

THIRD BIENNIAL
ROSENBERG INTERNATIONAL FORUM
ON
WATER POLICY

**INNOVATIVE GROUNDWATER MANAGEMENT
IN NAMIBIA**

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Ministry of Agriculture, Water and Rural Development



Department of Water Affairs

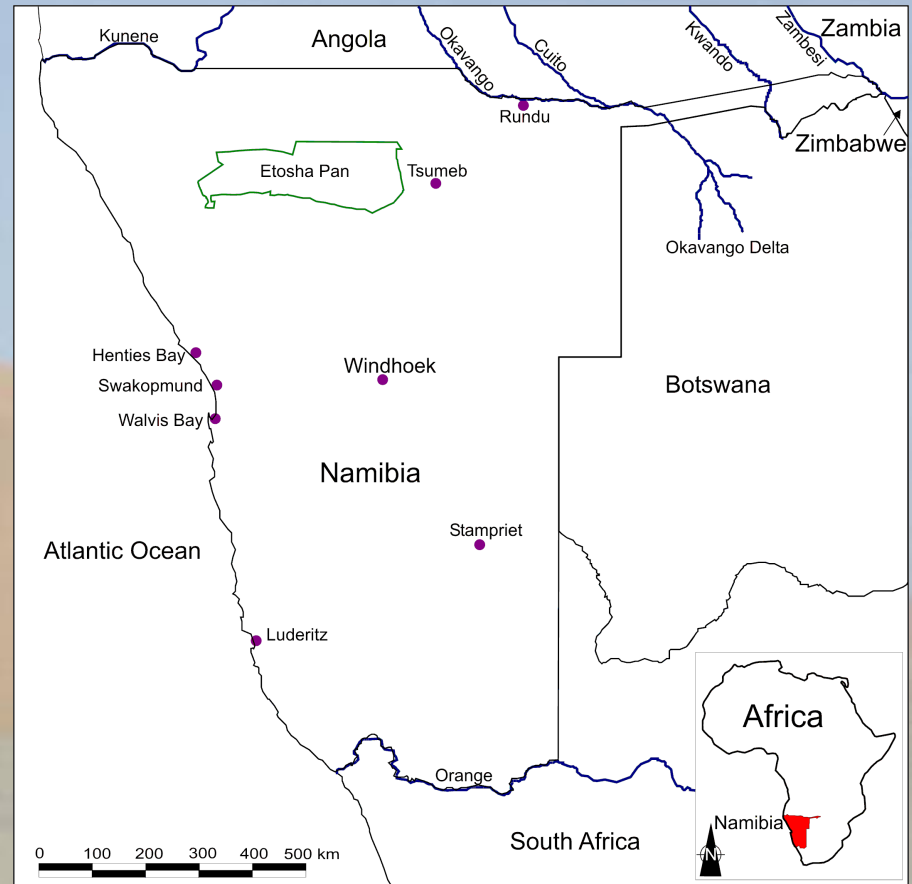
DEFENITION OF TERMINOLOGY

- : Enhancing the direct, natural recharge from rainfall runoff into an aquifer**
- : Replenishing an aquifer by using surface water from a source located elsewhere**
- : Using a groundwater source as a backup to increase the efficiency of a surface water source**
- : Interbasin water transfer to reduce evaporation losses (The transfer of water from reservoirs with less favourable evaporation characteristic to a reservoir with better evaporation characteristics in order to reduce evaporation)**

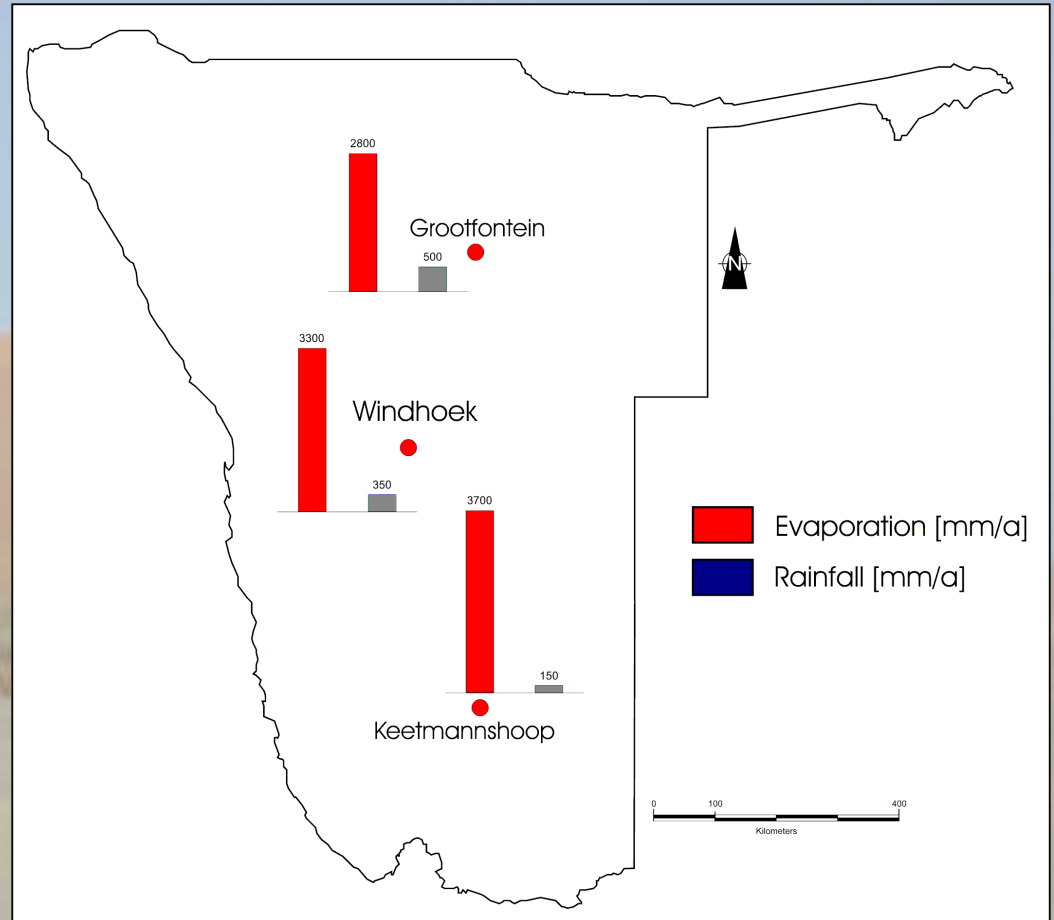


INTRODUCTION

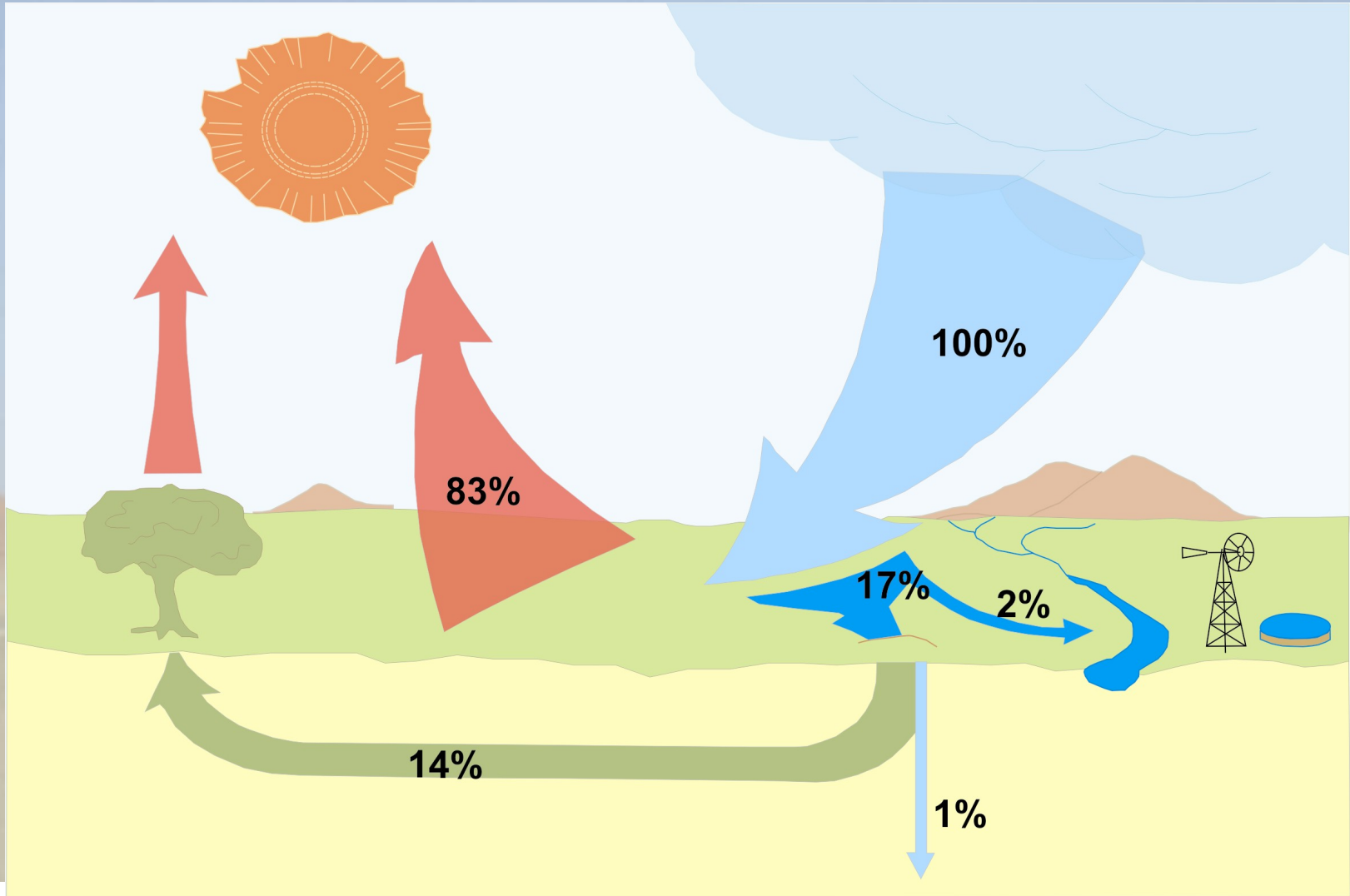
Area = 824 300 km²
Population = 1,83 million
Density = 2,2 persons/km²
GDP (2001) = US\$ 3 100 million
Per Capita GDP = US\$ 1 600



HYDROCLIMATE

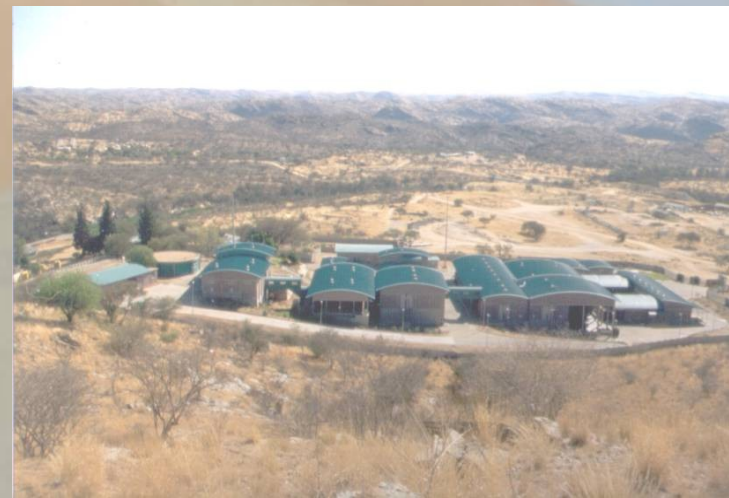


RAINFALL BALANCE



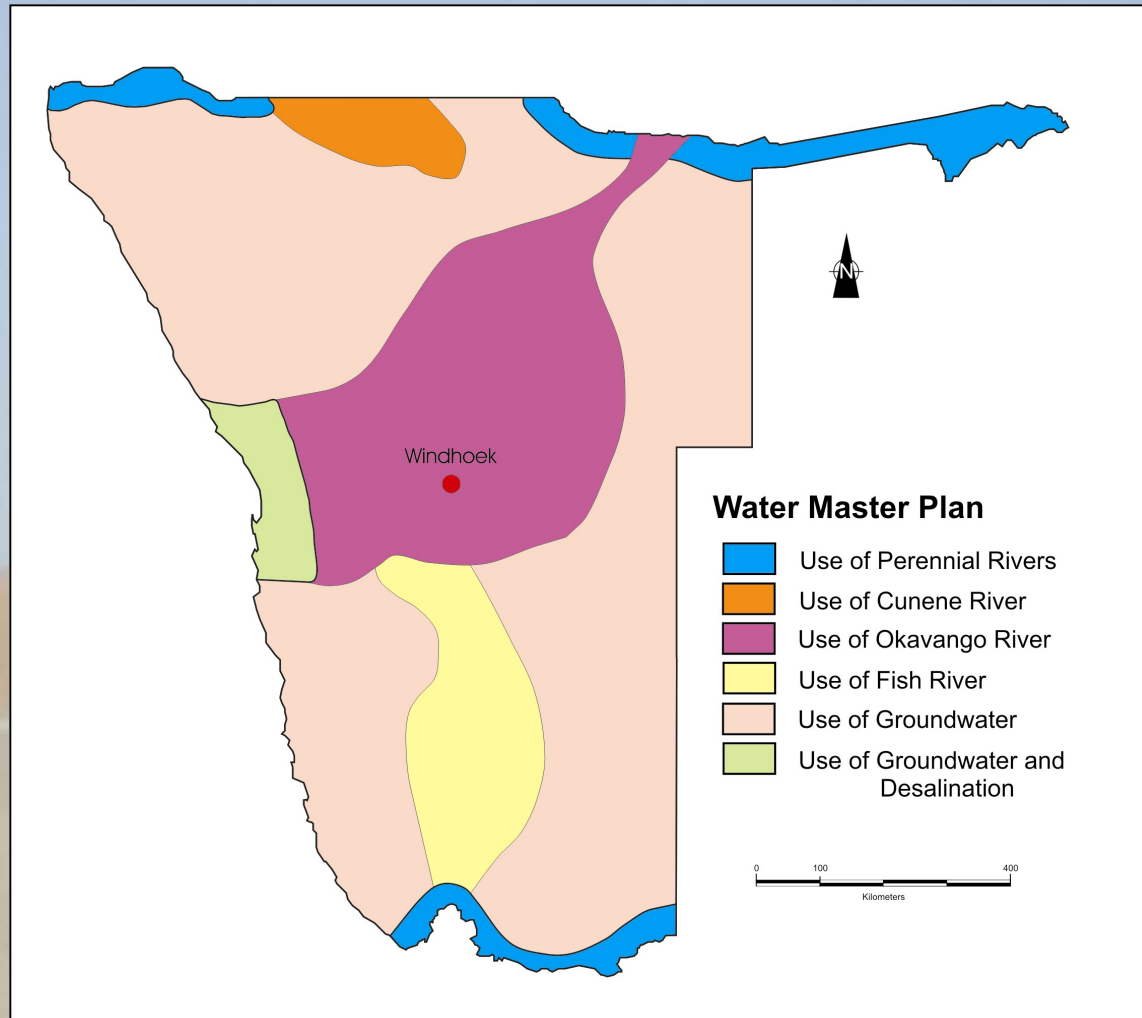
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WATER SOURCES



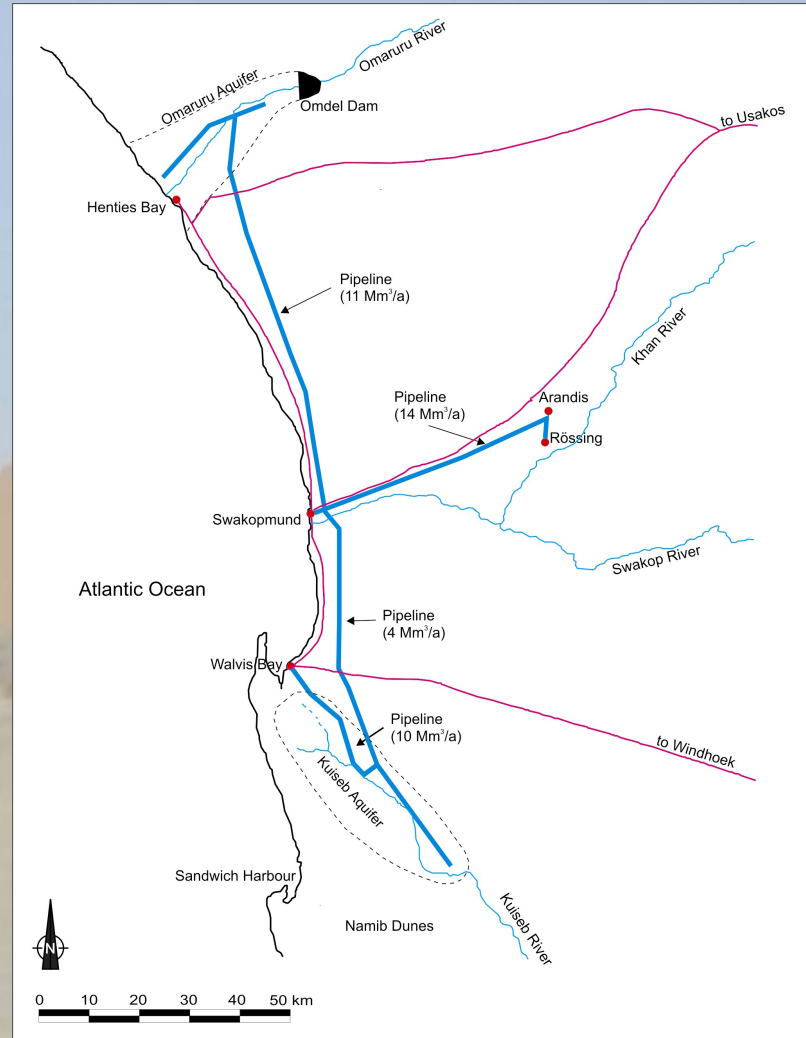
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WATER MASTER PLAN



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CENTRAL NAMIB REGIONAL WATER SCHEME (CNRWS)



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CNRWS DEMAND CENTRES



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CNRWS SOURCES AND DEMAND

Omdel Aquifer:

Long term safe yield	=	3,5 Mm ³ /a
Abstraction	=	5,7 Mm ³ /a

Kuiseb Aquifer:

Long term safe yield	=	6,0 Mm ³ /a
Abstraction	=	6,3 Mm ³ /a

Both Aquifers:

Total availability	=	9,5 Mm ³ /a
Total abstraction	=	12 Mm ³ /a

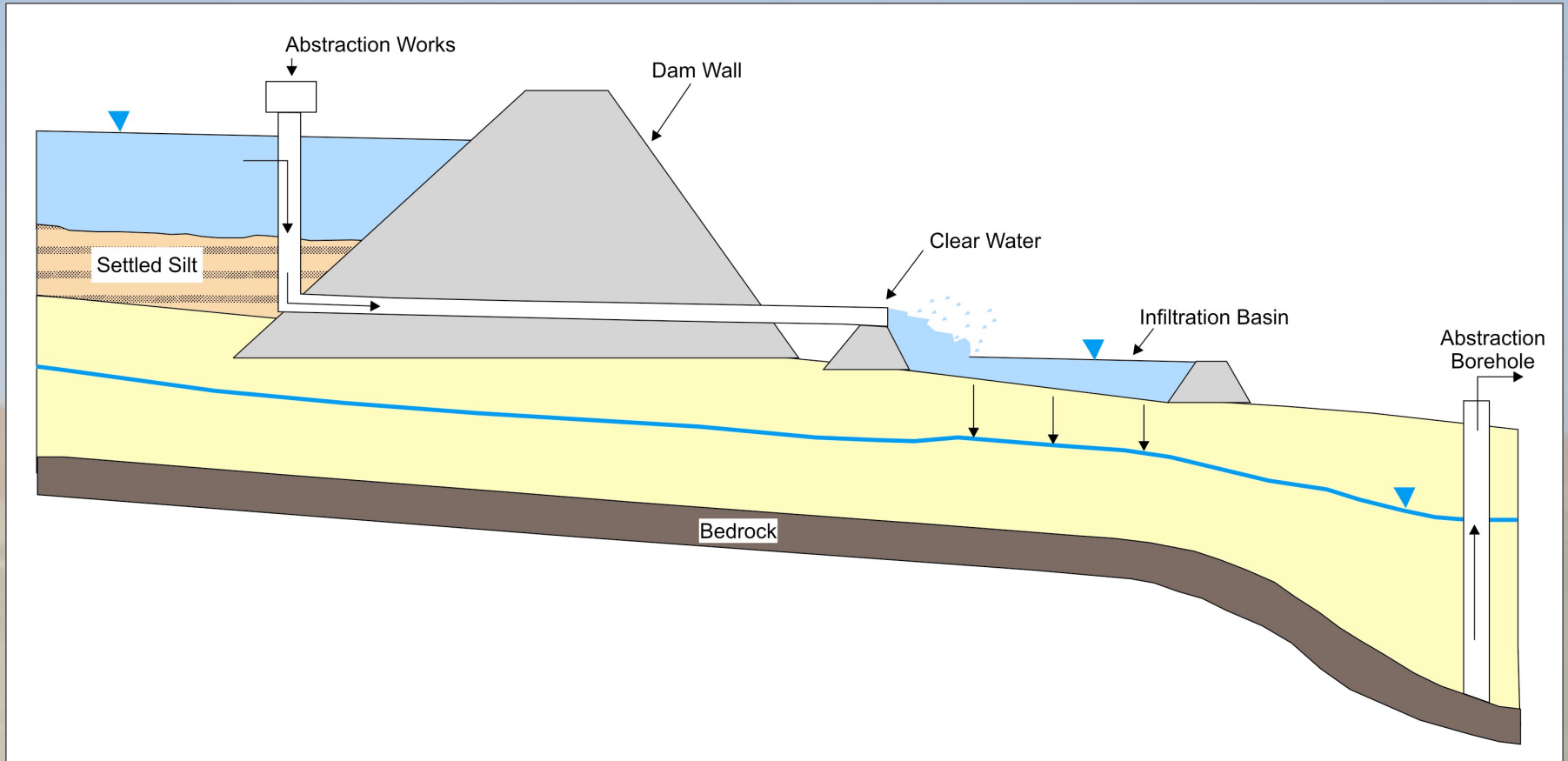


RUNOFF AND IMPOUNDMENT



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ARTIFICIAL RECHARGE PRINCIPLES



OMDEL DAM



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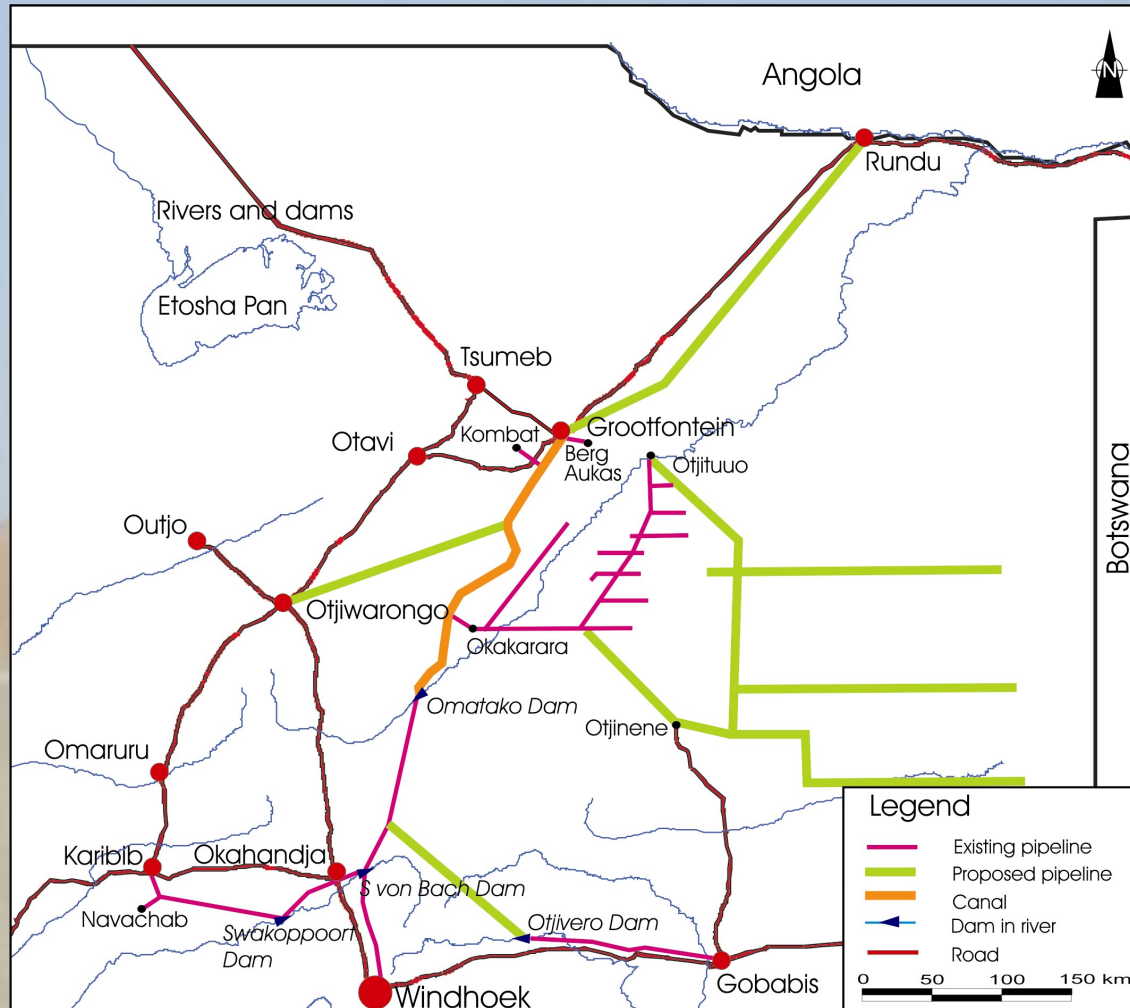
ARTIFICIAL RECHARGE RESULTS

Initial Results

Increase in infiltration	=	150 %
Original aquifer yield	=	3,5 Mm ³ /a
Improved aquifer yield	=	5,6 Mm ³ /a
Increase in aquifer yield	=	60 %



EASTERN NATIONAL WATER CARRIER (ENWC) (Providing Possibilities for Integrated Use, Conjunctive Use and Water Banking)



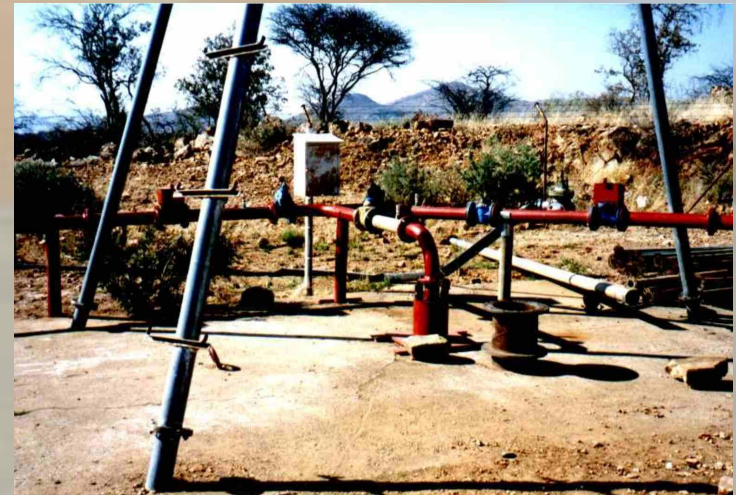
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ENWC COMPONENTS



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WATER BANKING IN THE WINDHOEK AQUIFER



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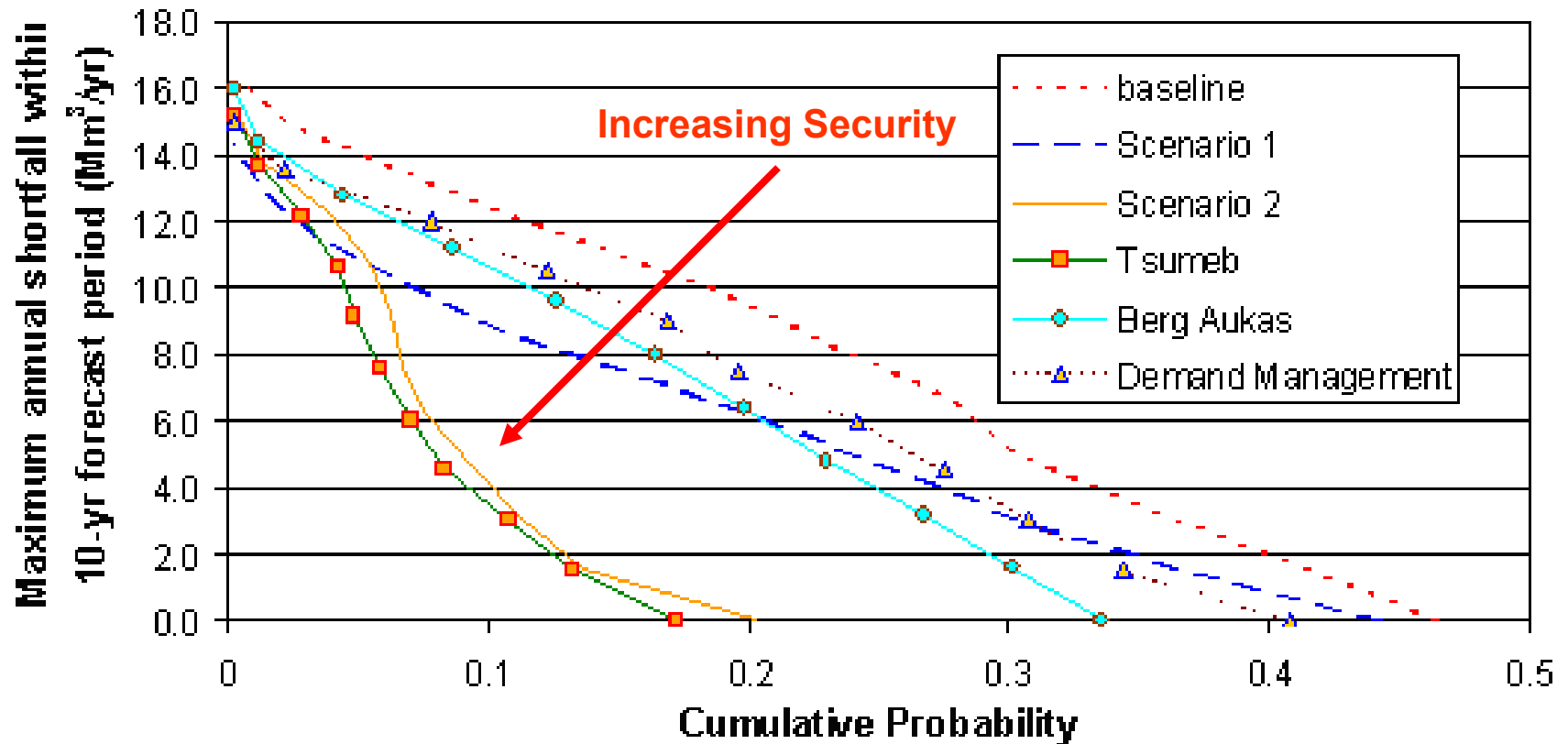
WATER BANKING INFORMATION

Aquifer depletion	=	40 Mm ³
Present water demand	=	18 Mm ³ /a
Injection capacity 2002	=	3,1 Mm ³ /a
Injection capacity by 2010	=	16,0 Mm ³ /a
Full cost recovery tariff	=	N\$2,50/m ³
Consumer price	=	N\$3,50/m ³
Injection operating cost	=	N\$0,80/m ³

(1 US\$ = 10 N\$)



WATER BANKING : INCREASING SECURITY



INCREASING RESERVOIR EFFICIENCY

THREE DAMS MODE OF OPERATION	95 % ASSURED SAFE YIELD [Mm³/a]				
Individual Basis	8				
Integrated Basis with Water Transfers		14			
Water Banking	-		16		
Conjunctive Use with Groundwater				25	
Access to Perennial Okavango River	-	-		-	45



CONCLUSION

More efficient use can be made of surface runoff and groundwater sources by

Reducing evaporation

Enhancing recharge to groundwater sources

Integrated use of surface water sources

Using surface water and groundwater conjunctively

Banking water



I thank you for your attention

Join me for a game of golf in the Kalahari !



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