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Rwanda Water Resources Accounts

Preliminary Findings

By

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Presentation Outline

- ❖ **Introduction**
- ❖ **Study area description**
- ❖ **Objectives**
- ❖ **Methodology**
- ❖ **Results and Policy Implications**
- ❖ **Way forward**

Introduction & Rationale

Water Sector & Institutional Issues

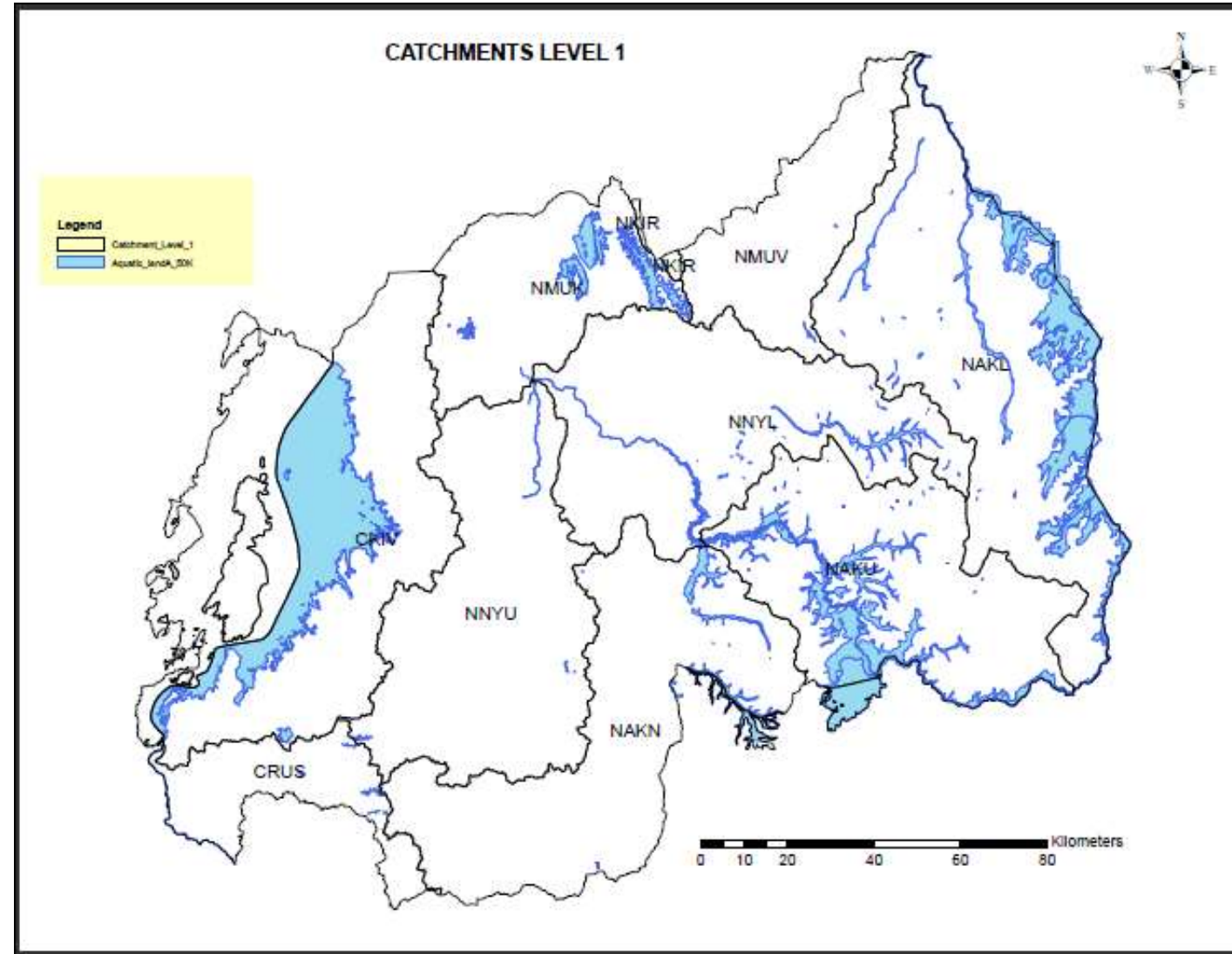
- **Water is a cross-cutting resource** and Water resources are under pressure due to population growth (> 11.5 M) and rapid economic development (Rda: 6.1% GDP growth in 2017);
- Extremely water dependent agriculture;
 - **31% of GDP** (2014) and Employing almost 50% of population (directly) and over 60 – 70 (incl. indirectly);
- **Water related issues in the country:** Water resources, large & essential input to economy (agriculture), Water efficiency, shortage, water quality, water pollution which harm to economic output and value;
- Previous statistics not detailed enough to provide accurate information on water allocation; water productivity, water resource use and water contribution to GDP and employment.

Why Water Accounts?

- **Inform policy makers** in decision making and policy formulation as a National Development priority sector;
- Clarify and compare the **economic values of water** in competing uses;
- Provide more accurate picture of **overall water use**, potential constraints to growth;
- Relate economic production to water use, **water productivity**;
- Monitor and enhance water productivity across sectors in Rwandan economy (use efficiency);
- Identify potential for improvement performance **'water supplying sector**, like water efficiency in supply.

Study area description

All 9 catchments of Rwanda at Level 1 were considered in this initiative



Literature Review:

❖ Population growth, urbanisation

- ✓ 2015: around 2% of renewable water used
- ✓ 2040: over 50% (average)
- ✓ 2040: over 80% in specific catchments

❖ Risk of severe water stress and decreased water quality due to increasing pollution

Water Accounts Objective

- Compile a **hybrid water accounts** which allows to derive indicators that inform issues surrounding water allocation
- From existing data sources establish system of data collection and subsequent compilation of physical **(Physical water flow accounts and water asset accounts)** and monetary water accounts

Methodology

Methodology

- 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.

Methodology

- Physical **Supply and Use tables** were compiled and analysed;
- Physical **Water Asset Accounts** was compiled and analysed;
- **Additional data** as rainfall, evapotranspiration, soil water, surface water, groundwater and artificial reservoirs **for 2010 to 2015** were collected from different institutions and used in this study.

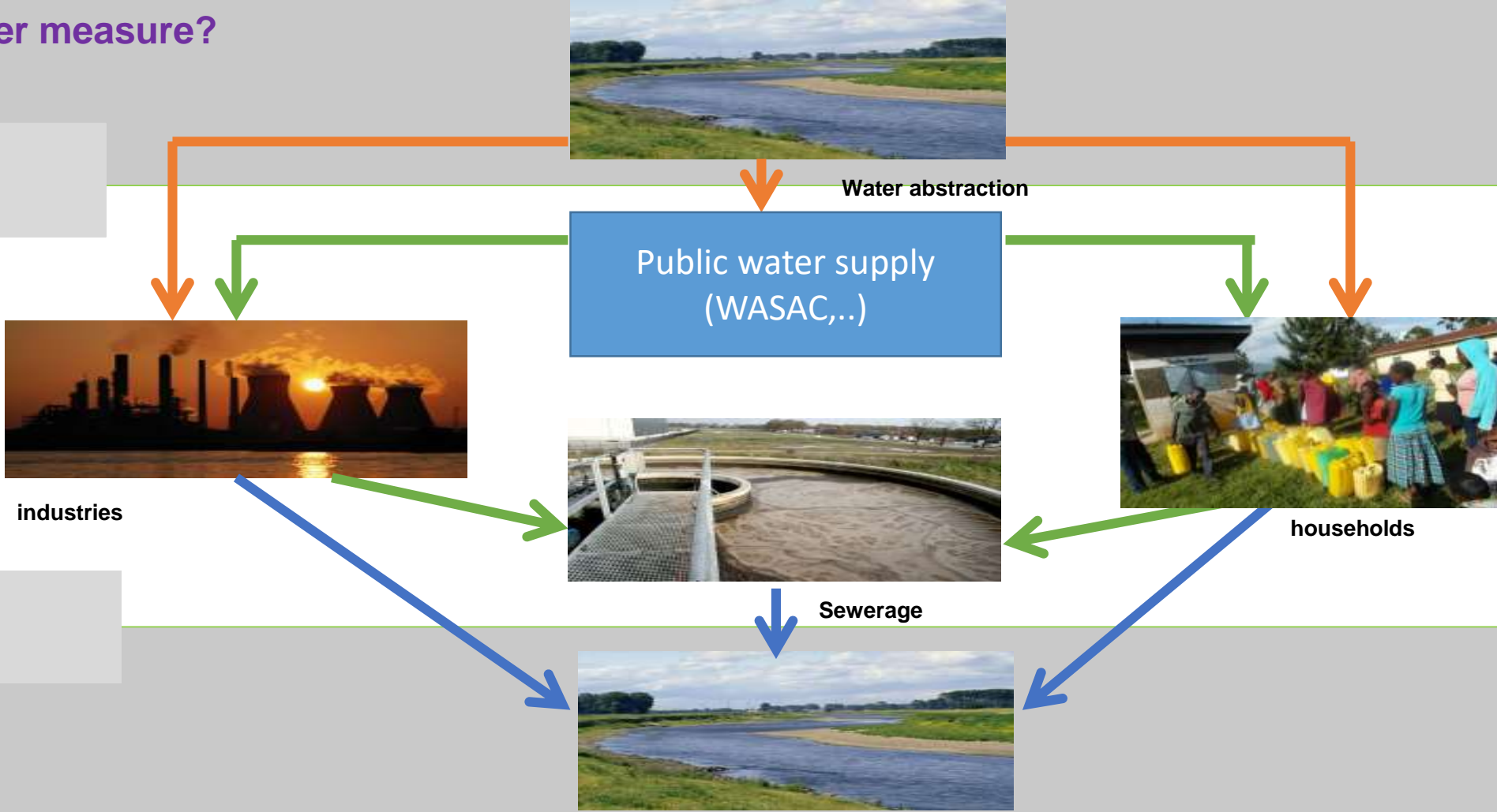
Physical Water Flow Accounts (PWFA)

What do PWFA for water measure?

Flows from environment to economy

Flows within the economy

Flows from economy to environment



Types of Data collected and sources

- **Hydrometeorological data** (Rainfall Temp, and rivers from **Rda Meteo & RWFA**)
- **Agriculture data** (livestock, Forestry, crops and fish from **MINAGRI/ RAB, RWFA**)
- **Water supply & sewerage** (WASAC, AquaVirunga)
- **Mining and quarrying data** (Coltan, Wolfram, Cassiterite from **RWFA**)
- **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 **RWFA**)
- **Accommodation** (Hotels, Restaurants, .. from **RDB**);
- **Country population trends (NISR); etc**

Results and Policy implication

Water Accounts: Main docs available

- **Draft Water accounts document Version 1 available**
- **Three water policy briefs elaborated:**
 1. Water use efficiency and productivity,
 2. Water stress, and
 3. Water resources availability and water demand.

Findings on Policy briefs

- Water Use efficiency and Productivity
 - **SDG6.4.1:**

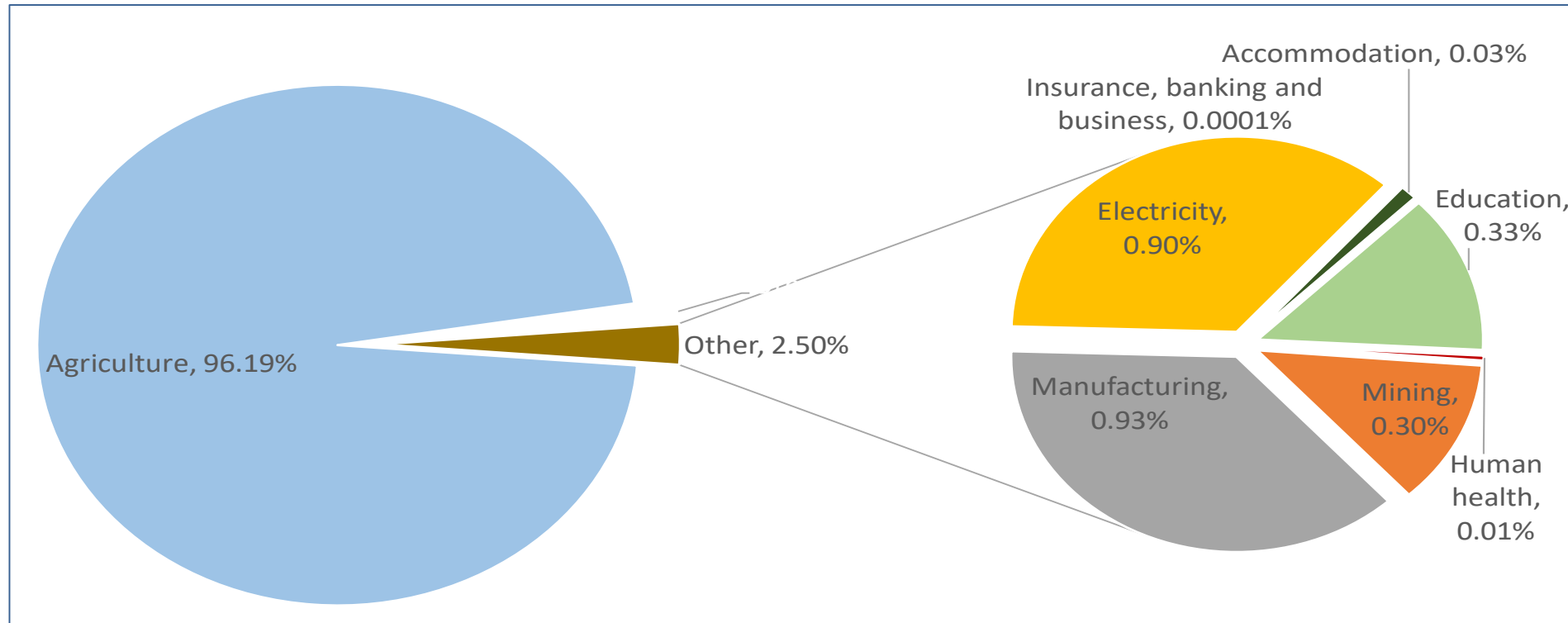
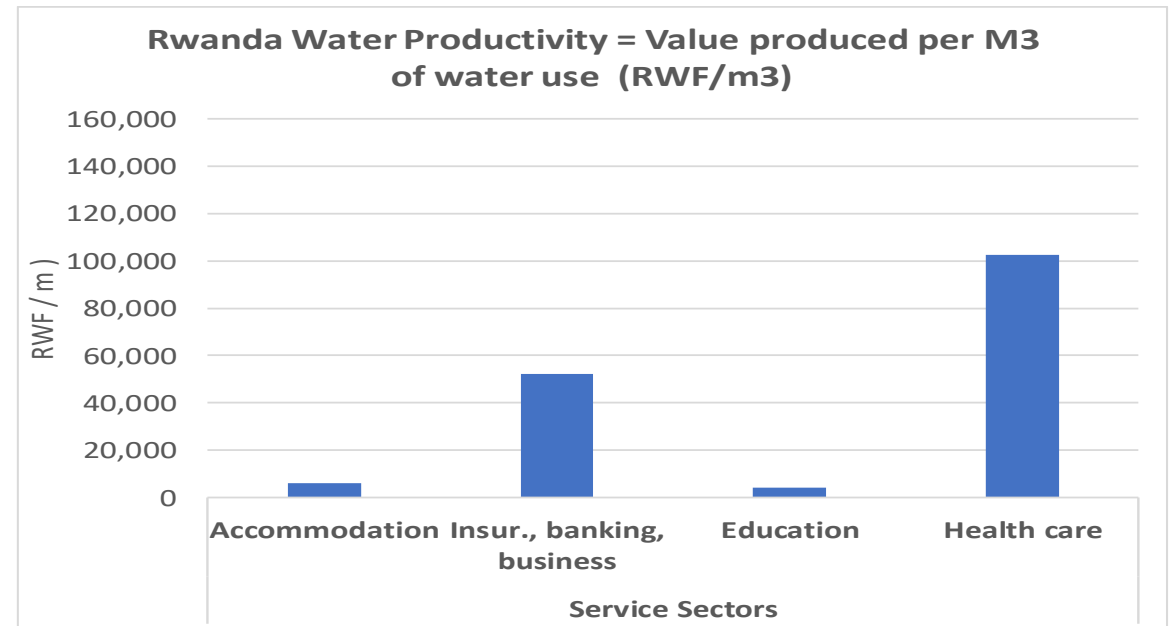
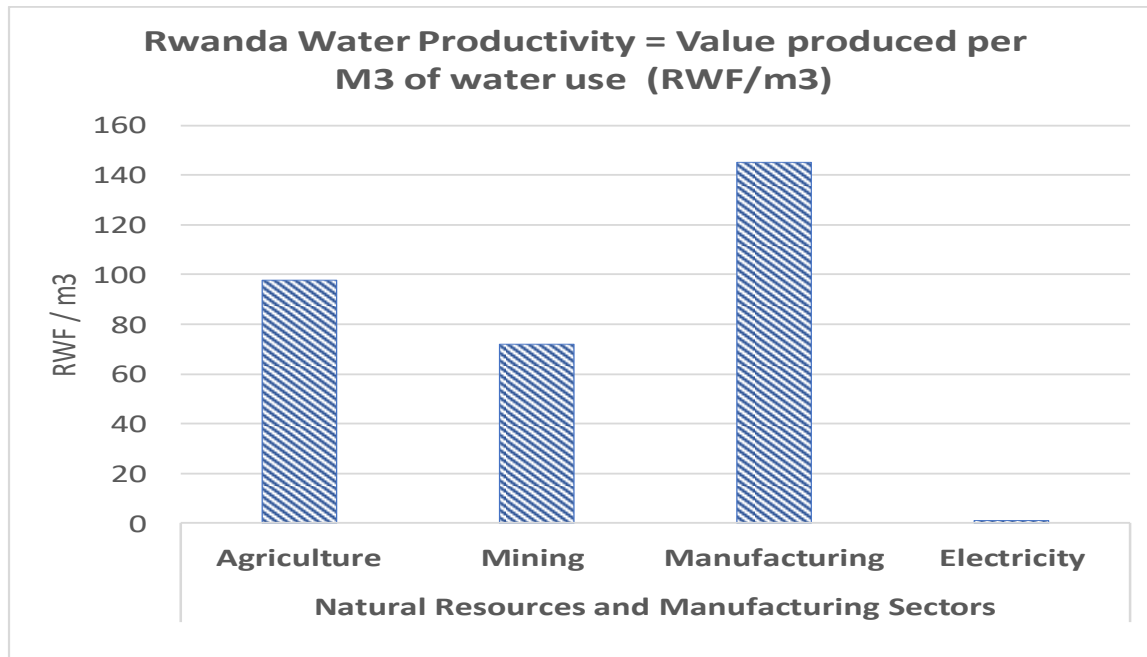


Figure 1: Shares of water consumption by major uses / sectors

Findings on Policy briefs

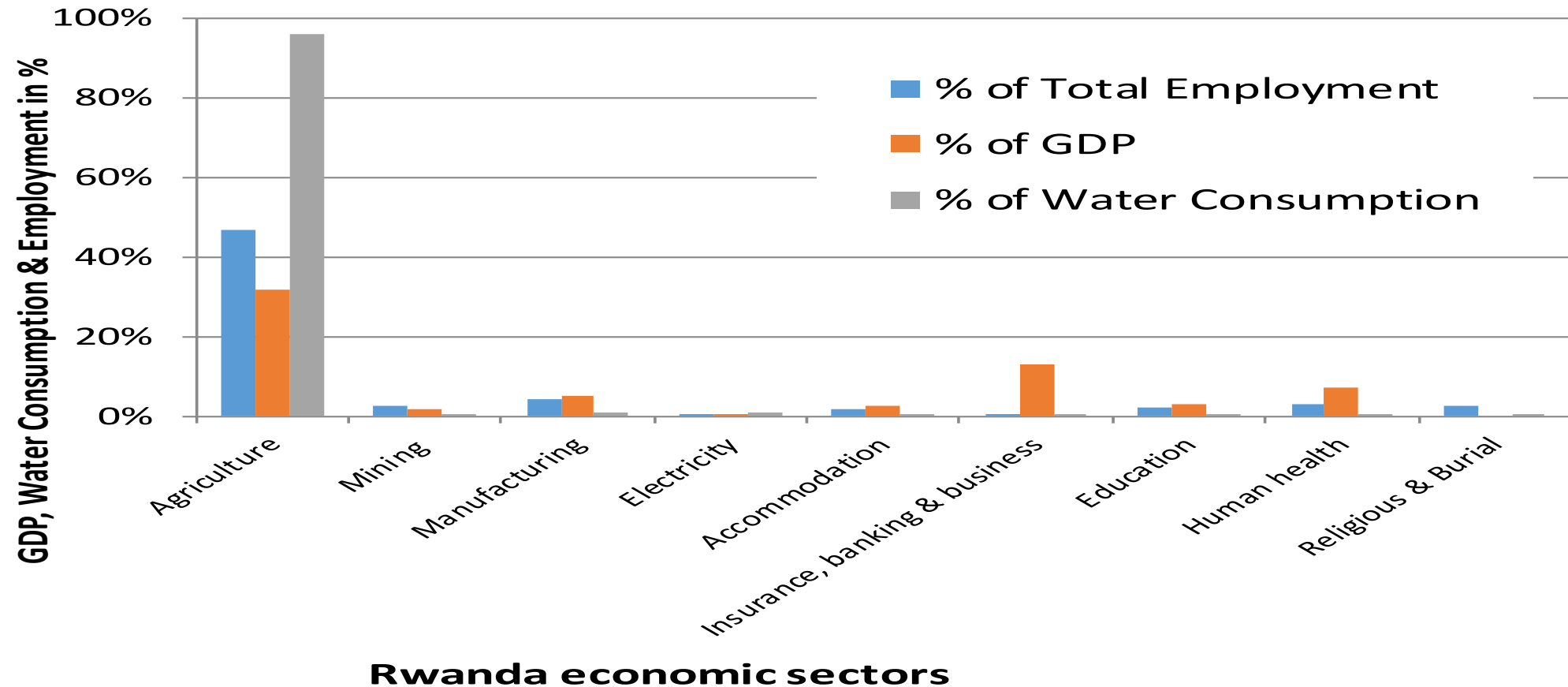
- Water Use efficiency and Productivity
- **SDG6.4.1: National Average (24.8 USD/m³ = 20,657 Rwf/m³)**



Rwanda Water Productivity by sector



Water Consumption, GDP and Employment (%), 2012



Agriculture created about 3.5% of jobs in formal way but yellow color shows other jobs created by agriculture in inform way in Rwanda is 56% (Labour force statistical table)

Water Use efficiency and Productivity Policy brief findings

• Conclusion and Policy Implications

1. It may be necessary to **improve cost recovery** in the sector, so that user groups and firms that are getting high returns on water use also pay for the provision of that water,
2. Preliminary NCA results show **policy instruments** that can help to **achieve sustainable use and management of water including**: payment of water use fees scheme (pricing) for catchment protection, water loss reduction measures, cost recovery measures, and specific investments in water supply, treatment and distribution, and
3. There is a **need to reinforce rules and water allocations strategies** that help to preserve the permanent green and attractive countryside that facilitates cultural functions like recreation and tourism.



Findings on Policy briefs

- Water Stress: **SDG6.4.2**

Year	IRWR (Million m ³)	TRWR (Million m ³)	Population as per NISR, 2017	IRWR (m3) / capita	TRWR (m3) / capita	TWW as per NWRMP and Water use study report (Million m ³)	Water Stress % with Env water flows consideration
2012	10,809.12	11,659.32	10,482,641	1,031	1112	151.62	1.3%
2013	9,476.2	10,585.2	10,978,053	863	964	197.1	1.9%
2014	11,072.5	12,181.5	11,002,628	1006	1107	256.2	2.1%
2015	10,406.1	11,515.1	11,262,564	924	1022	333.1	2.9%
2016	7,707.5	8,816.5	11,774,133	655	749	499.5	5.7%

Water accounts results on water stress in Rwanda at country level

The severity of water stress (WS) is classified by:

(WS < 10%) no water stress,

(10% < WS < 20%) low water stress,

(20% < WS < 40%) moderate water stress,

(40% < WS) high water stress



Water Stress Policy brief findings

- **Conclusion and Policy Implications**

1. Rwanda is under pressure and the level of stress is increasing year to year (from 1.3% in 2012 to 5.7% in 2016).
2. **New and improved water and agricultural management practices and application of new and enhanced technologies (groundwater recharge increase, reducing water losses and enhancing water use efficiency) should be thought to use and store available water resources in an wise manner.**



Water Stress Policy brief findings

- **Conclusion and Policy Implications**

3. However, **environmental water flows** and Nile basin negotiations and agreements should be considered **to avoid any conflict** with downstream water users.
4. Hence, **signing MoU** with both up and downstream countries **should be utmost urgent** for better collaboration and avoid any conflict based on water sharing.



Findings on Policy briefs

- **Water Availability and Water demand**

Years during closing stock	Surface water			Soil water	Groundwater	Total
	Lakes	Rivers	Artificial reservoirs			
Year 2012	258,910	8,806	891	12,422	55,707	336,737
Year 2013	259,332	7,998	1,472	21,867	49,623	340,292
Year 2014	259,869	7,367	2,008	31,484	44,208	344,935
Year 2015	260,505	6,560	2,502	39,929	39,440	348,934
Year 2016	260,989	4,497	2,968	45,910	34,772	349,135
Trends in % in 5 yrs	0.8%	-48.9%	233.0%	269.6%	-37.6%	-3.7%

Index (2012 = 100)	Lakes	Rivers	Artificial reservoirs	Soil water	Groundwater	Total
Year 2012	100.0	100.0	100.0	100.0	100.0	100.0
Year 2013	100.2	90.8	165.2	176.0	89.1	101.1
Year 2014	100.4	83.7	225.3	253.4	79.4	102.4
Year 2015	100.6	74.5	280.7	321.4	70.8	103.6
Year 2016	100.8	51.1	333.0	369.6	62.4	103.7

Trends results for water resources stocks in Rwanda for year 2012-2016 in Million m³.



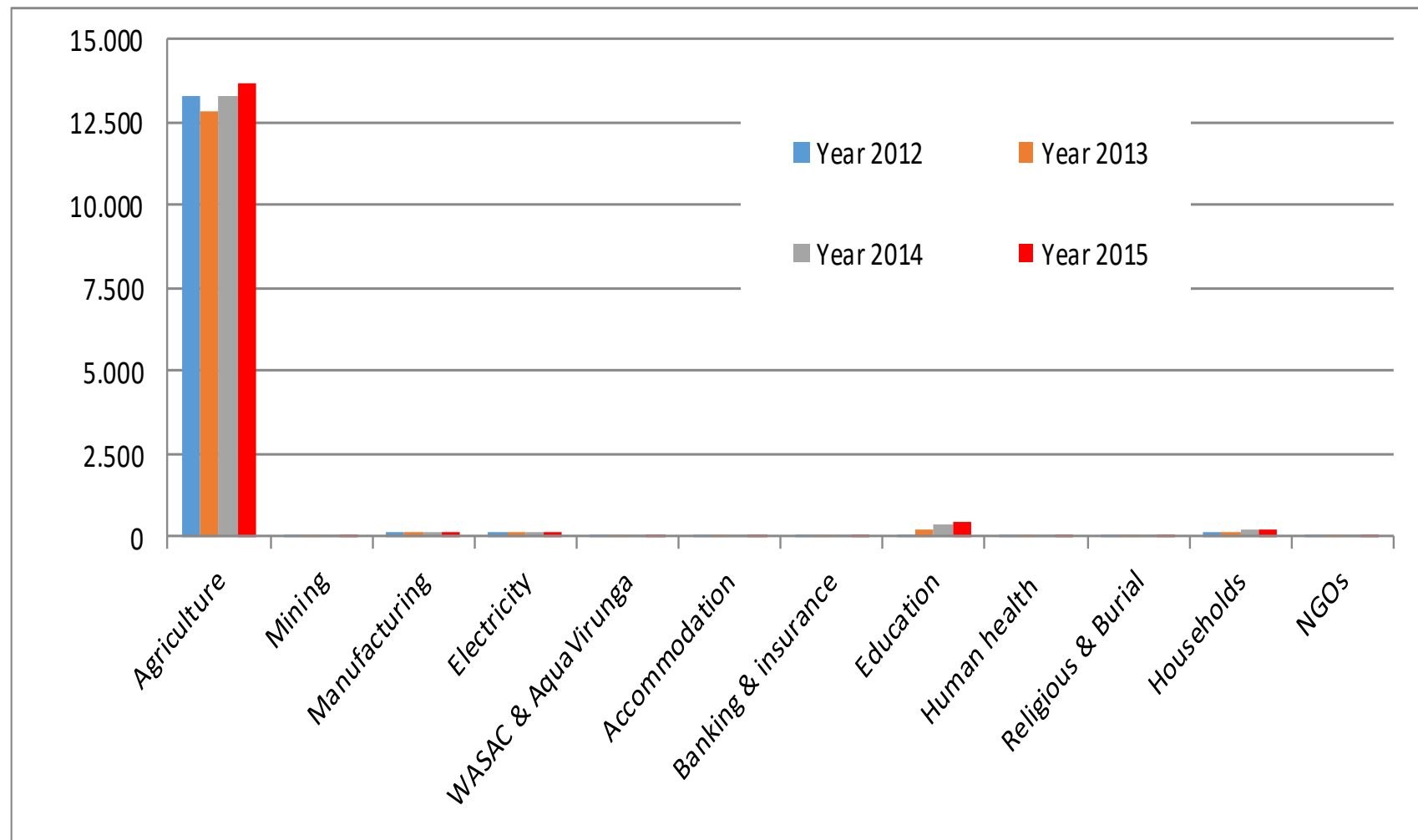
Rwanda Water demand in 2012 and projections in 2040 in '000 m³/year (NWRMP, 2015)

Projections	Dem 2012	Dem 2020	Dem 2030	Dem 2040
CKIV	28,189	77,816	132,713	203,308
CRUS	7,134	18,685	26,872	38,199
NNYU	31,329	86,624	161,331	251,459
NMUK	25,590	53,666	88,074	132,592
NNYL	55,216	166,822	307,049	450,897
NAKN	51,041	151,534	247,907	325,496
NAKU	39,841	148,462	251,622	307,102
NAKL	22,454	129,905	264,886	381,470
NMUV	22,908	60,815	108,434	153,724
Total for Rda	283,702	894,329	1,588,888	2,244,247

Note: Water demand for Rda **will increase** at the rate of **791%** in 30years

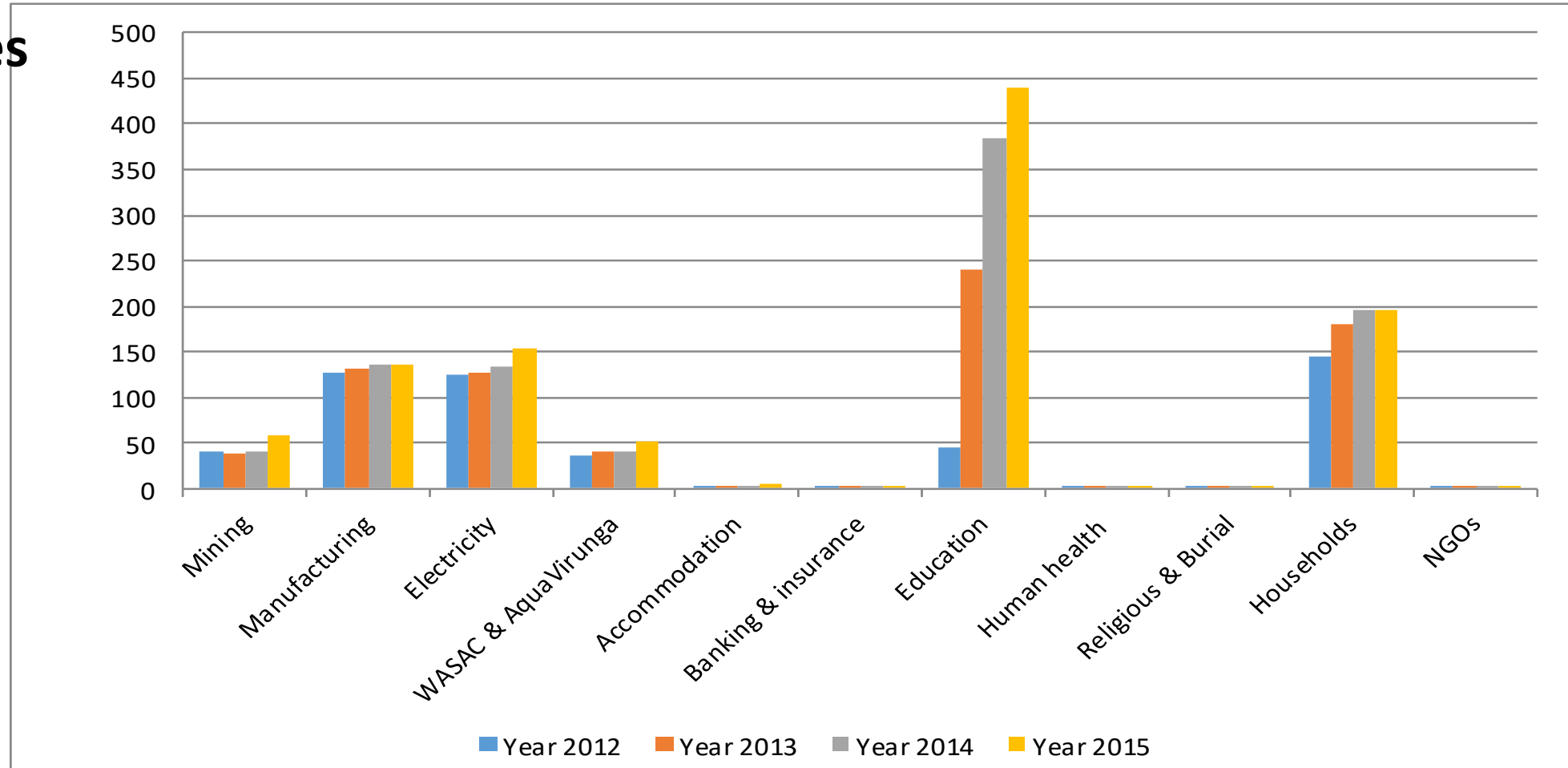
Trends for Water Consumption in Rwanda for 2012-2015 (Mm³)

- Clearly **agriculture is biggest**
- Largely **due to** Evapotranspiration (ET), from land.
- ET mainly in agriculture (crops) & forests
- Trend impacted by both precipitation and weather & climate impacting ET



Trends for Water Consumption in Rwanda for 2012-2015 (Mm³)

- Graph **excludes** agriculture
- To show other sectors
- Apparent growth



Water Availability and Water demand Policy brief findings

- **Conclusion and Policy Implications**

1. Generally, a **slight decrease** in Rwanda water asset has been observed from 2012 to 2015,
2. The decrease was mostly driven by a **decrease in GW water, rivers and streams stocks.**
3. The **significant decrease observed in GW water asset** will definitely influence the **reduction of crop productions** in Rwanda.



Water Availability and Water demand Policy brief findings

• Conclusion and Policy Implications

4. New technologies for water resources management (**water storage technologies**) should be thought about in time, to increase food security rather than using traditional methods (**rain-fed agriculture**).
5. The implementation of **RWRM strategic plan 2013-2018** and Rwanda rainwater harvesting strategy **may be beneficial**.
6. **As water demands grow**, Rwanda needs a coherent information and policy framework for making water allocation trade-offs in situations where there is not enough water for all potential users.



Water Accounts Way Forward

□ 2018- Version 2 Water Document

- Speed up water tables, policy briefs and water doc V.1 to be available end of this month of March 2018;
- **WASAC database and additional data** to complete coverage of sectors/ industries and, later, at catchment level;
- Disaggregate information **at catchment level (9 catch.)**;
- **Develop 3 new policy briefs**: 1. **Water Security** and 2. **Payment of water use fees scheme (pricing)** and 3. **Cost recovery**; and
- Have a **draft Water Doc V.2 for review** – End Dec 2018.





Thank you for your attention

Questions?