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Water Resources Accounts in Rwanda using Natural Capital Accounting Process

By

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Presentation Outline

- Introduction
- Study area description
- Research objectives
- Methodology
- Results and discussion
- Concluding remarks

Introduction

Sector & Institutional Issues

- **Water resources are under pressure** due to population growth and rapid economic development (6.9% GDP in 2015).

- Extremely **water dependent agriculture**;
  - **34% of GDP** (2014) and **Employing 90%** of population (directly / indirectly)

- **Water related issues** in the country: **Access**, Excess, **shortage**, water **quality**, water emissions / pollution **which harm to economic** output and value;

- **Urban water provision is uncertain**;

- Rural households rely on **less hygienic sources**, adding to the burden of **disease**;

- **Access to fresh water** by HH and production;

- **Current statistics** not detailed enough to provide accurate information on water allocation (e.g. **limited statistics** especially in **domestic water supply**).

Methodology and types of accounts

Methods and accounts

- Physical **Supply and Use tables;**
- Physical **Water Asset Accounts**;
- Use of **SEEA** (System of Environmental-Economic Accounting 2012 (United Nations New York, 2014);
- Use of **ISIC** (International Standard Industrial Classification of ALL economic activities) Revision 4 published by UN in New York 2008;
- Use of **Data from NWRMP** (Rwanda National Water Resources Master Plan) for year 2012;
- **Additional data** as rainfall, evapotranspiration, soil water, surface water, groundwater and artificial reservoirs **for 2010 to 2015** were collected from different institutions.

Data collected

- **Hydrometeorological data (**Rainfall Temp, and rivers from **Rda Meteo** and **RNRA)**
- **Agriculture data (**livestock, Forestry, crops and fish from **MINAGRI**/ RAB, RNRA**)**
- **Water supply & sewerage** (WASAC, AquaVirunga)
- **Mining and quarrying data** (Coltan, Wolfram, Cassiterite from **RNRA**)
- **Rainwater harvested** (ROTO, AfriTanks,… from **NISR, GT Bank and SACCO**)
- **Manufacturing data** (Textiles, Tobacco, Maize, Sugar,.. From **RDB**)
- **Electricity data** (REG)
- **Water permit data** (Water users from **RNRA**)
- **Accommodation** (Hotels, Restaurants, .. from **RDB);**
- **Country population trends (NISR);**

Results and discussion

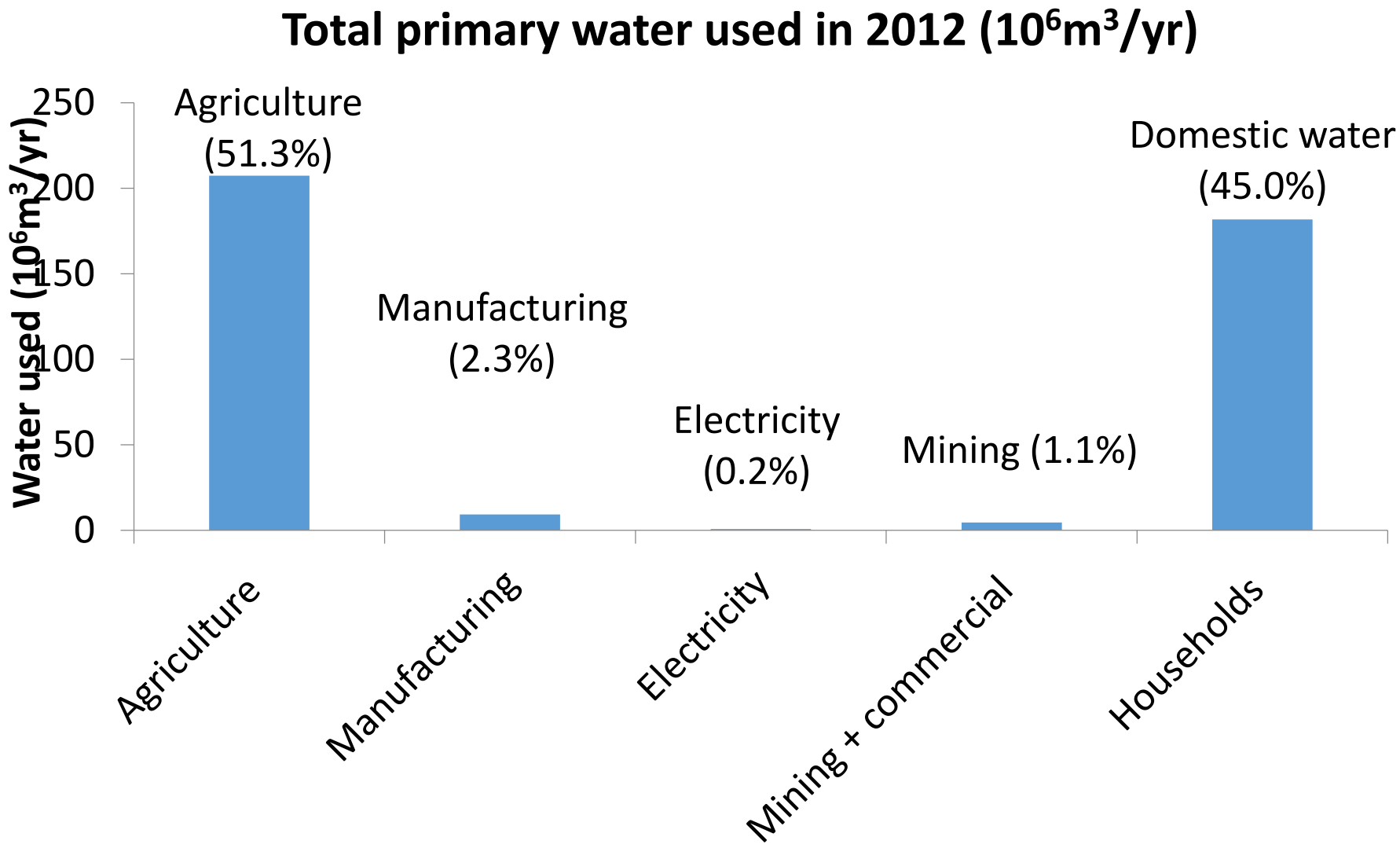
Water supply (abstractions) for year 2012 based on NWRMP in 10^3 m^3

	Abstraction of water, Production of water, Generation of return flows							Flow from the environment	Total supply 000m^3
	01 Agriculture	10 Manufacturing	35 electricity	36 water supply	37 sewerage	other industries + Mining +commercial	97 Households		
(I) Sources of abstracted water									
Surface Water								150,570	150,570
Ground water								128,610	128,610
Green water								33,494	33,494
Rainwater harvesting								807	807
(II) Abstracted Water									
For distribution				279,180					279,180
For own use	807	xx	xx		xx	xx			807
(III) Wastewater and reuse water									
Wastewater	9,106	6,866				3,406	149,652		159,924
Reused water	81,951	1,212			?	601	5,723		89,487
(IV) Return flows of water									
To inland water resources					159,924				159,924
(V) Evaporation of abstracted water, transpiration and water incorporated to products									
Evaporation	605	3,433	0	20,686	0	1,703	14,965		41,392
Losses	xx	xx	xx	xx					xx
Incoprporated	xx	xx	xx	xx					xx
Return flows	xx	xx	xx	?	xx	xx	xx		xx
TOTAL SUPPLY	**92,469**	**11,511**	**0**	**299,866**	**159,924**	**5,710**	**170,340**	**313,481**	**1,044,196**

Water use within the economy for year 2012 based on NWRMP in 10^3 m^3

	Abstraction of water, intermediate consumption, Return flows						Final consumption	Flow to environment	Total use
	Agriculture	Manufacturing	35 electricity	36 water supply	37 sewerage	other industries + Mining +commercial	Households		000m^3
(I) Sources of abstracted water									
surface Water	xx	xx	xx	150,570	xx	xx	xx		150,570
Ground water	xx	xx		128,610	xx	?	xx		128,610
Green water	33,494	?					?		33,494
Rainwater harvesting	807	?				?	xx		807
(II) Abstracted Water									
Distributed water	90,250	8,078	784			4,007	176,061		279,180
For own use	807		xx		xx		xx		807
(III) Wastewater and reused water									
Wastewater					159,924				159,924
Reused water	81,951	1,212			?	601	5,723		89,487
(IV) Return flows of water									
To inland water resources								159,924	159,924
(V) Evaporation of abstracted water, transpiration and water incorporated into products									
								41,392	41,392
TOTAL USE	**207,310**	**9,290**	**784**	**279,180**	**159,924**	**4,608**	**181,784**	**201,316**	**1,044,196**

Figure 1. Total primary water used in $10^6 m^3$/year for 2012



Physical Asset account for 2012 in Million m^3

MCM	Surface water			Soil water	Groundwater	Total
	Lakes	Rivers	Artificial reservoirs			
Opening stock water resources	553,838	6,822	54,253	33,494	62,127	**710,534**
Additions to stock						
Returns of water	223,990		xx	xx	xx	223,990
Precipitation	27,507	321	2,550	261	2,921	33,560
Inflows from other territories		**0.143**	xx			0.143
Inflows from other inland water resources	xx	xx				xx
Total additions to stock	251,497	320.831	xx	261	2,921	**257,550**
Reductions in stock						
Abstraction of water	279,987	xx	xx	xx	xx	279,987
Evaporation and transpiration	20,686	xx	xx	xx	?	20,686
outflows to other territories	0	**11**	?			11
outflow to the sea	0	0	0			0
outflow to other inland water resources	xx	0	xx	xx	xx	x
Total reductions in stock	300,673	11	xx	0	0	**300,684**
Closing stock water resources	504,662	7,132	xx	xx	65,048	**667,400**

Concluding remarks

- **Data are very** useful to improve the environmental policy,
- **Economic Water Accounts is also important and should** inform on **water productity (contribution to GDP),**
- **NCA WA is a complex**, multidisciplinary area, require many **agencies** and **professional** to work together,
- **NCA WA is a tool** to implement the Sustainable Development Goals (SDGs);
- **NCA WA provides information/data** for **green indicators** and is a **tool to monitor its implementation** progress.
- **Finally, Water demand** is **expected to grow** following the country's economic development. **Hence**, **water productivity increase** and **measures to minimize negative effect of water**, **proper management of water will be crucial**.

Thank you for your attention

Questions?

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