



ZAMBEZI BASIN STRATEGIC PLANNING IN THE CONTEXT OF A CHANGING CLIMATE OVERVIEW



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Presentation Outline

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1. Basin Context
2. Basin Challenges
3. Basin Opportunities
4. Key Messages

Key features - the Zambezi River Basin

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- 8 countries:
 - ▣ Angola
 - ▣ Botswana
 - ▣ Malawi
 - ▣ Mozambique
 - ▣ Namibia
 - ▣ Tanzania
 - ▣ Zambia
 - ▣ Zimbabwe
- 13 sub-basins:

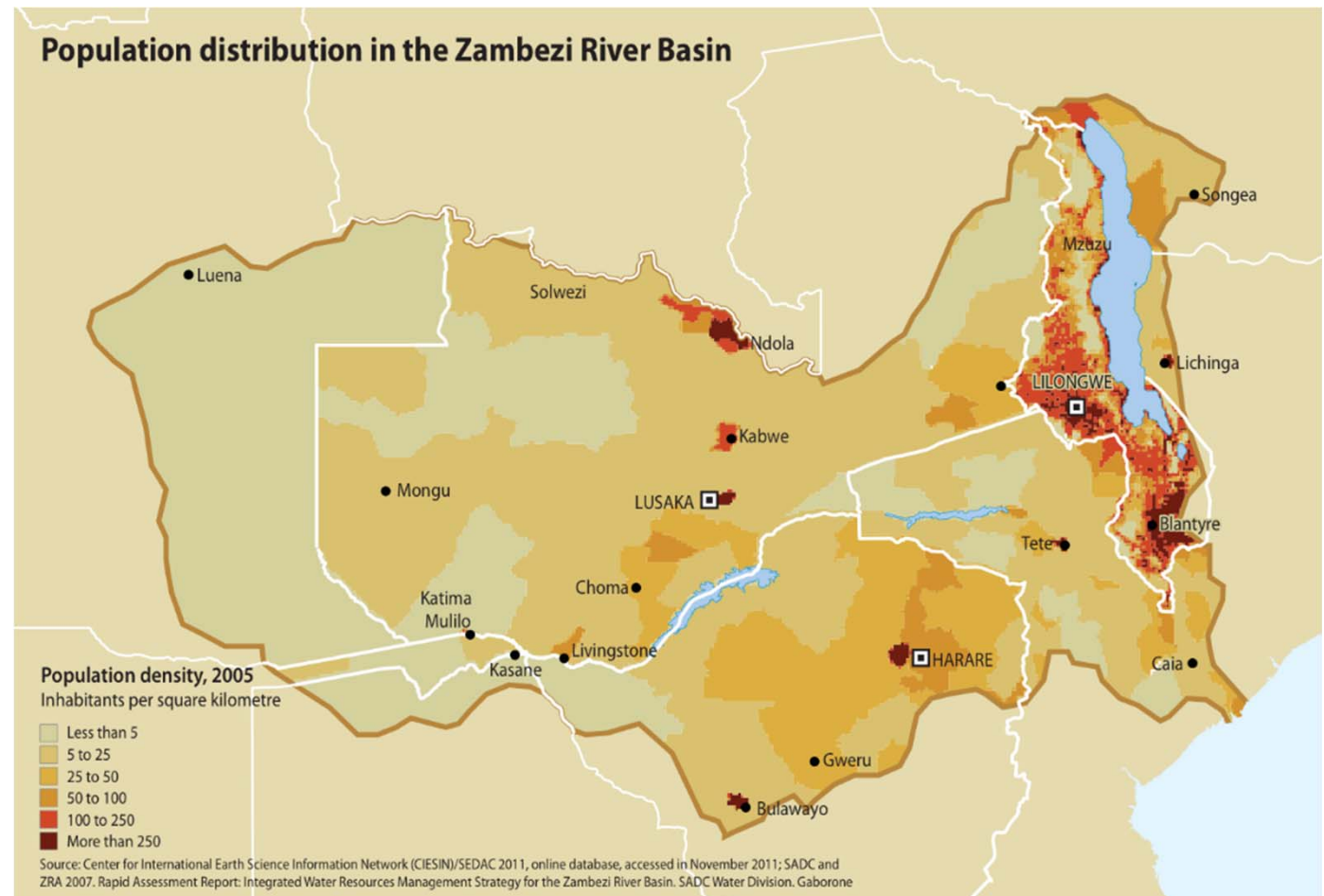


the Zambezi River Basin

Population and distribution

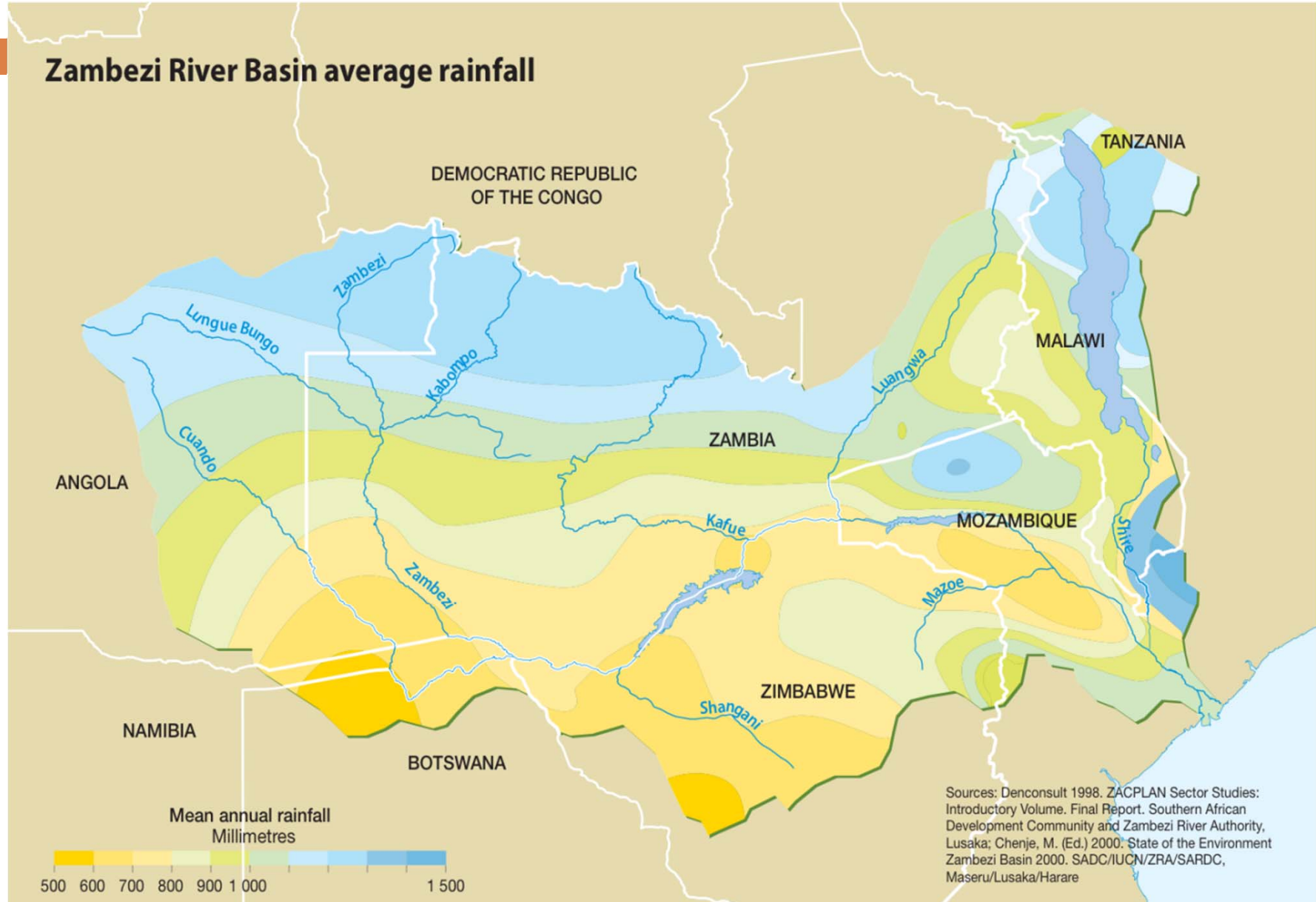
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- Within the basin:
 - > 32 million today:
 - 85% in Malawi, Zambia and Zimbabwe
 - Increasing to 51 million by 2025
 - 7.6 million in 21 urban centres



The Zambezi River Basin

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The Zambezi River Basin

Economic development

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- > 6% annual economic growth
 - ▣ Annual GDP: \$100bn annual GDP
 - ▣ GDP/capita (2015):
\$250 (Malawi) to \$7,800 (Botswana)
- Persistent poverty, but dual economies:
 - Some new investments possible in large infrastructure, and
 - Many relying on subsistence livelihoods based on environmental services
- Some important World Heritage and Ramsar sites
- Significant reliance on nature-based tourism
- Climatic variability est. GDP loss ~1%

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Zambezi Basin Challenges

Challenges

Socio-economic

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- Lack of significant investments in infrastructure in the past 30 years
- Limited coordinated development:
 - Economic inefficiencies
 - Loss of productivity
 - Impaired ability of natural systems to sustain environmental services
 - Increased risks to extreme climate events

Challenges

Climate Change Impacts

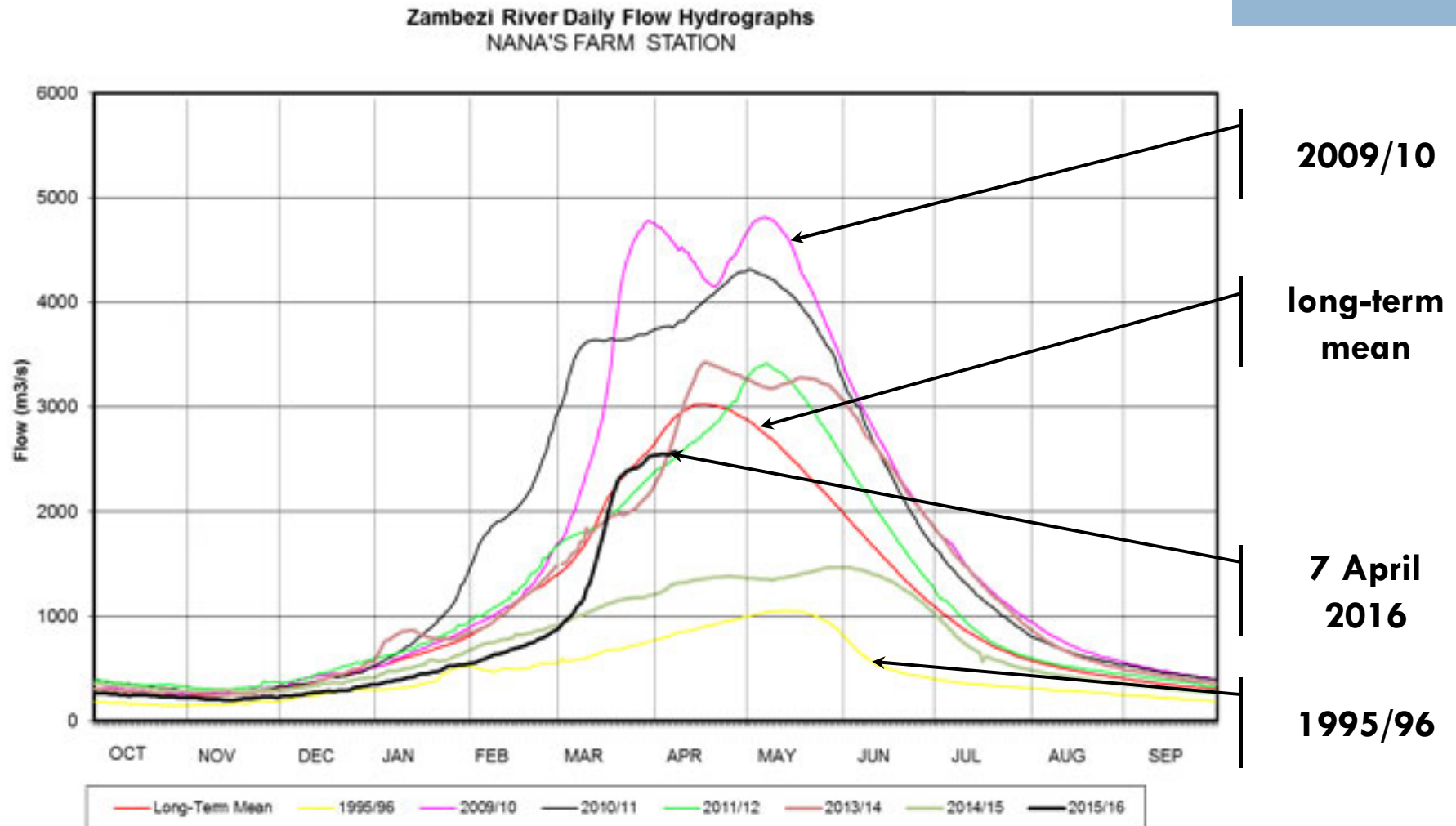
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- Preliminary assessments indicate:
 - Likely reduced runoff yield
 - Reduced flows of 26-40%
 - Increased irrigation deficits
 - Avg. temperature increases of 1.5C
 - Reduction in firm energy production of 32%
 - But, high levels of uncertainty

Zambezi basin flows - highly variable

Victoria Falls flows – Zambezi River Authority data:

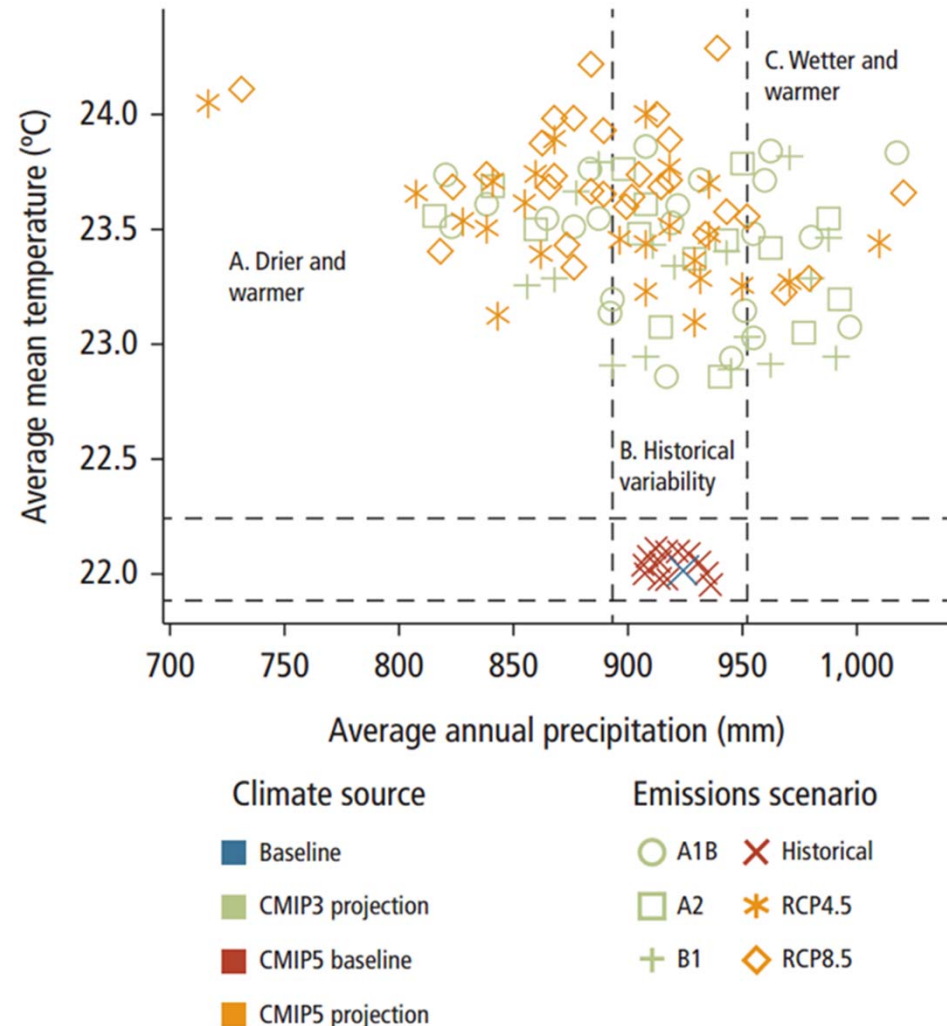
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Range of Plausible Future Climate Conditions by 2050 (ECRAI, 2015)

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- All climate projections suggest warming
- Many projections call for drier than historical conditions
- A few projections suggest wetter conditions
- Much uncertainty!



Impacts of Future Climate Change

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- The IPCC categorized the Zambezi basin as exhibiting the “worst” potential effects of climate change among 11 major African basins
- Zambezi river flow is already highly sensitive to variations in climate
- Over the next century, climate change is expected to increase this variability, and therefore the vulnerability of the basin – and its hydropower dams and other developments – to these changes.

Challenges

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- Benefits of cooperation have been recognised
 - ▣ but realising them has been elusive
- No significant investments in water management and development in the basin in the past 30 years!
- How to plan for the future in the context of climate change uncertainties?

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Zambezi Basin Opportunities

Zambezi Watercourse Commission (ZAMCOM) Agreement of 2004

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- Objective:
 - “To promote the equitable and reasonable utilisation of the water resources of the Zambezi Watercourse as well as the efficient management and sustainable development thereof”
 - Founded on the SADC Revised Protocol on Shared Watercourses.
 - IWRM Strategy for the Zambezi (2008)

Much Analytical Work Already Done!

Long history of cooperative efforts, supported by solid analytical foundations providing a strong data, information and knowledge base

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Integrated Water Resources Management Strategy and Implementation Plan for the Zambezi River Basin

Transboundary Water Management in SADC DAM SYNCHRONISATION AND FLOOD RELEASES IN THE ZAMBEZI RIVER BASIN PROJECT

Report on the Zambezi River Commission 1995

Zambia Managing Water for Sustainable Growth and Poverty Reduction

Report No. 36327-TZ United Republic of Tanzania Water Resources Assistance Strategy Improving Water Security for Sustaining Livelihoods and Growth February 2006

Zambezi River Basin Sustainable Agricultural Water Development

United Nations Economic Commission for Africa

Report on Various Cooperative Arrangements for the Zambezi River Basin Development

WorldFish Centre THE WORLD BANK

Making Water Work for Sustainable Growth and Poverty Reduction

THE WORLD BANK GROUP

THE ZAMBEZI RIVER BASIN A Multi-Sector Investment Opportunities Analysis

April 2008

NORWEGIAN EMBASSY

Euroconsult Mott MacDonald

Report on Various Cooperative Arrangements for the Zambezi River Basin Development

United Nations Economic Commission for Africa

WorldFish Centre THE WORLD BANK

Fisheries in Zambia: An undervalued contributor to poverty reduction

Malawi: Economic Vulnerability and Disaster Risk Assessment

Drought and Flood Risk Atlas

Mozambique: Economic Vulnerability and Disaster Risk Assessment

Drought and Flood Risk Atlas

September 2008

Submitted by RMSI Private Limited A Section 8(c) Public Benefit Organisation

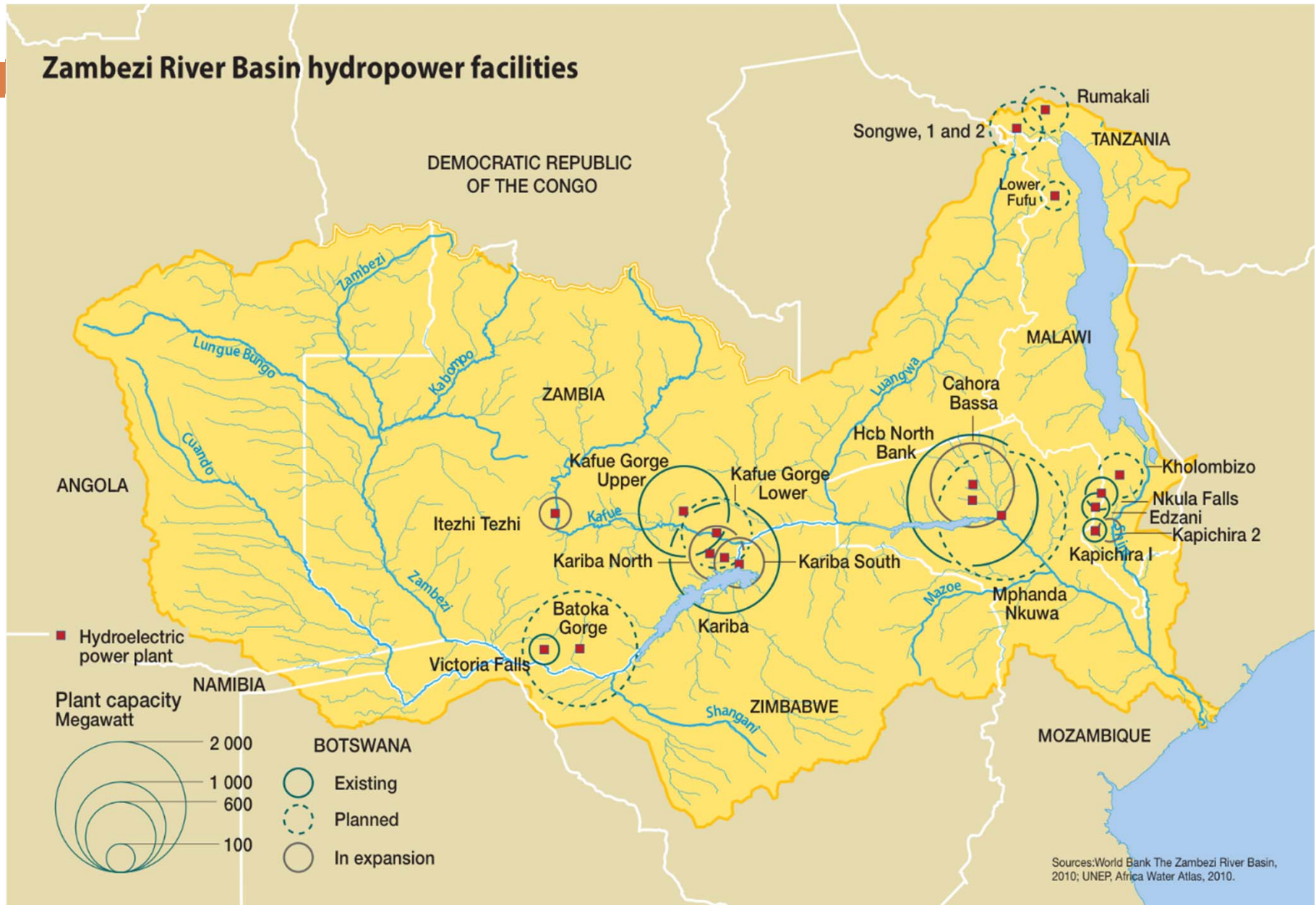
Inter-country cooperation for integrated development of water resources of the Zambezi Basin

United Nations Economic Commission for Africa

Existing and Potential HEPs

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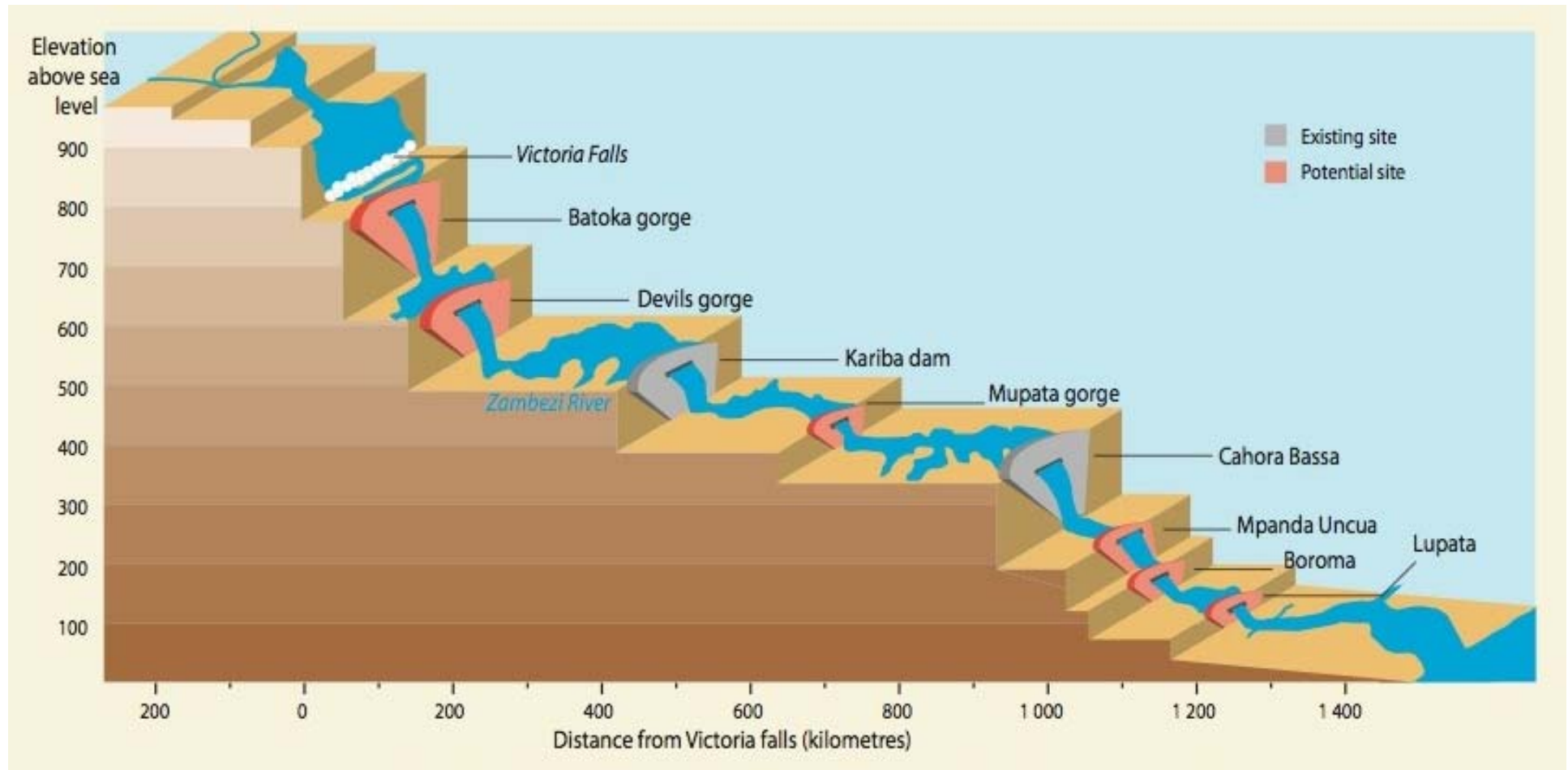
Zambezi River Basin hydropower facilities



Existing and Potential HEPs

Zambezi mainstream

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Current and Potential Hydropower

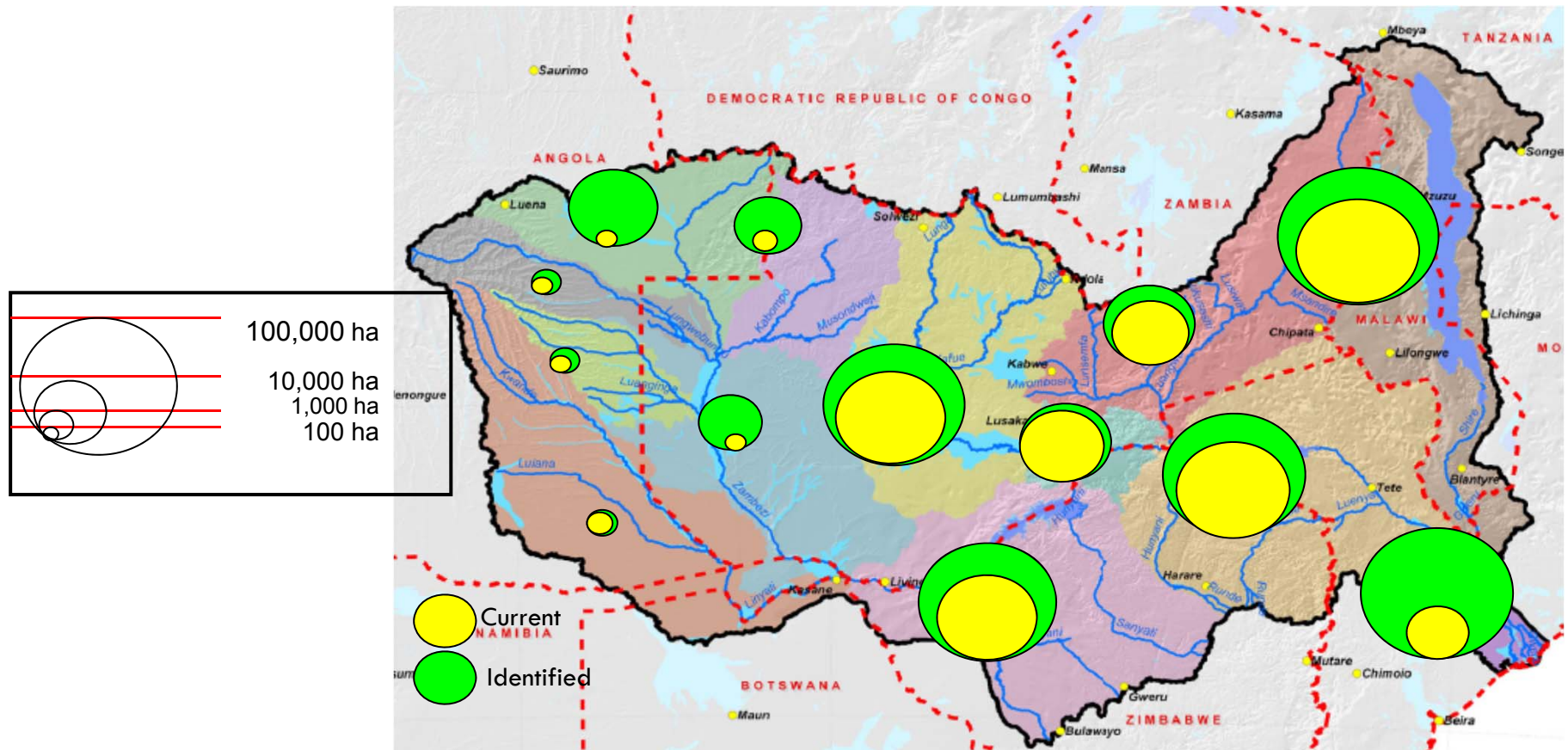
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	Current	Potential
Installed HEP generation capacity	5,000 MW half of SAPP HEP	13,000 MW
With potential investments of	\$10.6 bn	
Increase in average energy production	30,000 GWh/yr	90,000GWh/yr
Increase in firm energy production	23,000 GWh/yr	58,000 GWh/yr

- Coordinated operation of existing dams = 7% increase in firm energy adding \$585m over 30 yrs
 - At no added cost!

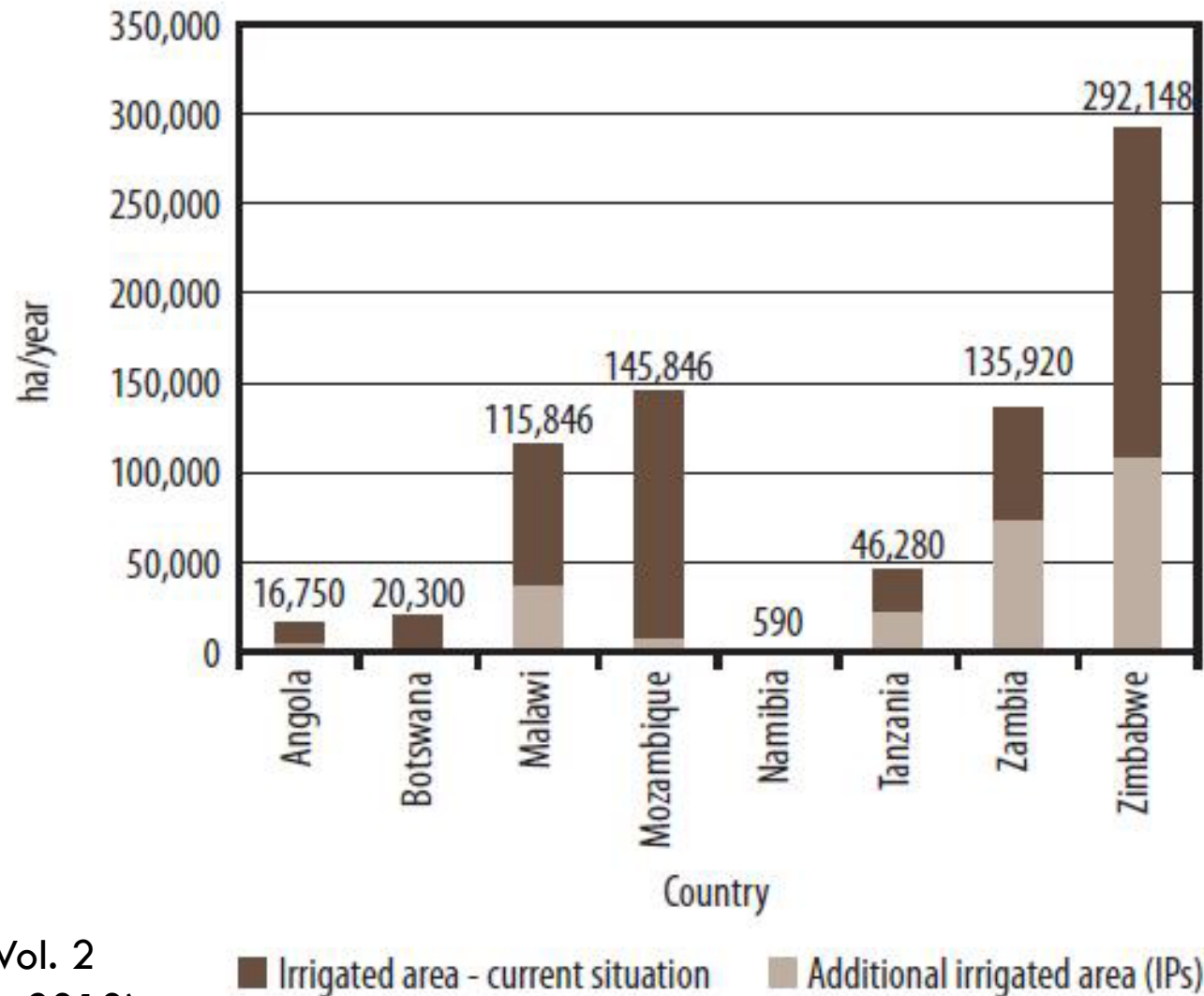
Current and Potential Irrigation

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Estimated total average irrigated area per country: Scenario 3

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(Fig 2.9, Vol. 2
World Bank, 2010)

Current and Potential Irrigation

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	Current	Potential
With potential investments:	\$2.5 bn	
Increase average area irrigated from	260,000 ha/yr	775,000 ha/yr
New job creation:	>500,000 jobs in the agriculture sector	

Other basin opportunities/benefits

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- Disaster Risk Reduction:
 - Hydropower and irrigation interventions will increase resilience with est \$1 bn reduced losses to floods, droughts and climate change
- Navigation:
 - reduced costs and improved opportunities for development through river navigation, and bridges
- Environmental management:
 - flow management in the delta, improved fisheries and basin-wide e-flows, etc.
- Fisheries production
 - lake and deltas
- Water supply for people and industry
 - >1,000m³/yr for Botswana, Malawi, Zambia and Zimbabwe
- Mining
 - potential negative impacts to water quality to be mitigated, and
 - reduced-cost transportation/navigation options to be explored
- Tourism

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Zambezi Basin: Key Messages

Zambezi basin development planning – climate change challenges:

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- Hydropower and irrigation project designs based on historical data may not adequately consider the risks associated with future flows and more extreme floods and droughts due to the changing climate
- The value of ecosystem goods and services have so far not fully taken into consideration in economic assessments of HEP and irrigation projects

Some considerations/recommendations:

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- Assess HEP in the context of comprehensive and strategic basin-wide planning considering ***all beneficial uses*** – already a goal of the ZSP
- Incorporate climate change scenarios into HEP designs
 - ▣ easier said than done given uncertainties
- Diversify regional power production to reduce HEP dependency
- Improve existing HEP generation capacity through collaborative management and operations
- Seek “no regrets” investments that increase climate resilience
 - ▣ i.e. prioritise investments that increase resilience to climate change
- Implement e-flows to support adaptation to climate change

Relevance of ECRAI Study to Zambezi investment strategic plan

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- Clear messages from the ECRAI study:
- Incorporate climate change scenarios into strategic plan development processes.
- Prioritise investments that increase climate resilience.

Selected References

- Beilfuss, R. 2012. A risky climate for Southern Africa Hydro. Assessing hydrological risks and consequences for Zambezi river basin dams. International Rivers. 60pp. <http://www.internationalrivers.org/resources/a-risky-climate-for-southern-african-hydro-7673>
- SADC-WD/ZRA. 2008. Integrated Water Resources Management Strategy and Implementation Plan for the Zambezi River Basin. <http://www.zambezicommission.org/downloads/Zambezi%20River%20Basin%20IWRM%20Strategy%20ZAMSTRAT.pdf>
- SADC/GIZ. 2011. Dam Synchronisation and Flood Releases in the Zambezi River Basin Project. <https://drive.google.com/a/zambezicommission.org/file/d/0B-pHY2DRpu1LWi00X3BJb0wyZGM/view?usp=sharing>
- World Bank. 2010. The Zambezi River Basin: a Multi-Sector Investment Opportunities Analysis. <http://documents.worldbank.org/curated/en/docsearch/report/58404>

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Thank you!