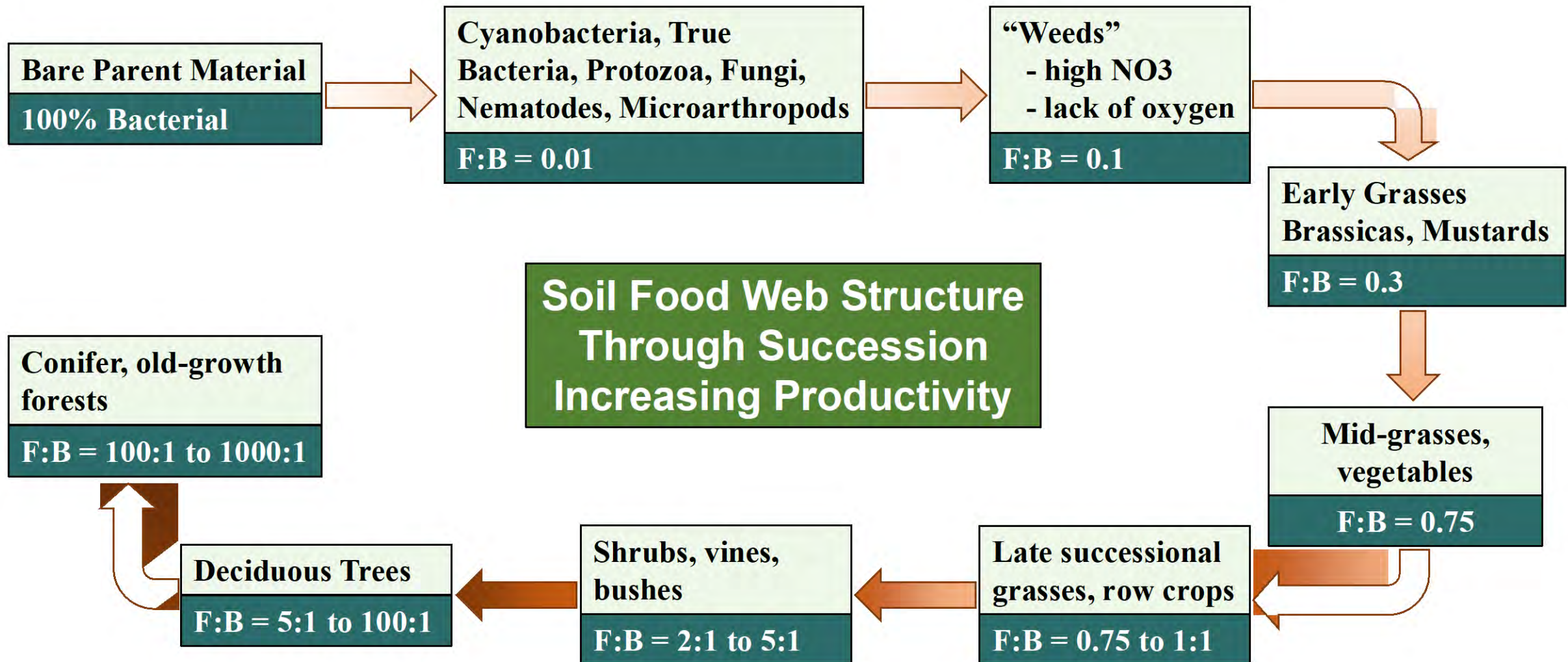
Where do our specific restoration landscapes fit in?
At what stage of succession are they?



Soil profiles are slightly different in different climates, but all require soil life to develop.



What Do Your Plants Need?



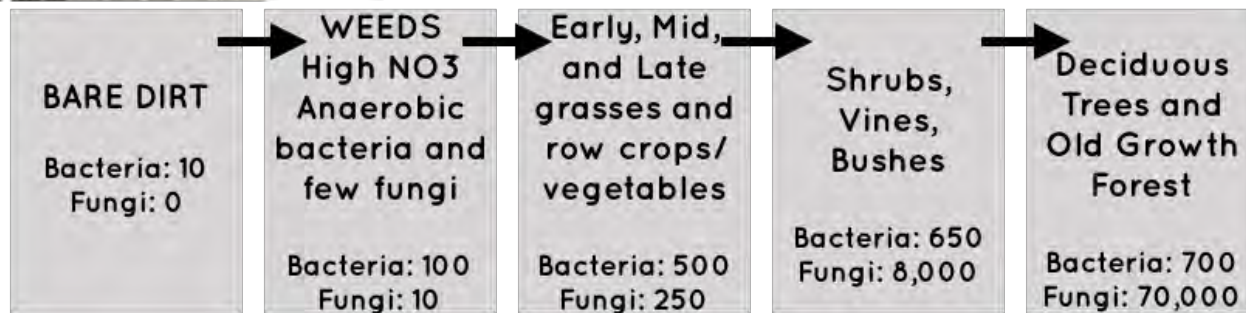
Soil Biological Succession Causes Plant Succession



Syntropic agroforestry mimics natural succession & allows us to make profitable income during all phases.

PROFITABLE RESTORATION

“Create areas of permanent inclusion of humans rather than areas that need permanent protection from humans.” Ernst Gotsch – [Life in Syntropy](#)



All units are in ug/g

Thank You Very Much

sven@leaf-africa.com



What is the world's largest organism?
FUNGI



TOPIC:

Presenter: Murray Roberts Oselu, Rehabilitation of Arid Environments Ltd



REHABILITATION OF ARID ENVIRONMENTS LTD

- The Rehabilitation of Arid Environments (RAE) transforms degraded semi-arid drylands into profitable grasslands for the benefit of the people and the environment through pasture development
- Over the past 35 years, RAE Trust, and now RAE Ltd, have developed a successful social-ecological model that reduces poverty, restores food security and economic opportunities in dryland areas





- **Land Rehabilitation:** RAE’s successful rehabilitation techniques have transformed over 6,600 acres into productive grasslands throughout Kenya’s drylands, mostly in Baringo County, RAE’s home base.
- **Quality Grass Seed:** RAE has six species of indigenous dryland grass seed in stock: seed processing, storage (for the required one year), and germination trials ensure that RAE seed is of the highest quality.
- **Seed Regulations:** RAE is a registered seed merchant, with ‘breeder maintainer’ rights for *Cenchrus ciliaris*, *Baringo Var 1*, an indigenous, drought resistant and nutritious grass variety bred on its fields.
- **Environmental Benefits:** RAE fields, planted with grasses and trees, have increased biodiversity, carbon sequestration, and hydrological flows, while decreasing soil erosion and invasive species (e.g. “*Mathenge*”; *Prosopis juliflora*), and mitigating climate change.



- **Social Benefits:** RAE has established land and livestock management practices, enhanced food and area security, and improved livelihoods and opportunities for men, women and youth.
- **Income Generation:** RAE out-growers and CBO's earn up to KES 5 million a year from their well-managed grass fields, through activities such as selling fattened livestock, milk, hay and grass seed.
- **Impact:** In addition to transferring knowledge and training, RAE has carried out consultancies, and sold grass seed (up to 10 tonnes annually) to 18 semi-arid counties in Kenya, Somalia and Somaliland.



Having developed viable solutions for the vulnerable people and lands of semi-arid areas, RAE's upscaling potential is immense, especially when enhanced by collaborative partnerships



BASE TITANIUM: Nick Okello





**BASE
TITANIUM**

SUSTAINABLE MINING

(LAND REHABILITATION &
RESTORATION)

We are an environmentally responsible Mining Company, committed to rehabilitating the land back to equal or better than we found it for sustainable Post Mining Land Use



**BASE
TITANIUM**

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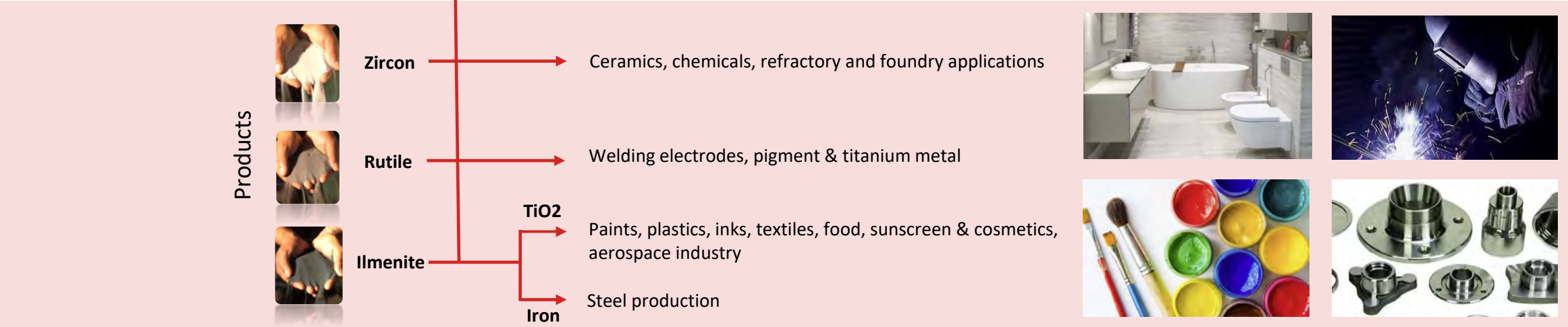
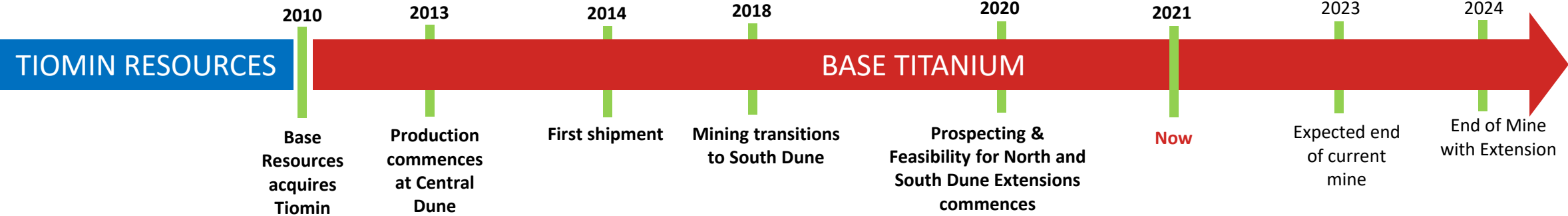
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4. Agricultural potential trials
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6. Biodiversity corridor
7. Brick making from mine waste

Dr Nick Okello

- Environmental Manager – BTL
- BSc. General – Moi University
- MSc. Environmental Science, UNESCO-IHE, Netherlands
- PhD. Environmental Geography and Management, University of Free State, South Africa
- 15 years mining and rehabilitation experience

Base Titanium – Timeline and products

A wholly owned subsidiary of Australian and UK-listed resources company, Base Resources Limited. Located in Kwale County, 50km from Mombasa Town. Separate heavy minerals from slimes and sand using gravimetric and electromagnetic properties of the mineral fractions.



Our product comes from sand and separation is purely by means of physical processes. There is no noxious chemical addition at any stage of the process making this form of mining and processing environmentally friendly

Environmental Considerations / Government & Legal

We are obliged to conserve nature through legal requirements and have good relations with specific government institutions that can assist us achieve this goal and cement our PMLU vision



Constitution of the Republic of Kenya

Guarantees right to clean & healthy environment & Land.



Vision 2030

Provides a blue-print to make Kenya an industrialized middle-income nation by 2030.

Calls for a clean, secure and sustainable environment with increased forest cover.



The Mining Act of 2016

Guides the exploration and exploitation of mineral resources in Kenya. *The SML with its various conditions is issued under this Act.*



The Environmental Management and Coordination Act, 2015

Framework law on environmental management and conservation. EIA licence conditions & rehabilitation bond calls for conservation.



Forest Conservation & Management Act, 2016

Mandate to conserve & manage public forest resources and assist Counties to develop/manage forest resources on community and private lands.



National Wildlife Conservation & Management Act 2013 The Act governs conservation of wildlife. **KWS encourages biodiversity conservation by communities living on land essential to wildlife, such as wildlife corridors.**



Water Act, 2016: Controls protection, management, use, development and conservation of water sources. Key for Mukurumudzi Dam, Gongoni Borefield and Wetlands.



The National Land Policy (NLP) 2017: Guides the country towards sustainable and equitable use of land. NLC key decision maker for PMLU

Environmental Considerations / Government & Legal

Sustainable conservation would contribute to the requirements of various treaties and enhance achievement of the Country's vision and global image in terms of sustainability

Kyoto Protocol



National Climate Change Response Strategy



Increase forest to **10% by 2030**, from the current 7.2% to help curb climate change and sequester carbon



SUSTAINABLE DEVELOPMENT GOALS

17 Goals with goal 11 to 15 encouraging sustainability, climate action and biodiversity



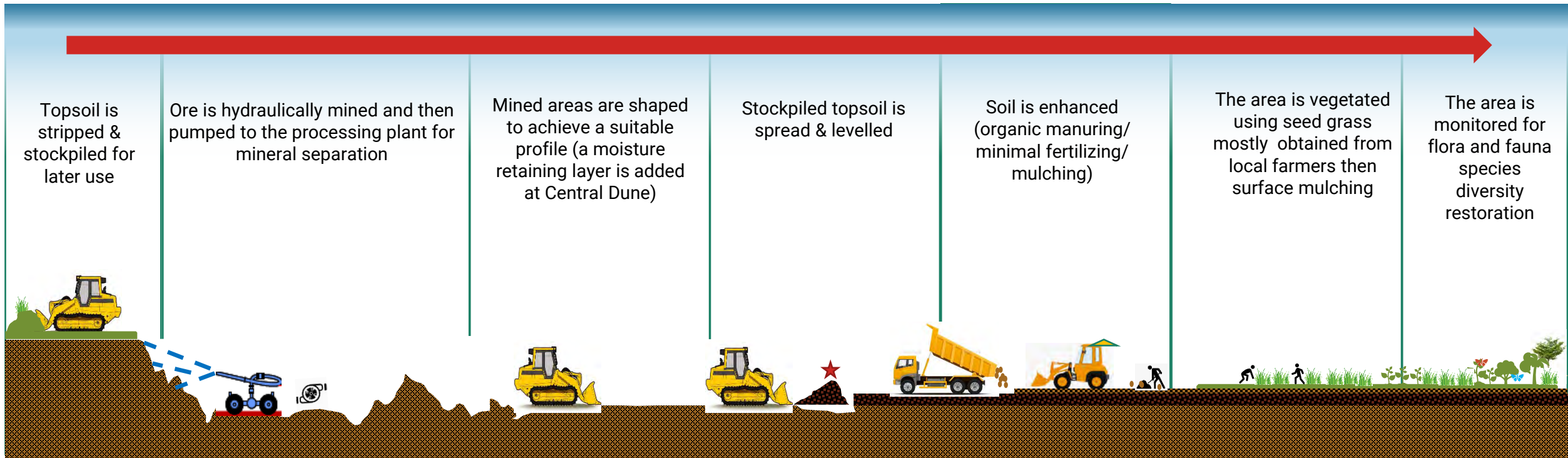
Convention on International Trade on Endangered Species



Convention on Biological Diversity

Rehabilitation process

Our rehabilitation objective is to minimize residual environmental impacts resulting from mining operations; Ensure a safe, sustainable and commercially viable post-mining environment



Rehabilitation begins with stockpiling of topsoil before mining. Topsoil contains useful seeds, organic matter and nutrients beneficial for pioneer species growth. Shaping of backfilled/ or mined-out areas into dunes like those that existed before mining is important in ensuring that natural drainage patterns are maintained. After shaping and topsoil spreading, manuring and mulching is done to enhance soil organic matter which is good for vegetation. Mulching protects the sown seeds from birds and wind, it insulates soil from excessive heat and rain. It also helps to retain moisture in the soil which is essential for seed germination and acts as organic matter to the topsoil.

A mixture of fast-growing grass seeds sourced from the local community is then sown into the topsoil. Our indigenous nursery provides shrubs and trees for the areas planted with pioneer grass species.

Rehabilitation seed sourcing and preparation

A unique aspect of the Base Titanium rehabilitation process is that grass and legume seeds are sourced from local communities with seed viability done on site



Sourcing grass/ legume seeds from community

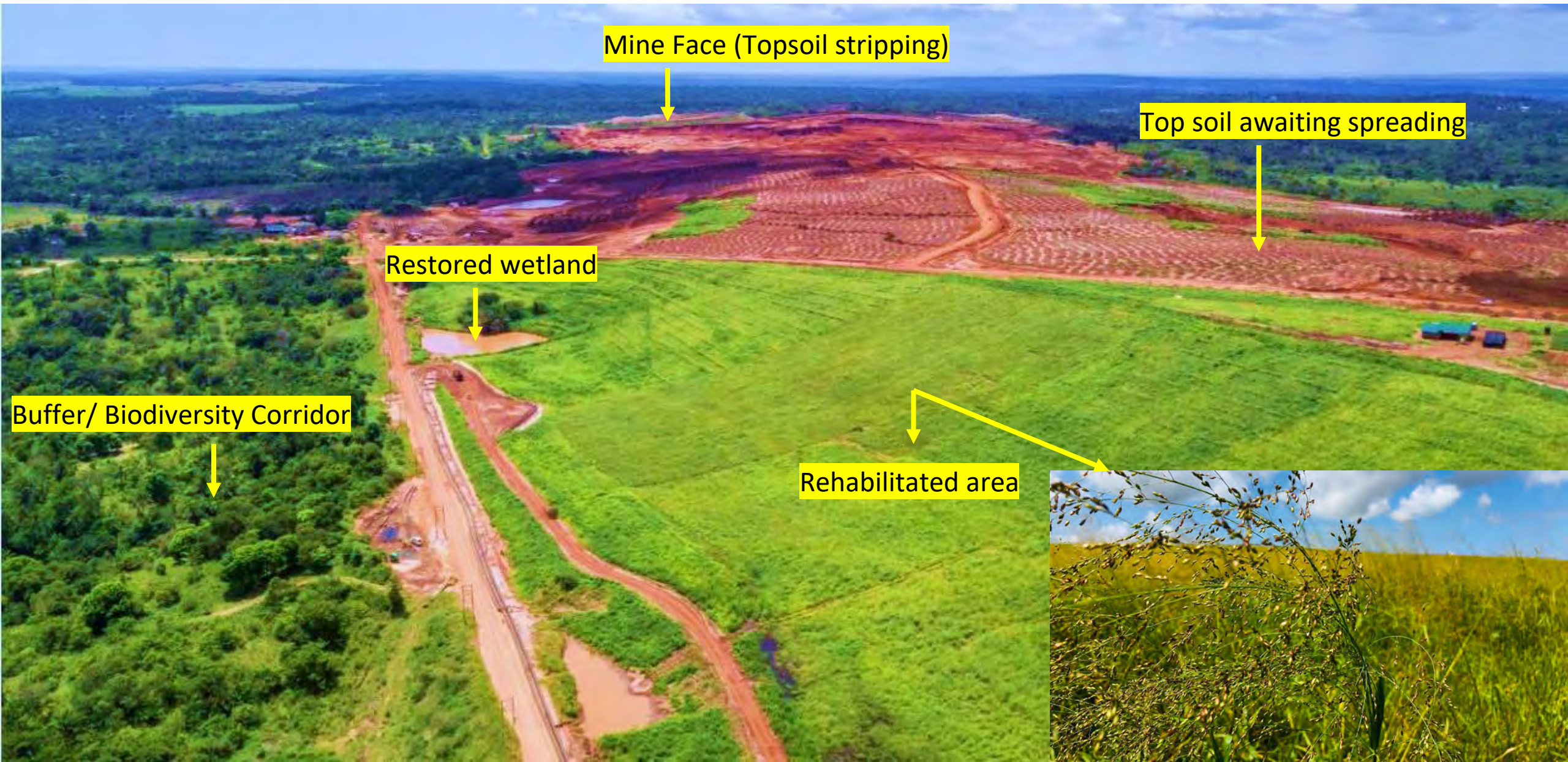


QC/ Storage/ Mixing and issuing for rehabilitation



Viability testing of seeds (40% requirement)

Rehabilitation outcome



Rehabilitation outcome

Dec 2020



July 2021



Rehabilitation outcome

2nd Jan 2021

(South Dune shaped and top soiled area with manure application)



17th June 2021

(Area grassing - grass is a pioneer rehabilitation species)



Agricultural potential trials

Agricultural trials with Pwani University and Community on-going with great success in terms of the variety of food crops that can be produced. Example of how mined areas can become very productive.



Crops trialled: Maize, Tomatoes, Cassava, Cotton, Simsim, Ginger, Ghalic, Highland rice, Okra, Cabbage, Kales, Onions etc

Conservation efforts and track record

Over time, Base has developed world-class programs in biodiversity recognised nationally and internationally. This is a solid foundation to build on in developing a Sustainable Conservation Post mining land use and improve on environmental conservation

Indigenous tree nursery & Arboretum



- **Largest of Kind in Africa**
- **285** indigenous tree species.
- Over **2500** Critically Endangered trees have been propagated: *Uvaria puguensis*, *Gigasiphon macrosiphon*, *Euphorbia Tanaensis*, *Cola porphyrantha*, *Pavetta tarennoides*, *Vangueriopsis shimbaensis*
- Close to **85,000** tree planted out

Wetland Restoration



- Former **silt traps** are now being converted into functional wetland areas with propagation and introduction of wetland vegetation such as sedges, reeds, water-lily, rushes and sedges. **Thriving Flora & Fauna**



Shimba Hills Spiny Reed Frog (*Afraxalus sylvaticus*), categorized as IUCN Red List Endangered (EN)

Butterfly project



- Community support (export pupae for the international butterfly buying houses in Europe and America through MIDA Butterflies, Watamu.

99 Species in corridor
120 in Gongoni & 56 in Buda.

Biodiversity corridor

The Corridor is a key area in conservation and links patches of indigenous forest with Gongoni. It is critical to maintain and enhance for sustainable conservation to make sense.



Biodiversity Corridor links Gongoni forest to some remnant patches of indigenous forest in SML.

Area has been maintained and planted with more indigenous vegetation.

Increased sightings of a wide range of invertebrates, amphibians, birds and mammals with new species being periodically added.

An interface between (1) **Biodiversity corridor**, (2) Rehabilitated tailings impoundment wall and (3) Unrehabilitated tailings impoundment wall

Brick making from waste mine tailings

Fine sand/ clay is a waste product. We have conducted a feasibility study and have determined that with different sand/clay ratios with addition of cement we can produce interlocking bricks of up to 10MPa strength. We now need to scale this up.



Interlocking brick making



Renovation of a school kitchen using Base interlocking blocks



Our success has always been reliant on the teamwork, the passion and the dedication of all staff of Base Titanium. Asante Sana!

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