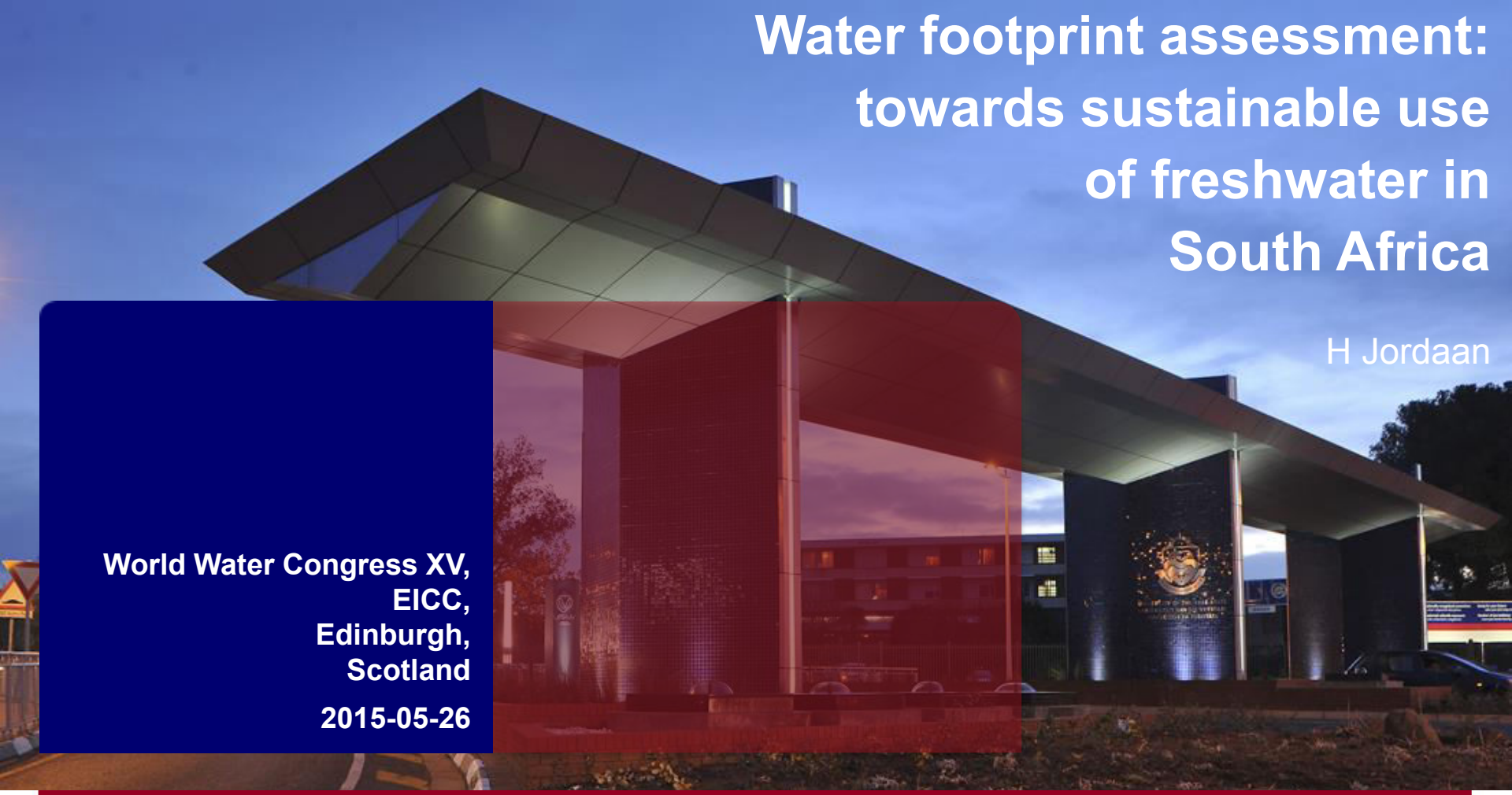
Water footprint assessment: towards sustainable use of freshwater in South Africa

H Jordaan



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INTRODUCTION

- South Africa is ranked 30th driest country in the world (DAFF, 2013).
- Rapid growth and increased variability in rainfall caused (DAFF, 2013):
  - Tighter supply;
  - Demand often exceeds supply in different basins in SA.
- Agricultural sector is a major user of scarce freshwater resource in South Africa.
  - Irr agric uses about 40% of exploitable runoff (Backeberg and Reinders, 2009).
  - Direct contribution to Gross Domestic Product of SA is small (<3%) (DAFF, 2014).
  - Currently the agricultural sector may be an inefficient user of freshwater (Nieuwoudt, Backeberg & du Plessis 2004:162)

INTRODUCTION (CONT…)

- Agricultural sector is crucial for food security in SA
  - Produce food;
  - Generate employment along whole value chain.

  => Need to use scarce freshwater resource in a sustainable manner.
    - Environmental; economic; social (Three pillars of sustainable water use (Hoekstra, 2014))

- Water footprint is important sustainability indicator for agri-food sector (Ridoutt et al., 2010).
  - It is believed that water footprint information can guide policy towards sustainable use of freshwater (Hoekstra *et al*., 2011).
  - Economic growth has to be planned in context of sector specific water footprints (DWA, 2012).

- Aim: Report on some WFA activities in South Africa.

WATER FOOTPRINT ASSESSMENT IN SA

- Eight organisations are involved.
  - Funders
    - Water Research Commission (WRC) (Initiating, funding and managing WF-research).
    - National Research Foundation (NRF) (Funding WF-research)
  - Researchers
    - Four universities
      - University of the Free State
      - University of Pretoria
      - Rhodes University
      - Wits University
    - Research Institute
      - CSIR
    - Consultancy firm
      - Pegasys:

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WATER FOOTPRINT ASSESSMENT IN SA (CONT…)

- Pegasys
  - Dr Guy Pegram (Project leader)

  - Breede River Catchment in South Africa.
  - Basin wide assessment for Water Resource Management Plan for Orange-Senqu Basin.
  - WRC project
    - Case studies to assess value of WFA as tool for companies to:
      - assess their water use,
      - Assess impact of their water use on the freshwater resource.

    => They concluded that WFA is useful tool to achieve such an objective.

WATER FOOTPRINT ASSESSMENT IN SA (CONT…)

- WITS University
  - Dr Kevin Harding (project leader)

  - Water footprint of:
    - Paper and pulp industry in South Africa
      - 11 different sites across South Africa
    - Three Platinum mines
      - 2 underground; 1 open cast
    - Gold/Coal mine
      - TBC

WATER FOOTPRINT ASSESSMENT IN SA (CONT…)

- Rhodes University (NRF Project)
  - Prof Gavin Fraser (project leader)

  - Water footprint of citrus production in Sundays River Valley of South Africa
    - Calculated the volumetric water footprint indicator
    - Conducted sustainability assessment
      - Considered inter-basin transfer
    - Assessed economic water productivity

WATER FOOTPRINT ASSESSMENT IN SA (CONT…)

- University of Pretoria and CSIR (WRC Project: K5/2273//4)
  - Dr Michael van der Laan (Project leader)

  - Water Footprint of selected vegetable and fruit crops produced in South Africa.
    - Case studies (Irrigated crops)
      - Steenkoppies Aquiffer & Doorn/Olifants Catchment
        - » Potatoes; Onions; Tomatoes; Carrots; Beetroot; Broccoli;

  => Research in progress

WATER FOOTPRINT ASSESSMENT IN SA (CONT…)

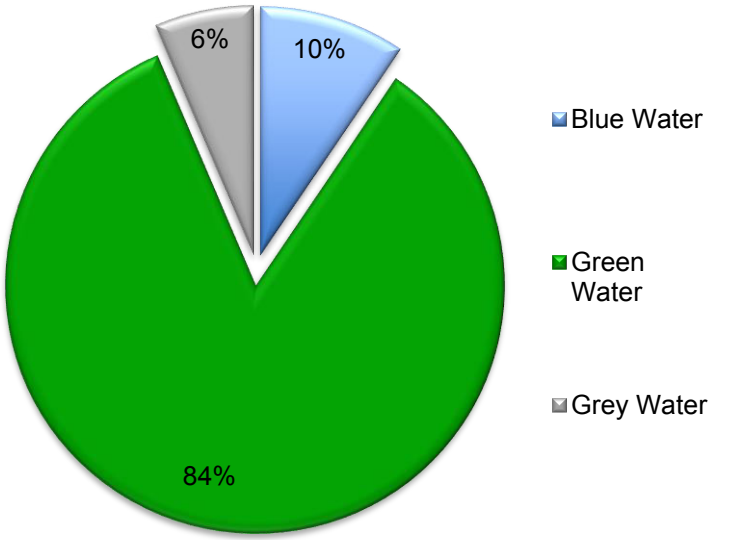
- University of the Free State (WRC Project K5/2397//4)
  - Dr Henry Jordaan (Project leader)
  - Assessing the water footprints of selected field and forage crops towards sustainable freshwater use in South Africa
    - Case studies
      - Irrigated crops and their derived crop products:
        - » Maize and wheat
        - » Alfalfa and irrigated pastures
      - Calculating volumetric water footprint indicators of crops
      - Sustainability assessment (environment; economic; social)
      - Economic water productivity
    - Consumer awareness and willingness to pay price premium for water footprint information.

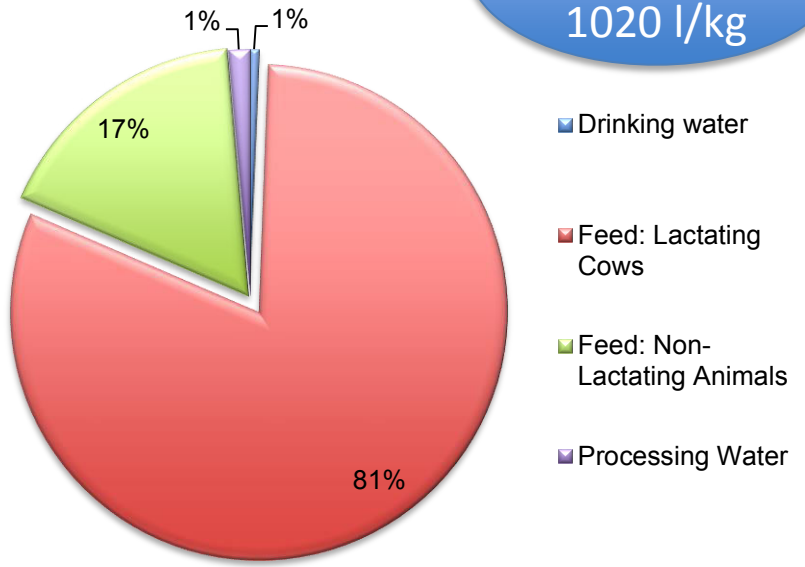
WATER FOOTPRINT ASSESSMENT IN SA (CONT…)

- Preliminary findings:
  - Total water footprint of milk (4% fat; 3.3% protein) value chain:

		Blue	Green	Grey	Total	
Total water Footprint		0.097	0.862	0.066	1.025	**m^3/kg**
		96.99	**862.21**	**65.76**	**1024.97**	**litre/kg**

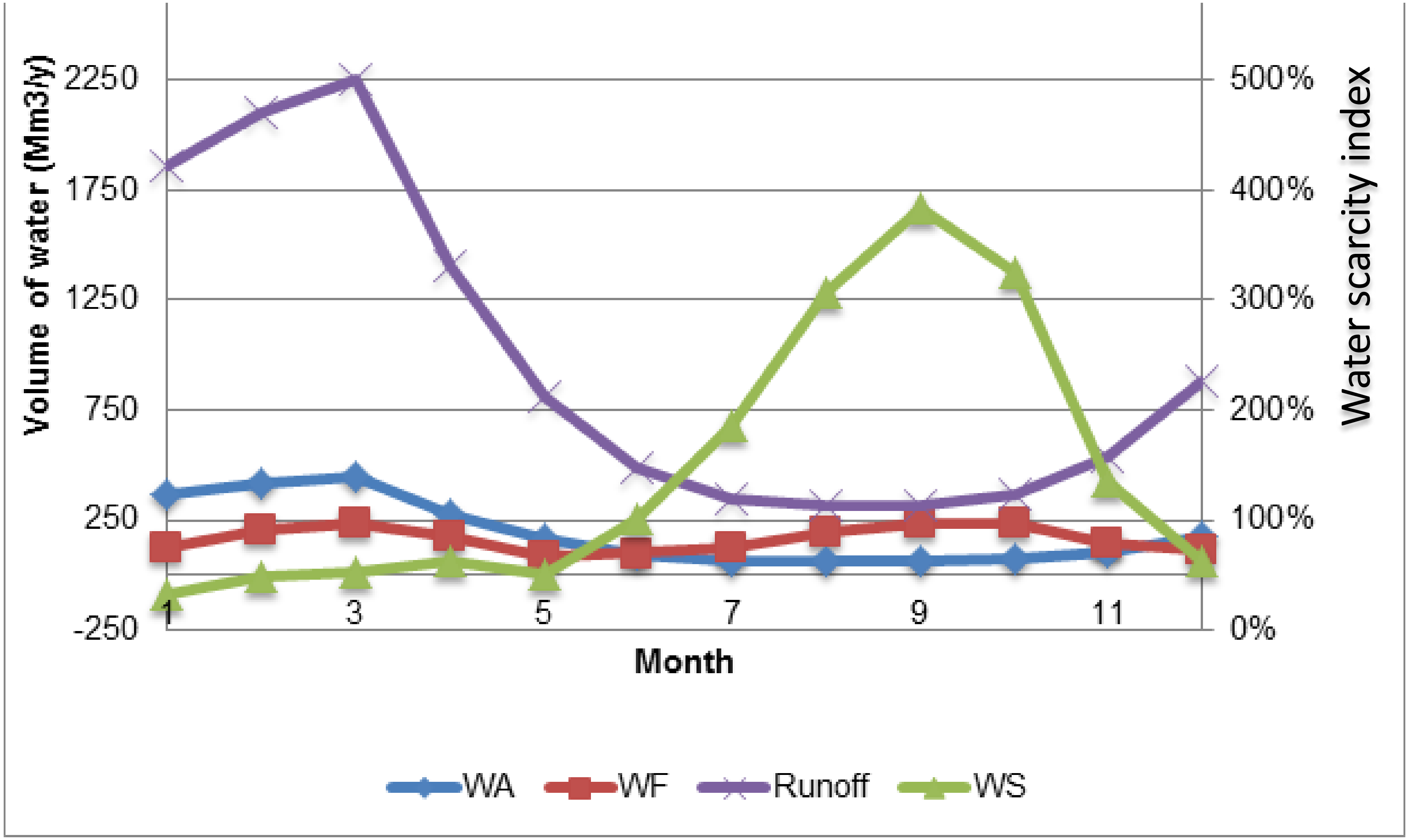
Global average = 1020 l/kg





WATER FOOTPRINT ASSESSMENT IN SA (CONT…)

- Sustainability assessment (Source: Hoekstra and Mekonnen 2011):



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WATER FOOTPRINT ASSESSMENT IN SA (CONT…)

- Value added to water:

	1Litre	3Litre	
Dairy Value Added	R 1.57	R 1.57	R/kg
Processing Value Added	R 5.84	R 4.01	R/kg
Retail Value Added	R 4.70	R 3.46	R/kg
Total Value Added	R 12.11	R 9.04	R/kg
Water Used for Production	1.0250		m^3/kg
Value Added to the Water	**R 11.81**	**R 8.82**	**R/m^3**

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CONCLUSIONS AND RECOMMENDATIONS

- WFA is a relatively new field of research in South Africa.
  - Some industries reacted with distrust.
- Drive is mainly to generate local, context specific information on freshwater use:
  - Case studies.
  - Involve industry partners.

  => to ensure buy-in of everybody for sustainable freshwater use in SA.

CONCLUSIONS AND RECOMMENDATIONS

- Recommendations:
  - Clearly specify
    - The aim and scope of the WFA.
      - Why are you doing WFA?
      - What exactly are you doing (i.e. case study, etc.)?
      - What data was collected and used?
  - Involve industry partners.
    - Get their buy-in.
    - Also increase awareness.

ACKNOWLEDGEMENTS

- WRC
  - initiated, manages and funds my project;
  - is the main driver of water footprint assessment in South Africa.
- UFS for support and additional funding.
- NRF for funding.
- RMRDSA for funding.

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Thank You
Dankie

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