



Quantifying Available Water Resources in Kenya



Presented
By

Eng. Boniface Mwaniki
Technical Coordination Manager
Water Resources Authority

**World Water Week Conference, Stockholm,
Sweden , August 27th 2017**

Theme: “Water and waste – Reduce and Reuse”



Structure of Presentation

Introduction to Water Resources Authority

Legislative framework for water resources management

Quantifying water resources in Kenya

Challenges

Lessons learned



Introduction to WRMA



- ❑ Water Resources Authority is established as a body corporate under the new Water Act (2016) that was operationalized on the 21st of April 2017 vide Special Issue Kenya Gazette Notice No. 59.
- ❑ The organization has been in existence for the past 12 years following its establishment under the Water Act (2002) that has now been replaced by the new Water Act 2016.
- ❑ WRA is anticipated to undergo structural reforms in accordance with the Water Act 2016 in order to deliver on its expanded mandate, given the changing policy, technological and socio-economic environments



WRA Functions and Mandate



□ WRA has 10 stipulated functions under Water Act 2016 that can be grouped into four broad categories namely; Regulation of the management and use of water resources:

1. Water allocation and enforcement of Water Resource Management rules
2. Water Resources Information management- Water Resource monitoring network, data collection, analysis, dissemination and storage
3. Water quality management- water pollution control activities
4. Water Resources induced disaster risk management- floods and droughts management



Legislative framework for Water Resources Management

- The Constitution of Kenya 2010
- National Water Policy
- National Water Resources Management Strategy
- National Water Quality Management Strategy
- Water Act 2016
- Water Resources Management Rules 2007
- National Water Master Plan 2030
- Catchment Management Strategy



Water Resources Ownership and Responsibility



- The Constitution of Kenya 2010 has elevated water resources into a human rights issue; Sec. 43 (1) (d) Every person has a right to clean and safe water in adequate quantities
- The Constitution of Kenya 2010 has placed water resources management functions in the National Government in an effort to deliver this human right.
- On behalf of the government of Kenya, WRA the Authority charged with the responsibility of regulating use of water resources in Kenya.
- Vision 2030 – SO: to increase water resources availability for multi-purpose use
- SDG 6 addresses drinking water, sanitation, hygiene, quality and sustainability of the water resources worldwide



Water Resources Management vs Water Supply



- ❑ Separation of functions of water resources management from water service provision following water sector reforms in Kenya
- ❑ The Reform created several state agencies with respective mandates as per Water Act 2002, now replaced with Water Act 2016.
- ❑ The Constitution of Kenya 2010 further devolved water services function to the county governments and retained Water Resources Regulation and Management as national government function.



Status of Water Resources in Kenya



Annual internal renewable water resources less than 1000m³ per capita, which has been decreasing over time from 2,399.0m³ per capita in 1962 to 449.5m³ in 2013 (World Data Atlas, 2014).

Kenya is water stressed, as water demand exceeds water availability, a factor majorly attributed to pollution, diminishing quantities due to overexploitation of aquifers and rivers and population pressure

Kenya is water scarce Country



Quantifying Water Resources in Kenya



1. Measuring and Modelling water availability

Monitoring Surface and Ground Water

Regions	CMS Target	Stations with water level	Stations with updated rating curves	Number of Monitoring Boreholes	Number of Operational Boreholes	% Operational	Boreholes with water rest data
LVNCA	28	36	5	19	17	89	17
LVSCA	38	38	5	18	15	83	15
RVCA	41	25	5	41	24	58	24
ACA	31	19	0	33	25	73	24
TCA	47	40	0	18	12	67	12
ENNCA	38	35	0	16	12	75	12
TOTAL	223	193	15	145	105	74	104

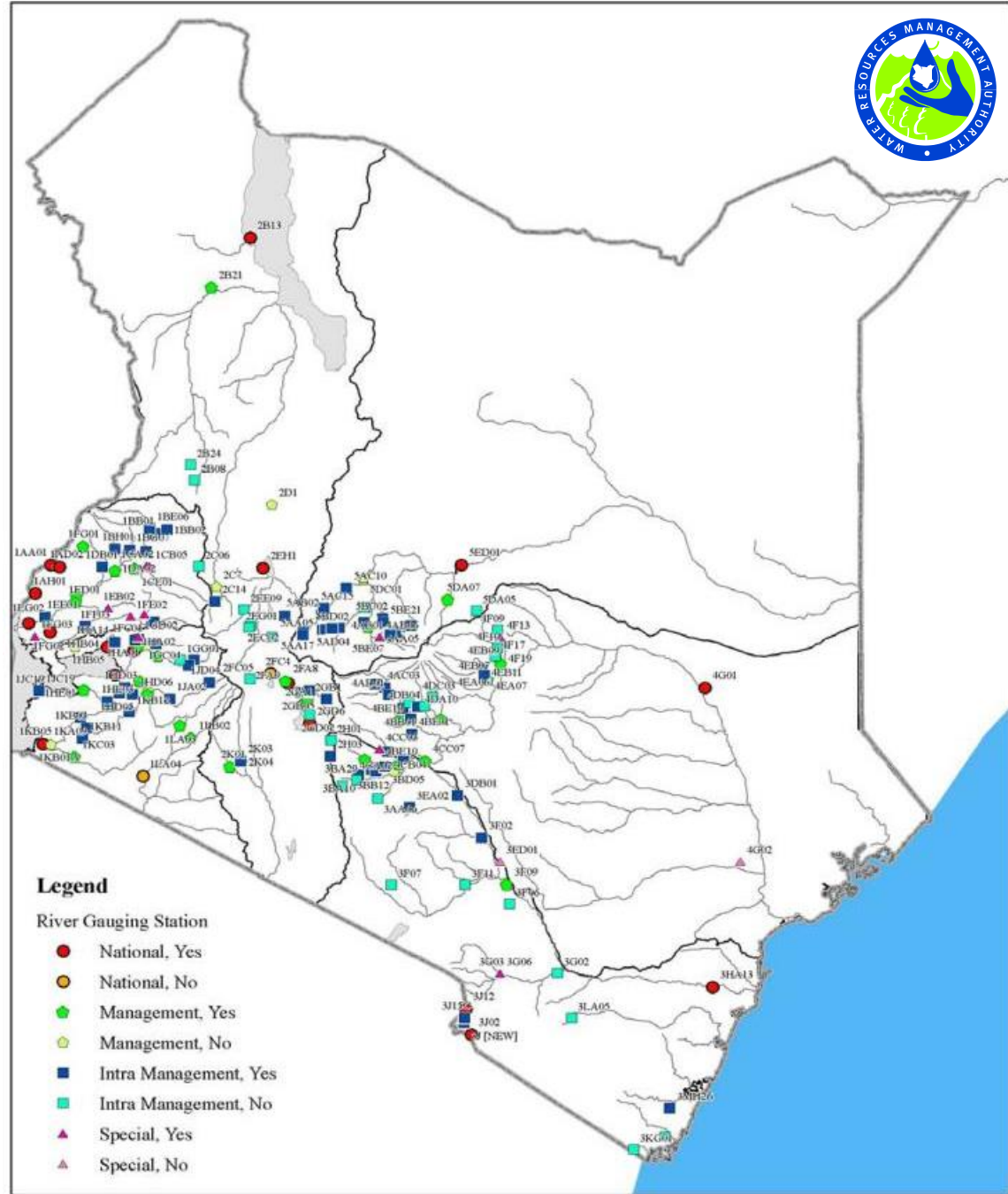
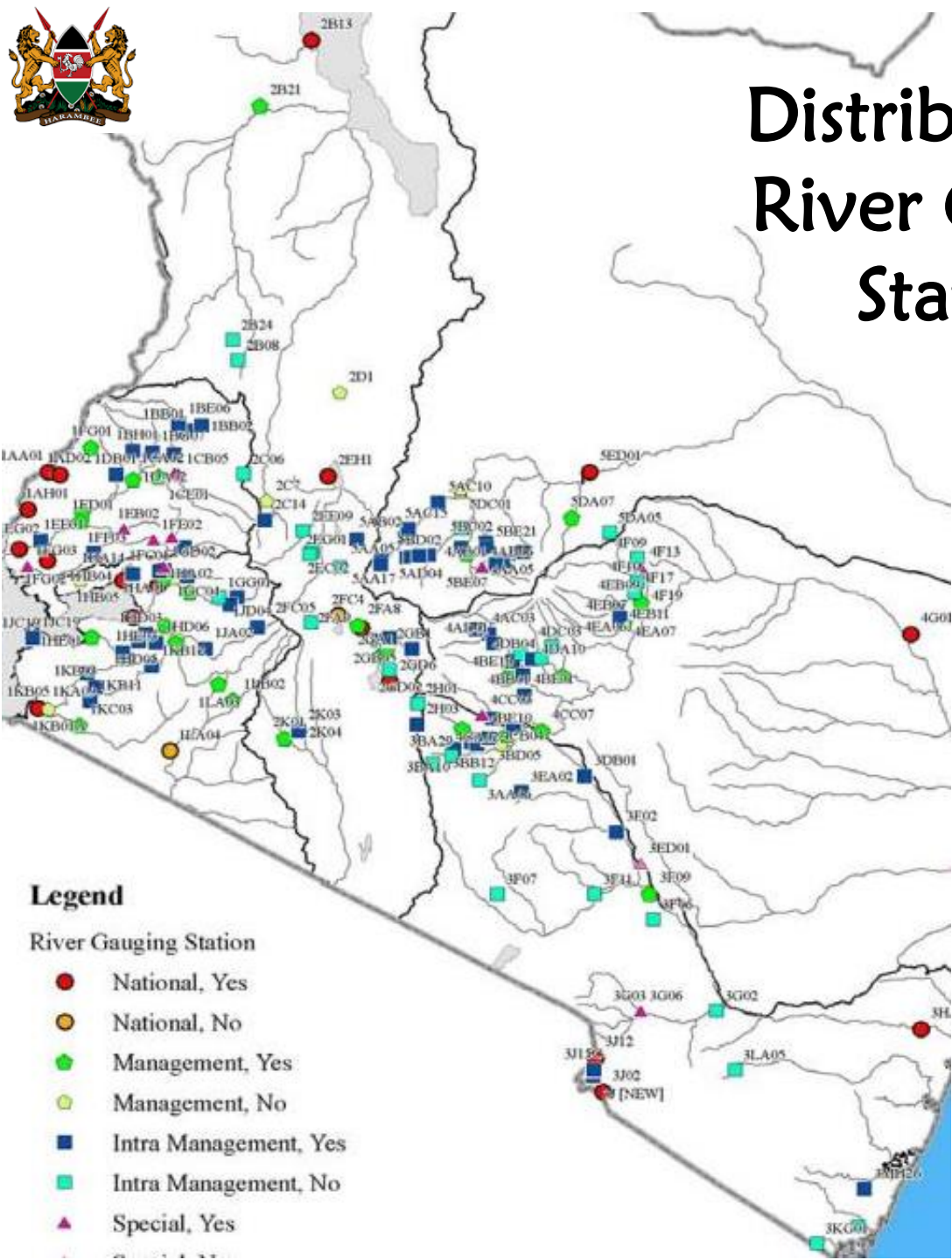
Surface water demand of 20,363MCM/year estimated for 2030 is 7.6 times as large as the present demand of 2,693MCM/year



Volume of estimated water deficit will increase overwhelmingly from 1,418MCM/Year in 2010 to 14,959MCM/Year in 2030 due to increase in demand.



Distribution of River Gauging Stations





Drilling of an exploratory borehole in Turkana County. Aimed at ground-truthing an earlier study to assess the aquifer.

Groundwater level monitoring in a borehole, this helps to inform the behavior of groundwater with respect to abstraction vs recharge rate, climatic conditions (eg rainfall), depletions





a) Automatic weather station at Marsabit courtesy of CETRAD

**b) Concrete post installed at Mwache 3 MB02
Gauge reader being trained on reading RGS in Athi Catchment**



**c) Inspecting the Tilting bucket of Rainfall
one low cost equipment being
experimented Bomet courtesy of MAMASE**



Monitoring Water Quality and Quantity



- ✓ WRA undertakes Abstraction and Pollution surveys in collaborations with WRUAs and support from various stakeholders.
- ✓ The surveys are vital as the information is used to develop a Water Allocation Plan.
- ✓ Assessment of non-point pollution sources by monitoring Water resources at Regular Gauging Stations (RGS) to capture levels of nutrients, agrochemicals and sediments from agricultural farms and surface run-off. Point Pollution sources are monitored by quarterly inspection of Effluent discharging facilities and sampling final effluent and at satisfactorily determined downstream/upstream discharge points.
- ✓ The major pollution incidences are raw effluent disposal from non-function urban sewer system, industrial development, farming, informal settlements, deforestation solid waste disposal, wetlands and riparian encroachment.



Case of Water Pollution: Athi River Basin

- ❑ 591 Km long – 2nd longest river in Kenya after the Tana. The Athi Catchment Area (ACA) is 37,750 km²
- ❑ Sources: Athi River- Ngong Hills, the Nairobi River- Kikuyu Escarpment. Other tributaries- Ndarugu, Thiririka, Thwake and Tsavo Rivers
- ❑ Nairobi River Basin Rehabilitation & Restoration (NRRP) forms an integral and the most crucial part of the ARRP



Nairobi River at Racecourse Rd Roundabout

56 % of the city residents live in 46 highly congested informal and middle class settlements mainly located along the Nairobi River banks



Mathare Slums



Pollution & Encroachment on Nairobi River





On-going Interventions



Expert Mission to NRRP



RECOMMENDATIONS OF THE MISSION

- Start with an upper water shed project- upstream for demonstration/pilot
- Have cyclical solutions - Identify waste stream, determine solution for each- recycle, value addition, get fresh energy source, deal with removal, disposal.
- Involve local community participation in mapping, citizen science and communications outreach
- Engage local business entrepreneurs, outreach, education , partnerships
- Incorporate trans agency collaboration steering committee
- Identify issues, identify hotspots, classify hotspots, prioritize



Case of Upper Tana: Nairobi Water Fund

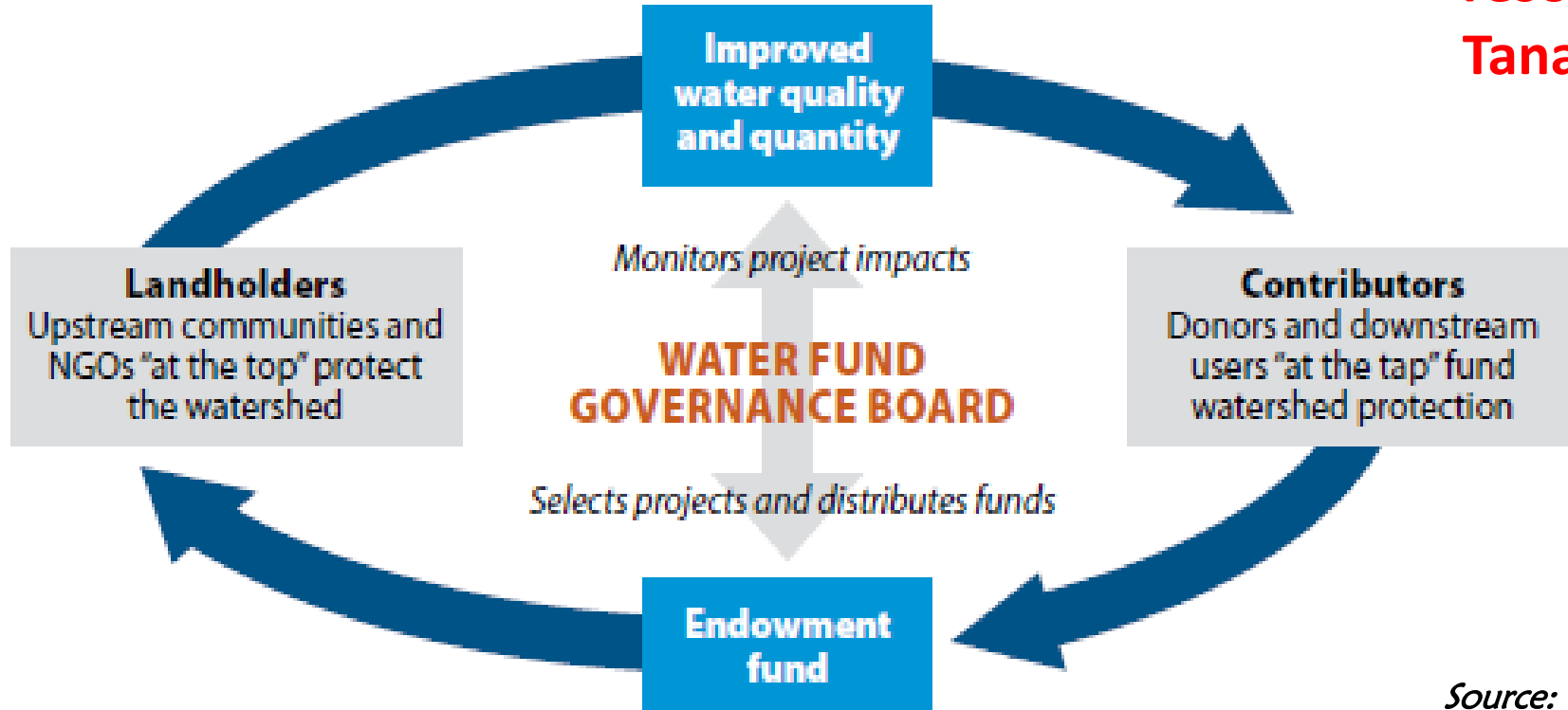


Our goal

Harness nature's ability to capture, filter, store and deliver clean and reliable water

✓ **Conservation of water resources in the upper Tana catchment**

✓ **The Water fund is a PPP**



Impact

A cost-effective solution where the water supply is naturally replenished and filtered, and rural livelihoods are improved

Source: TNC, 2015. Upper Tana-Nairobi Water Fund Business Case. Version 2. The Nature Conservancy: Nairobi, Kenya.





- World Bank
 - UNEP/UNDP/UNESCO
 - US Embassy/USAID/US Water Partnership
 - JICA
 - Deutsche Gesellschaft Fur Internationale Zusammenarbeit (GIZ)
 - Mau Mara Serengeti Sustainable Water Initiative (MAMASE)
 - Swedish International Development Agency (SIDA)
 - Danish International Development Agency (DANIDA)
 - PEGASYS and International Water Management Institute (IWMI)
 - Center for International Forestry Research (CIFOR)
 - Nile Basin Initiative (NBI)
 - Nile Equatorial Lakes Subsidiary Action Plan (NELSAP)
 - Tullow Oil
 - AIRBUS SE
- Among others.....





Water Allocation Planning



Permitting, which includes authorization and permit issuance has been steadily increasing with more water users registering their abstractions with WRA.

Permitting Trend since 2006

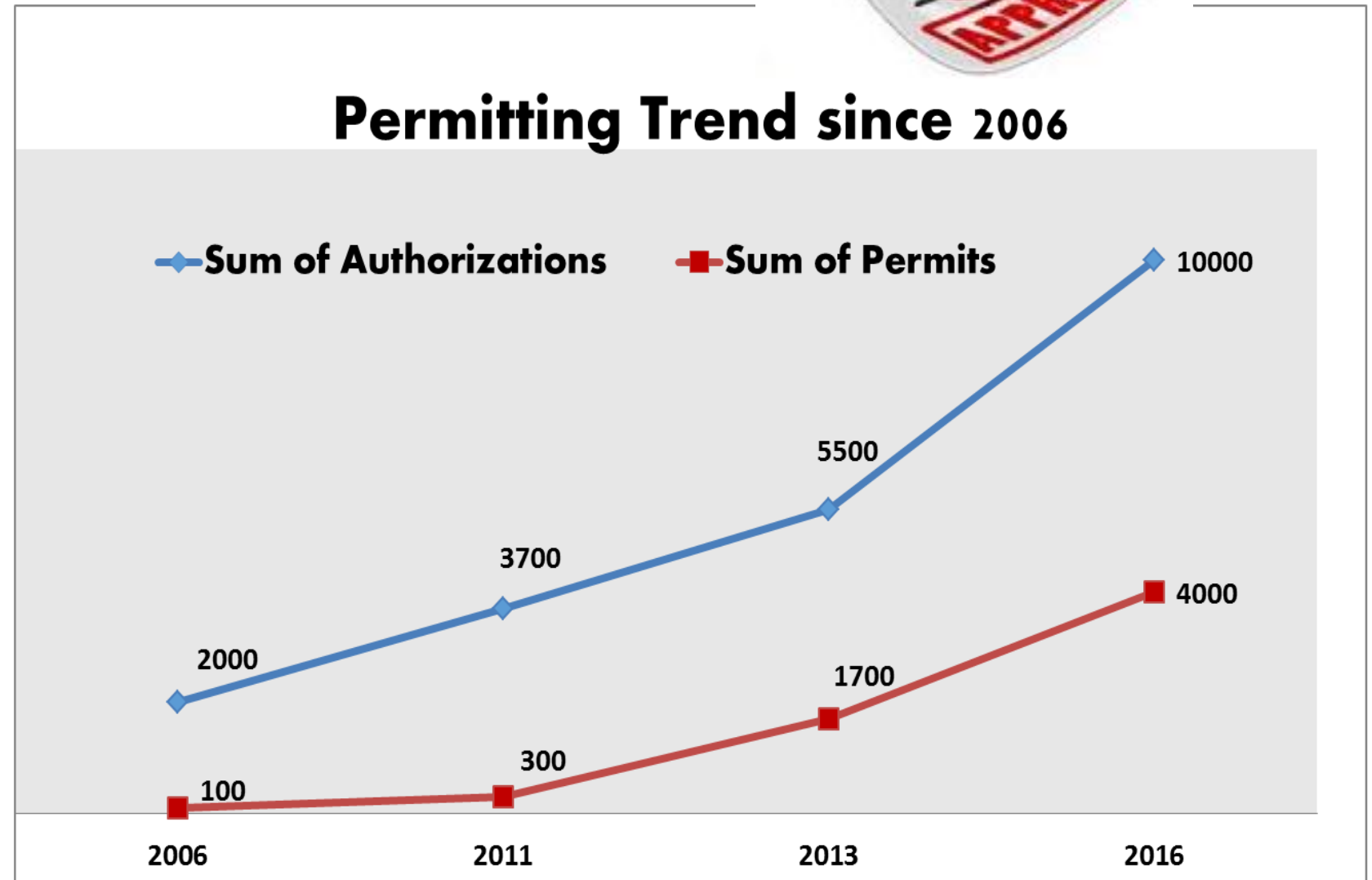
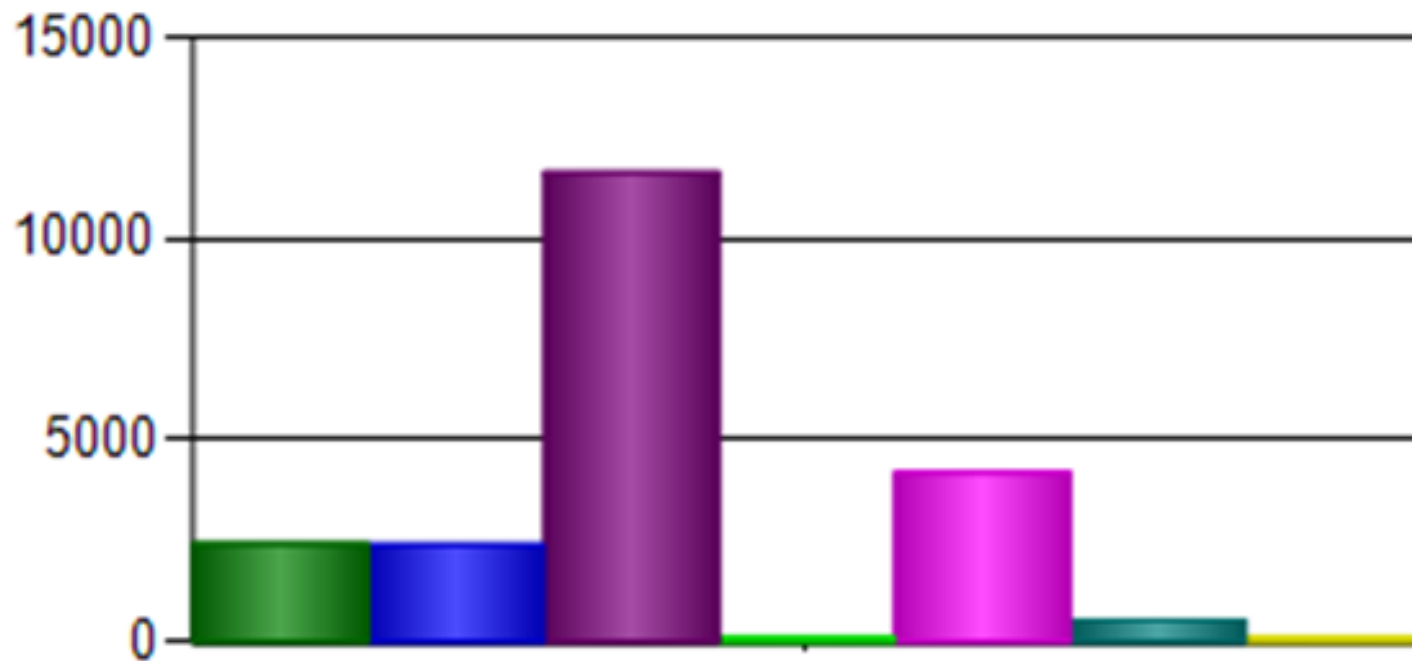




Table 1: Summary of applications, authorizations and permits as at September 2016

	No. of New Applications	Current Authorization Status			Current Permit Status		
		Valid	Expired	Cancelled	Valid	Expired	Cancelled
TOTAL	2441	2406	12311	8	4236	658	8





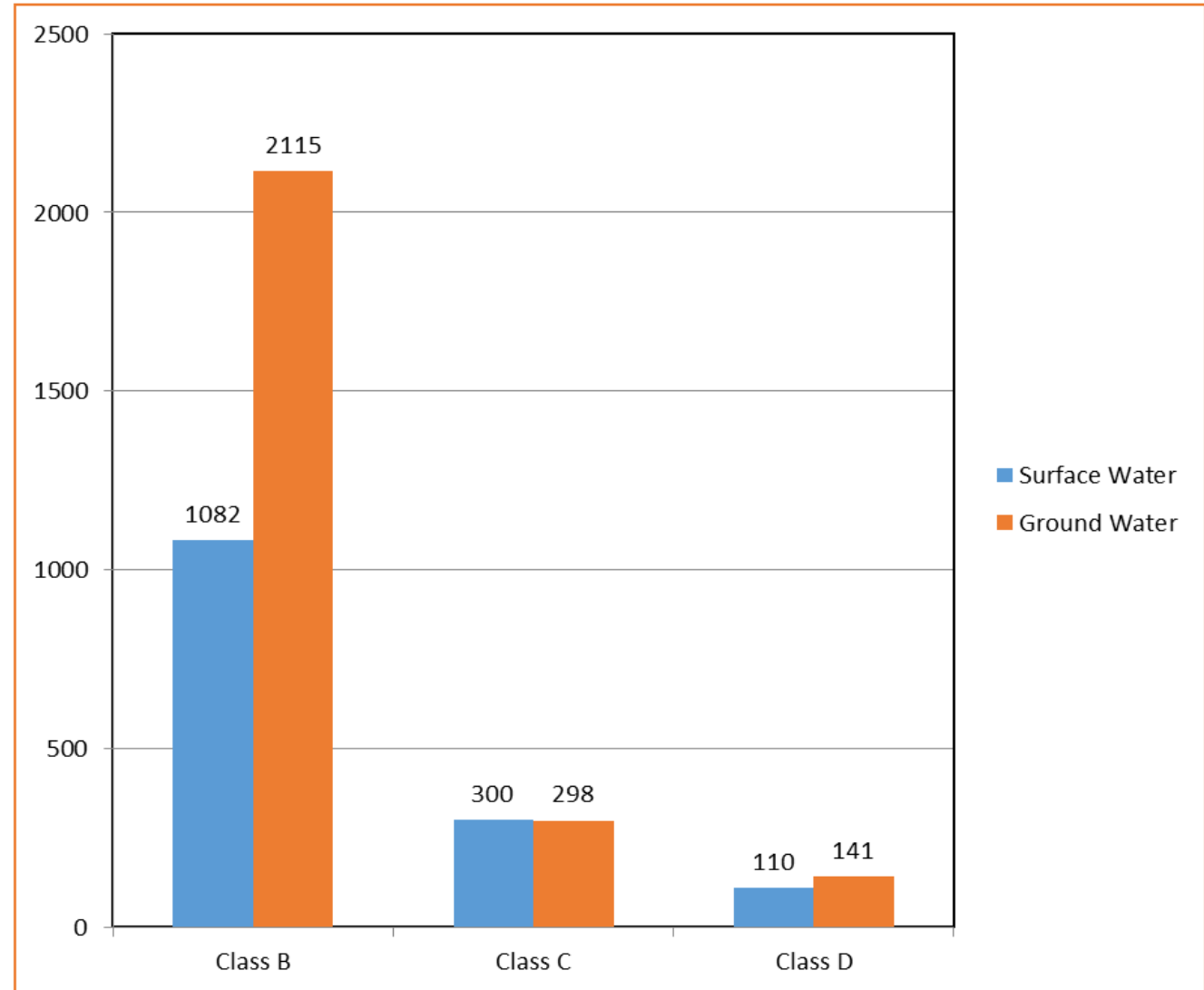
Permit Classification Category B, C & D



Type of Water Use	Criteria	Rate
DOMESTIC, PUBLIC, LIVESTOCK	Domestic, public, and livestock purposes	50 cents/m ³
HYDROPOWER GENERATION	Installed capacity	
	Up to 1 MW	No charge
	Over 1 MW	5 cents per kW/h
IRRIGATION	First 300 m ³ /day	50 cents/m ³
	Over 300 m ³ /day	75 cents/m ³
FISH FARMING	Amount of water supplied	5 cents/m ³
COMMERCIAL INDUSTRIAL	First 300 m ³ /day	50 cents/m ³
	Over 300 m ³ /day	75 cents/m ³
EFFLUENT DISCHARGE		Pollution load rate.



Water Consumption Surface Vs Ground Water



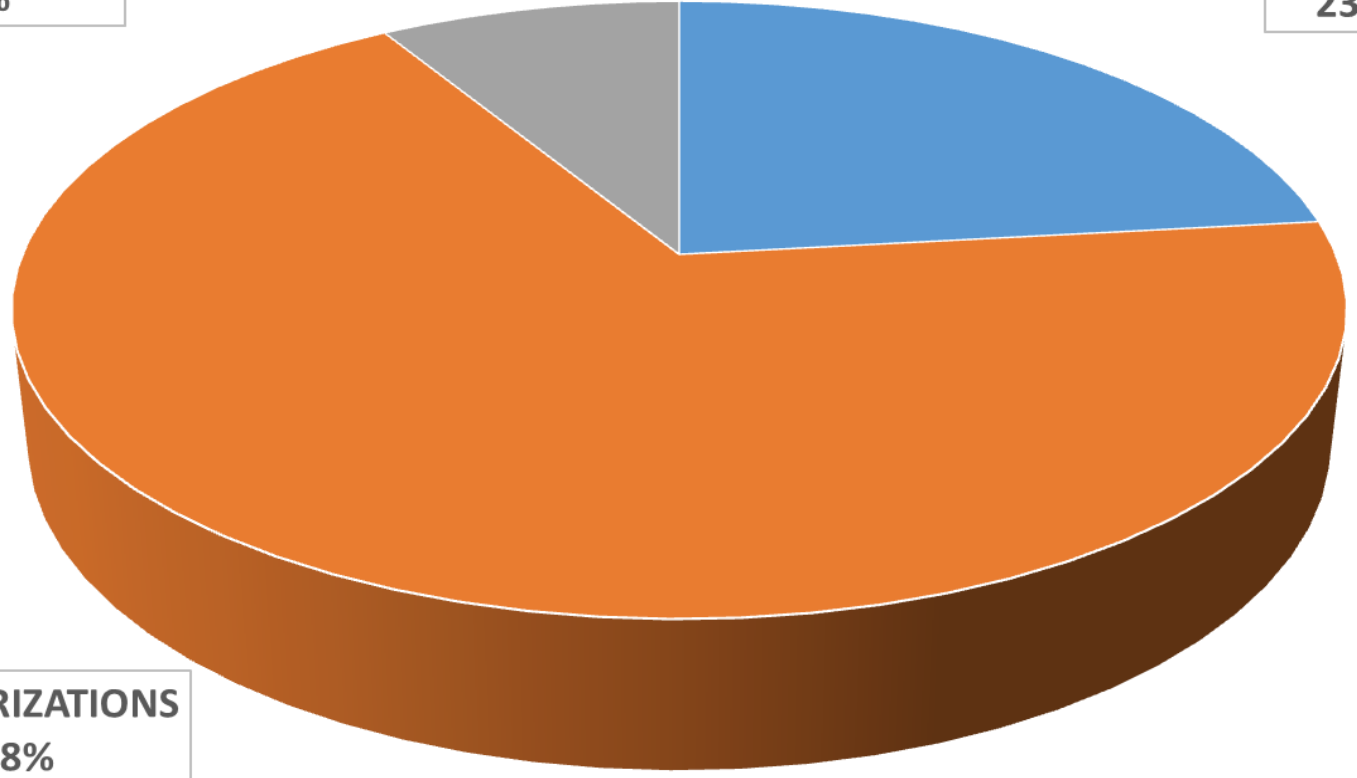


PERMITTING PROCESSING STATUS

APPLICATIONS
9%

PERMITS
23%

AUTHORIZATIONS
68%



■ PERMITS ■ AUTHORIZATIONS ■ APPLICATIONS



Successes in Permitting



- ❑ Illegal abstractors identified through Abstraction and Pollution surveys
- ❑ Enhanced water allocation and regulation through WAPs
- ❑ Generation of several permitting reports through the Permit database
- ❑ Provides data on ground and surface water useful for planning
- ❑ Political goodwill (Legislation) in enacting and incorporating environmental issues in water allocation (Water 2002 and 2016)
- ❑ Minimizes water use related conflicts





Challenges in Permitting



- Diminishing water resources
- Low compliance level by users
- Water related conflicts - ASALs
- Lack of Political goodwill
- Low level of awareness on permitting procedures among users
- Illegal water users
- Weak enforcement – inadequate resources





Challenges in Monitoring Surface and Ground Water



- Lack of long-term series data
- Clients not adhering to the permitted amounts
- Lack of enforcement to ensure compliance to issued permits
- Unpredictable climate fluctuations
- Illegal groundwater abstractions
- Lack of necessary knowledge on our aquifers





LESSONS
LEARNT



1. Citizen involvement in WRM

2. Exchange of Ideas and Information sharing

3. COORDINATION



Different Actors
(Public/Private/Dev.
Partners/CSO/Community)



4. Awareness creation on matters WRM



Accounting For Every Drop!

THANK YOU