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IRRIGATION AS PART OF AN ACID MINE DRAINAGE TREATMENT STRATEGY

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Decanting acid mine drainage is presenting a major problem in the economic heartland of South Africa / Reverse osmosis (RO) proposed as solution but very expensive and energy intensive / Irrigation represents an attractive alternative to RO as it removes significant salt loads and can use the water productively to produce crops in a food insecure region

MANAGING POOR QUALITY MINE WATER: IS IRRIGATION PART OF THE SOLUTION?

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- Quality of water decanting from mine voids in South Africa varies, but often acidic and saline, dominated by $CaSO_4$, Na_2SO_4, $MgSO_4$ or $NaHCO_3$
- Results in a salinity problem as there is not enough clean water available to dilute the salts and still achieve water quality objectives

Technology principle:

Irrigation with $CaSO_4$ rich mine water

⬇

Roots take up water and concentrate the salt – precipitation of gypsum in the soil profile

⬇

Salts therefore removed from the water

Managing poor quality mine water in the Vaal Basin, South Africa

Poject's name	Country	City	Start Date-End Date	Water Sources	Uses
Managing poor quality mine water in the Vaal Basin, South Africa	South Africa	Johannesburg	2013 -2015	Gold mine waste water	Irrigation

Sources

Origin	*Industrial - mining*
Water reused (m^3/Y)	*Potential: 54 000 000*

Uses

Crops	*soybean, wheat*
Irrigated Area (Ha)	*Potential: 12 000*
Cost of the Cubic meter (€/m^3)	*0.35*

Water Reuse Chain

Treatment	*Neutralisation using lime in a high density sludge plant*
Disinfection	*None*
Storage Capacity (m^3)	*Mine void – capacity unkown*
Irrigation	*Sprinkler (pivot)*

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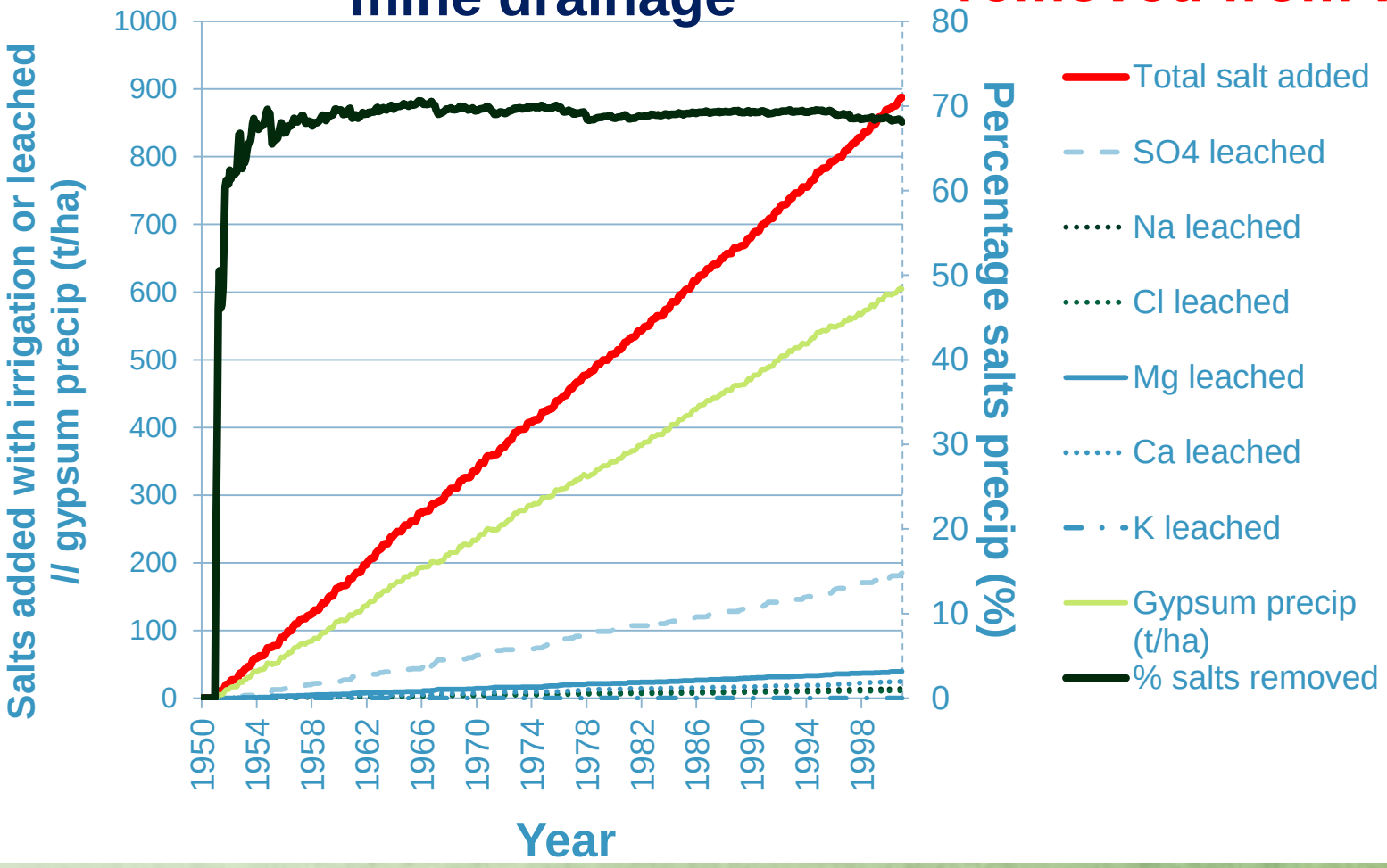
Irrigation with neutralised acid mine drainage

➢ **69% salts removed from water**



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MANAGING POOR QUALITY MINE WATER: IS IRRIGATION PART OF THE SOLUTION?

- Yes, but only certain water qualities (must be high in calcium and sulfate)
- Potentially cheaper with a lower environmental impact compared to reverse osmosis
- A 40 ha farm could realise a profit of approximately 15 000 euros/yr
- Salt tolerant crops such as soybean and wheat recommended
- Hydrogeological setting should be carefully planned