ASSESSING WATER FOOTPRINT OF TOBACCO PRODUCTION IN MPUMALANGA PROVINCE, SOUTH AFRICA: IMPLICATION FOR WATER USE POLICIES AT A FARM LEVEL

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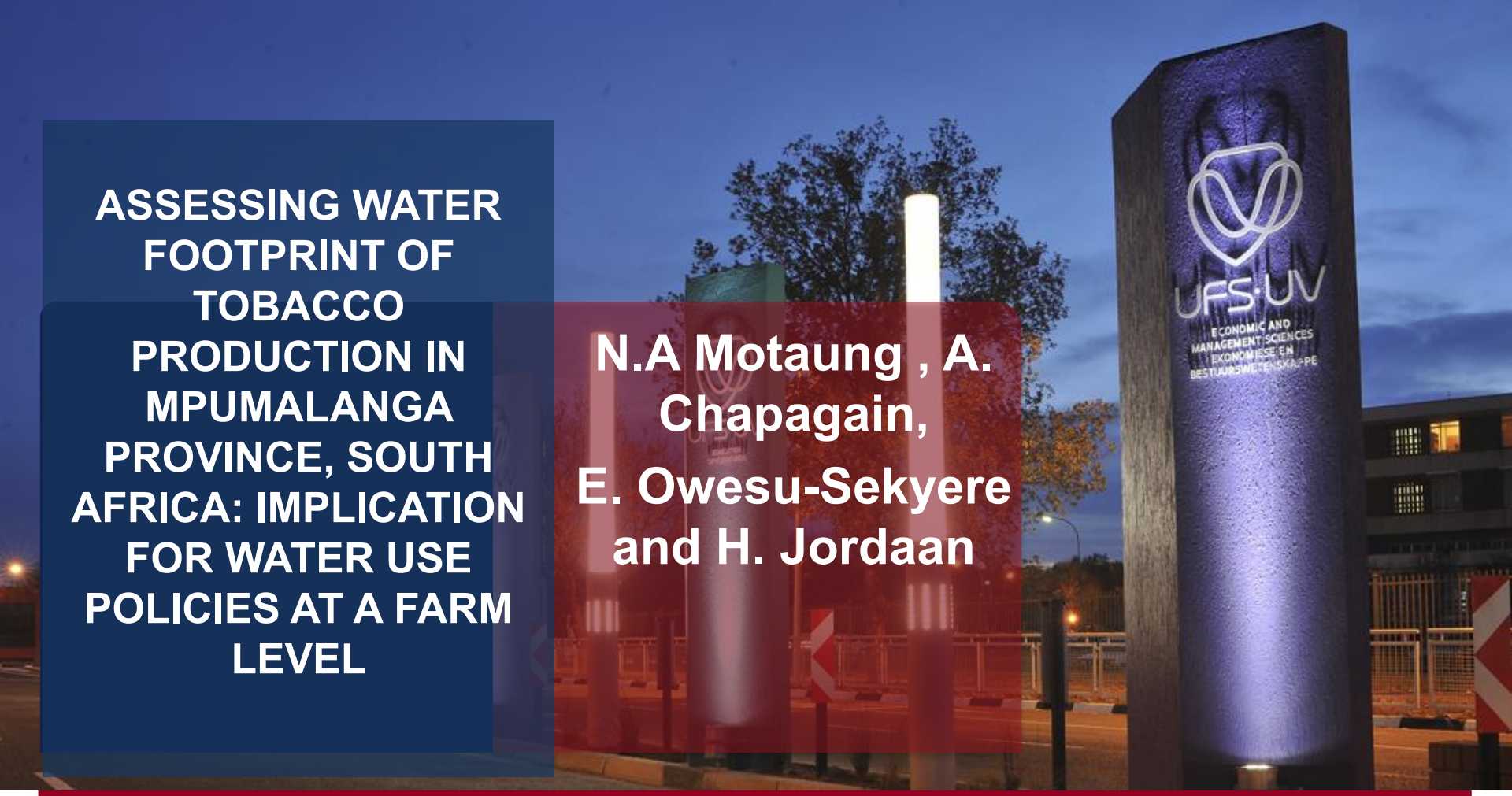

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PRESENTATION OUTLINE

1. Background and motivation
2. Data and method
3. Volumetric water footprint
4. Results
5. Discussions
6. Conclusion

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DID YOU KNOW??

- Blue WF
- Green WF
- Grey WF
- 1 cup of coffee = 140 Litres of water

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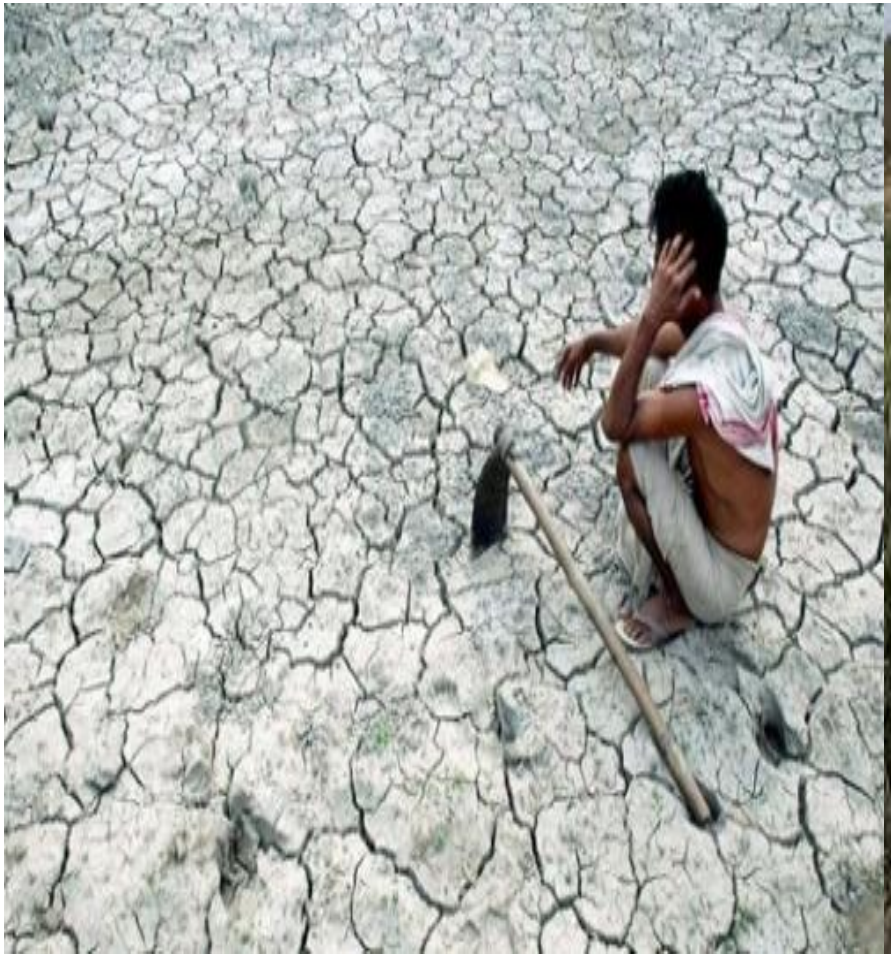
WATER SCARCITY



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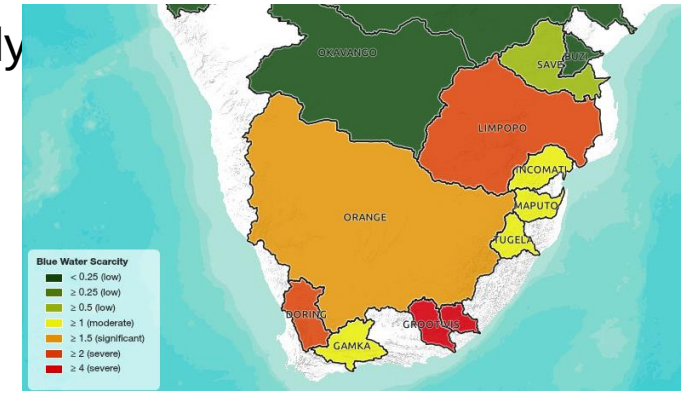
BACKGROUND AND MOTIVATION

- Water scarcity is an ever-worsening issue globally
  - More than 40% global population suffering (FAOSTAT, 2016)

- South Africa is a water scarce country
  - Ranked the 30th driest country in the world (DWA, 2013)
  - Agriculture is the single largest utilizer of available water (DAFF, 2016)



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BACKGROUND AND MOTIVATION

- Tobacco is as an important agricultural crop from an economic perspective (DAFF, 2016)
  - Provision of jobs;
    - Farm level and processing plants
  - Generate excise duty;
  - Earn foreign exchange.

- Vast amount of water is consumed for tobacco production

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BACKGROUND AND MOTIVATION

- Water footprint concept:
  - Is a useful indicator of freshwater use that takes into account both direct and indirect water use (Chapagain and Hoekstra, 2008; Hoekstra et al., 2011)
  - Allows for interpreting water use in the context of water availability to understand the degree of sustainability of water use (Hoekstra et al., 2011)

- Water footprint distinguishes between:
  - Blue water footprint
  - Green water footprint
  - Grey water footprint

Blue water footprint

The blue water footprint is an indicator of consumptive use of so-called blue water - fresh surface water or groundwater.

“Consumptive use”:

- *Water evaporates;*
- *Water is incorporated into the product;*
- *Water does not return to the same catchment area, for example; and/or water does not return in the same period*

Green water footprint

The green water footprint is an indicator of the human use of the so-called green water – precipitation stored in the soil or temporarily staying on top of the soil or vegetation.

“Human use of the green water”:

- *Water is evaporated or transpired*
- *Water is incorporated into the product*
- *Found in crop/fruit growth and forestry production.*

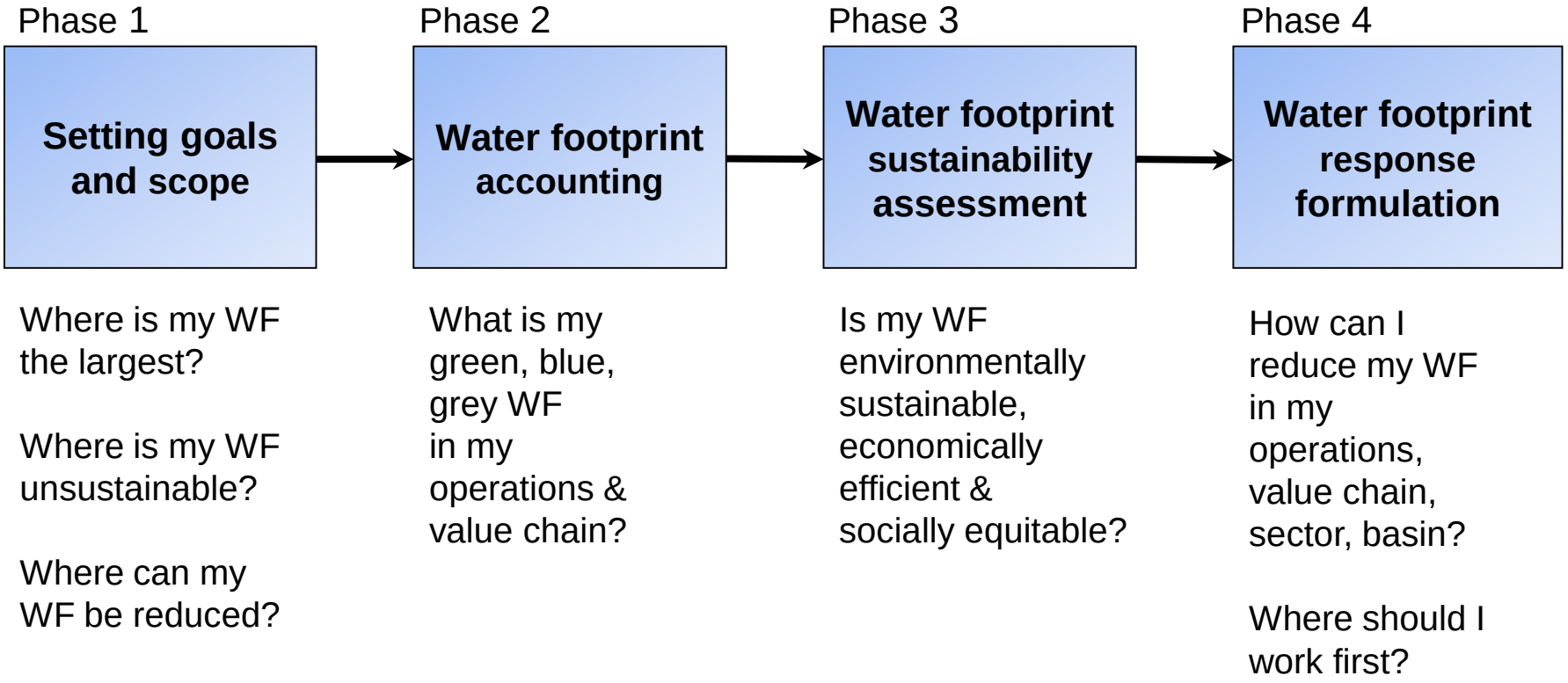
Grey water footprint

The grey water footprint the volume of freshwater that is required to assimilate the load of pollutants in order to maintain the quality of the ambient water above the agreed water quality standards.

“Assimilation capacity”
with respect to:

- *Pollution load;*
- *Ambient water quality standards;*
- *Natural background water quality.*

Water Footprint Assessment: 4 Phases



(Hoekstra et al., 2011)

SCOPE OF THE STUDY

The study focus:

- Blue plus Green Water Footprint
- Farm level
- Case study at Loskop Irrigation Scheme.
  - Supplementary irrigation.

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STUDY AREA

The Loskop Irrigation scheme :

- Located at the Groblersdal, in the Mpumalanga province

- Found in the upper Olifants sub-catchment, Groblersdal (DAFF, 2016).

- Ranked as the 2nd largest irrigation scheme in South Africa.

-Size of the scheme approximately to 25 600 ha

- Mean annual rainfall is in the range of 500 mm to 800 mm

Source: DWAF 2002

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DATA AND METHODOLOGY

- The ET values were used to estimate the WF components,
- SAPTWAT 4 (Van Heerden and Walker, 2016)

Table 1. Summary of data for water use at measuring points in Loskop Irrigation Scheme

Crop	Crop option	Yield (ton/ha)	ET_{crop} (mm)	R (mm)	EI (mm)	ER (mm)	EI+ER (mm)
Tobacco	Short grower	3	596	378	313	280	593

Source: Author's estimates

METHODOLOGY FOR TOBACCO

- Estimating the WF components using the concepts outlined in the Water Footprint Assessment Manual (Hoekstra et al., 2011);

$$WF_{blue} = \frac{CWU_{blue}}{Y} \quad (1)$$

$$WF_{green} = \frac{CWU_{green}}{Y} \quad (2)$$

$$WF_{blue+green} = WF_{blue} + WF_{green} \quad (3)$$

RESULTS

Table 2. Crop water use components and WF indicators for tobacco production in Loskop irrigation area.

Blue and green water usage							
ET_{crop}	ET_{green}	ET_{blue}	CWU_{green}	CWU_{blue}	Yield	WF_{green}	WF_{blue}
mm/period			m³/ha		ton/ha	m³/ton	
596	280	313	2800	3130	3	933	1043
$WF_{green+blue}$							1977

Source: Author's estimates

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DISCUSSION

- The results for the total tobacco water footprint indicator were **1 977 m^3/ton**

- Of this results water , WF blue constitutes **53%** and WF green constitutes **47%,** respectively.

- Tobacco production at the Loskop Irrigation scheme utilizes vast amount of irrigation water compared to effective rainfall water, however that green fraction also confirms the importance of rainfall

- Global water footprint of crop production estimated **78%** green and **12%** blue (Mekonnen and Hoekstra, 2011).

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CONCLUSIONS

- The tobacco production at Loskop Irrigation scheme relies on both green and blue water footprint.

- Further research:

- Include the grey water footprint because it contributes significantly to the total water footprint of tobacco production.

- Gather economic information and analyze whether it is sustainable to produce this agricultural commodity

Thank You
Dankie

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