Collaboration Opportunities with the Regional Water and Environmental Sanitation Centre (KNUST-RWESCK)

WASH Sanitation Conference

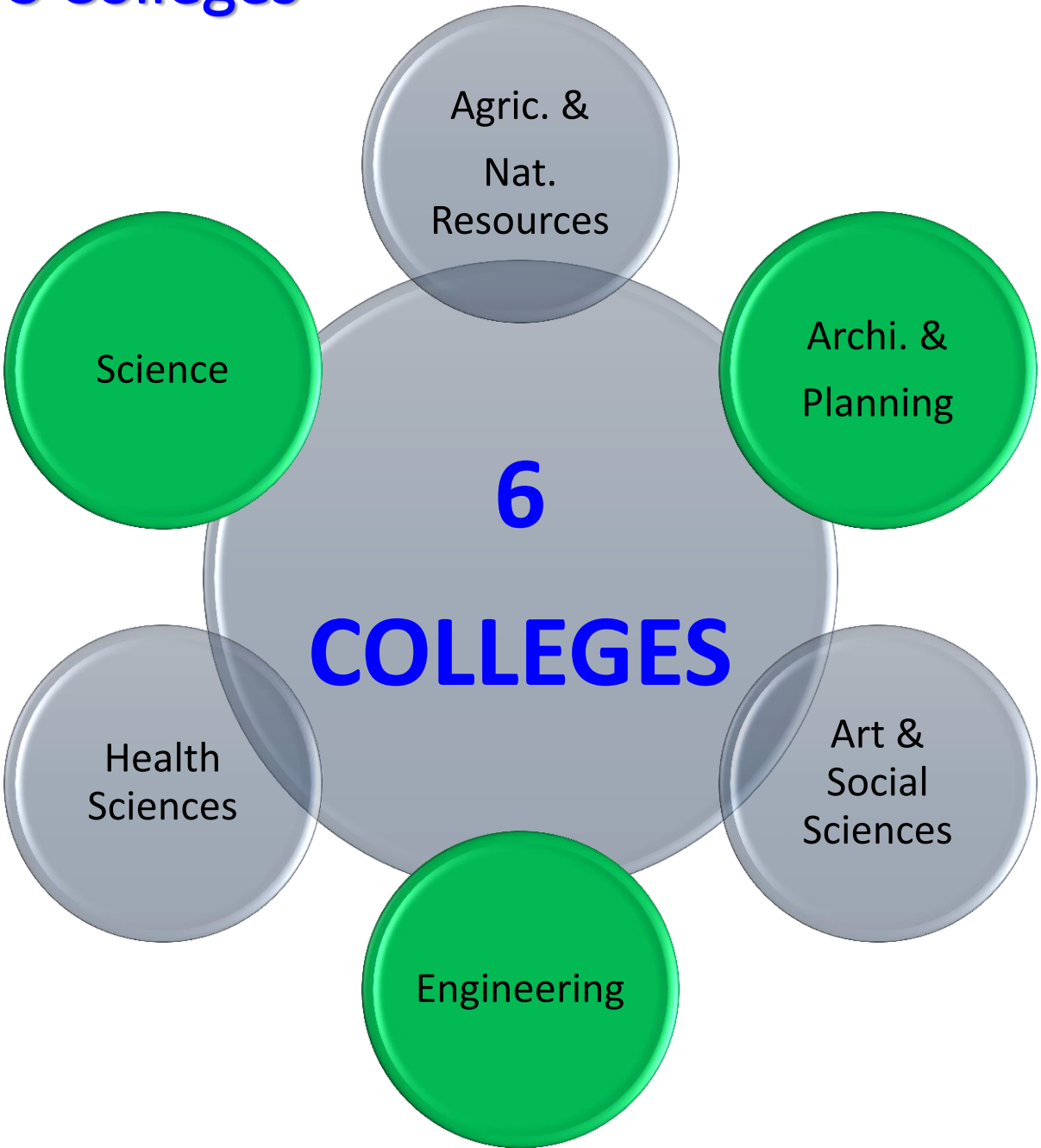
15h July, NODA, Kumasi

Outline of Presentation

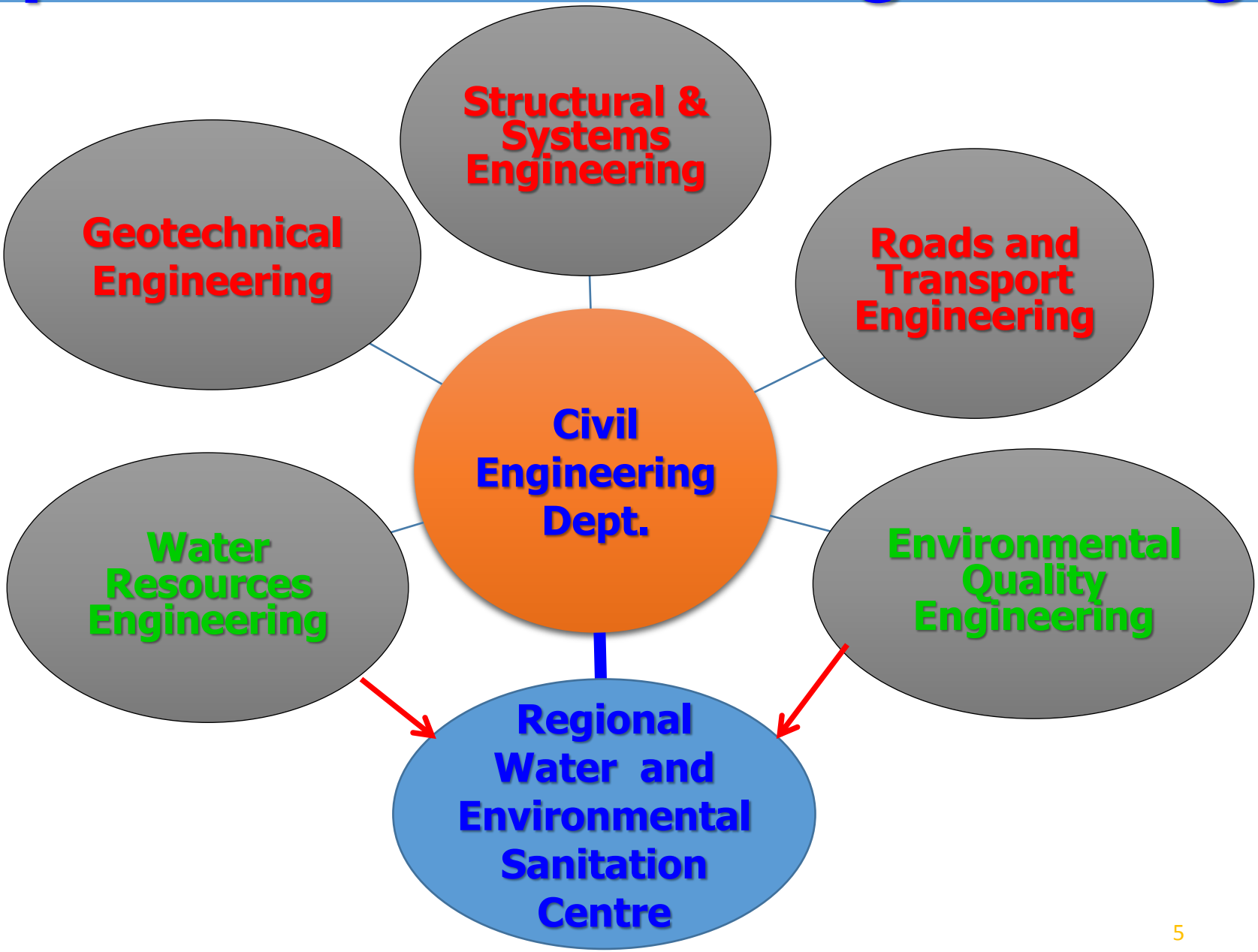
- About RWESCK – who are we?
- Activities of RWESCK – what do we do ?
- Academic and Industrial Partnerships and collaborations

About RWESCK
who are we?

KNUST'S Colleges



Department of Civil Engineering



RWESCK Core Activities

- Train high caliber of water, sanitation and waste professionals at the undergraduate and post graduate levels
- Build strong strategic partnerships and collaborations with industry and sector partners
- Research into innovative smart technologies, products and systems with industry partners

Postgraduate Programmes

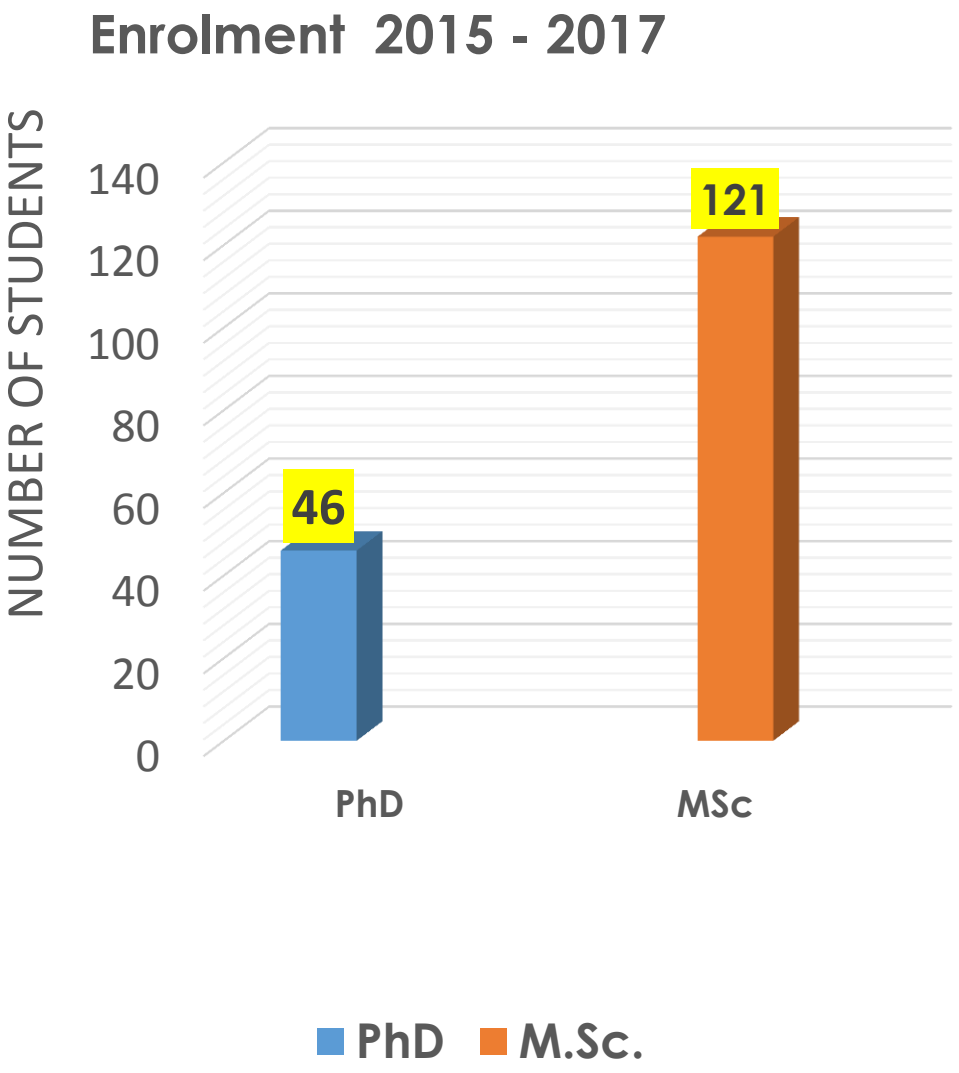
MSc Programmes

- MSc in Water Resources Engineering and Management
- MSc in Water Supply and Environmental Sanitation
- MSc in Water and Sanitation Governance

PhD Programmes

- PhD in Water Resources Engineering and Management
- PhD in Water Supply and Treatment Technologies
- PhD in Environmental Sanitation and Waste Management
- PhD Water and Sanitation Governance

Student Enrolment



- Regional Students PhD = 6 (2F+4M)
- Regional Students MSc = 13 (2F+11M)

International Accreditation of programmes

AQAS to accredit 3PhDs and 2MScs

AQAS site visit in April 2018

Accreditation by December 2018

Dedicated Centre Building for Teaching and Learning

Regional WASH Faculty Capacity for Training and Research

Water Resources, Flooding and Climate Change	Urban and Rural Water Supply	Sanitation and Faecal Sludge Management
RWESCK ❖ 6 Professors ❖ 2 Senior Lectures ❖ 1 Lecturer	**RWESCK** ❖ 5 Professors ❖ 2 Senior Lecturers	**RWESCK** ❖ 8 Professors ❖ 4 Senior Lectures ❖ 2 Lecturer
Regional Academic Partners ❖ 4 Professors ❖ 4 Senior Lecturers	**Regional Academic Partners** ❖ 3 Professors ❖ 5 Senior Lecturers	**Regional Academic Partners** ❖ 4 Professors ❖ 6 Senior Lecturers

Mapping of Regional Academic Capacity for WASH

High Calibre Regional Capacity for Training & Research

- All faculty members with PhD, most of them Professors,
- Active Teaching and Learning for faculty members
- Project Management and Grant Proposal writing,
- Entrepreneurial University Initiatives,
  - Collaboration with Maastricht School of Management
  - Participants from Nigeria (4), Senegal (2), Serra Leone

Regional WASH Conference

- 1st Regional Conference on Climate, Water, Environmental Sanitation, Accra, 2017

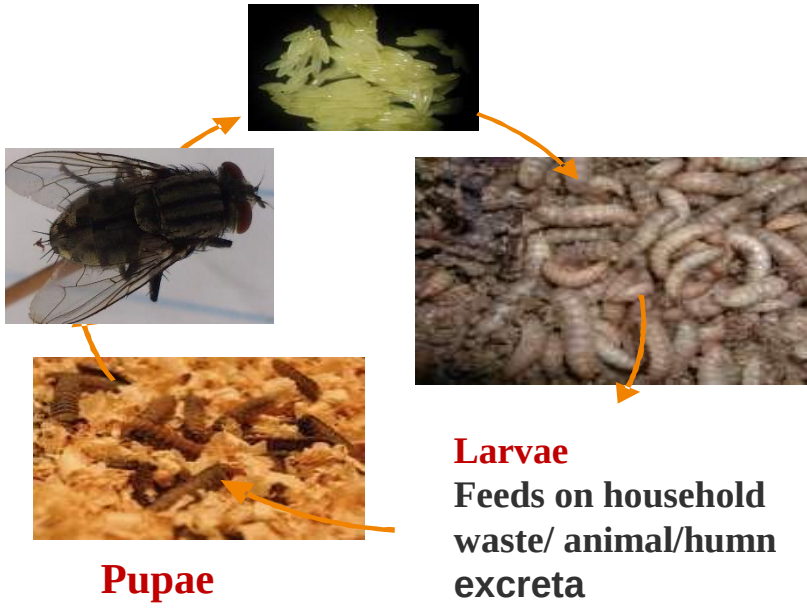
- 2nd Regional conference in 2019, Kumasi

National and Regional Short Courses

- Sanitation and faecal sludge management
- Municipal solid waste management
- Latrine construction technologies
- Borehole drilling and construction
- GIS and data management
- Risk assessment and management
- Environmental impact assessment
- Project management and proposal writing
- Public private partnerships & contract management
- Water treatment processes
- Water distribution modelling and losses management
- WASH monitoring and evaluation
- WASH life cycle cost management

Environmental Sanitation Research

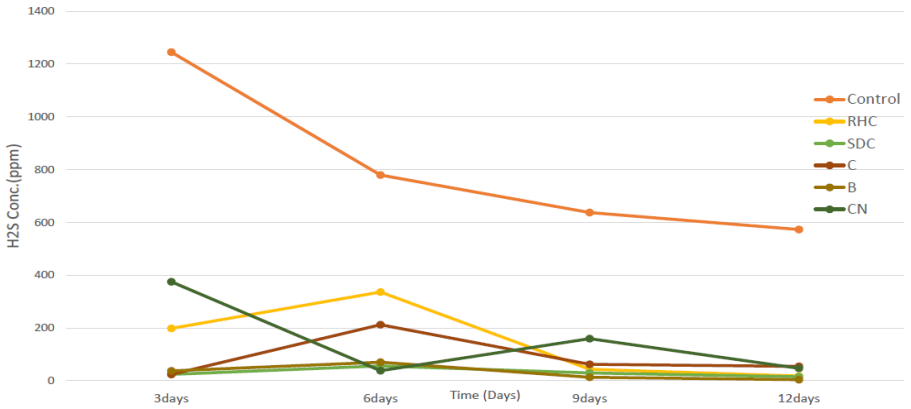
- Solid waste management cost recovery
- Recycling and treatment of solid waste,
- Bio-toilet and biotechnologies for faecal sludge treatment,
- Wastewater treatment biotechnologies
- Faecal Sludge Odour Reduction Materials



Faecal Sludge Odour Reduction Materials

Additives	pH	Moisture Content (MC)%
Basic		
Coconut Husk Ash	13	3.9
Cocoa Ash	12	3.2
Bamboo Charcoal	9	2.3
Rice husk Biochar	8	2.9
Sawdust Biochar	9	5
Acidic		
Neem seed powder	5	11.1
Moringa	5	8.7
Rice husk	6	9
Neutral		
Sawdust	7	30.8

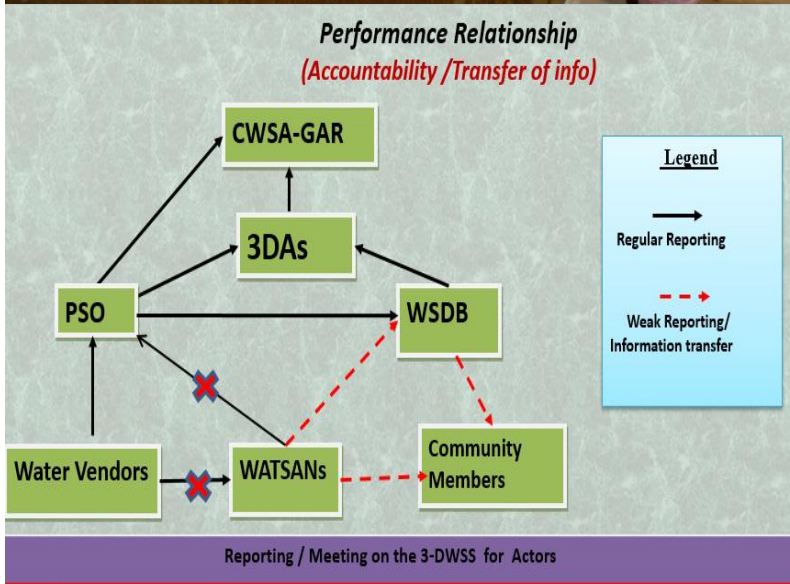
EFFICIENCY OF BASIC ADDITIVES ON H_2S REMOVAL



Sawdust Char (SDC)-pH(9)-p(0.002)-RE(96%) ,Bamboo(B)-pH(9)-p(0.002)-RE(96%) ,Cocoa Ash(C) –pH(12)-p(0.004)-RE(88%) , Coconut Ash(CN)-pH(13)-p(0.009)RE(83%), Rice Husk Char(RHC)-pH(8)-p(0.008)-RE(83%) , Control - pH(5.7)

Water Supply Research

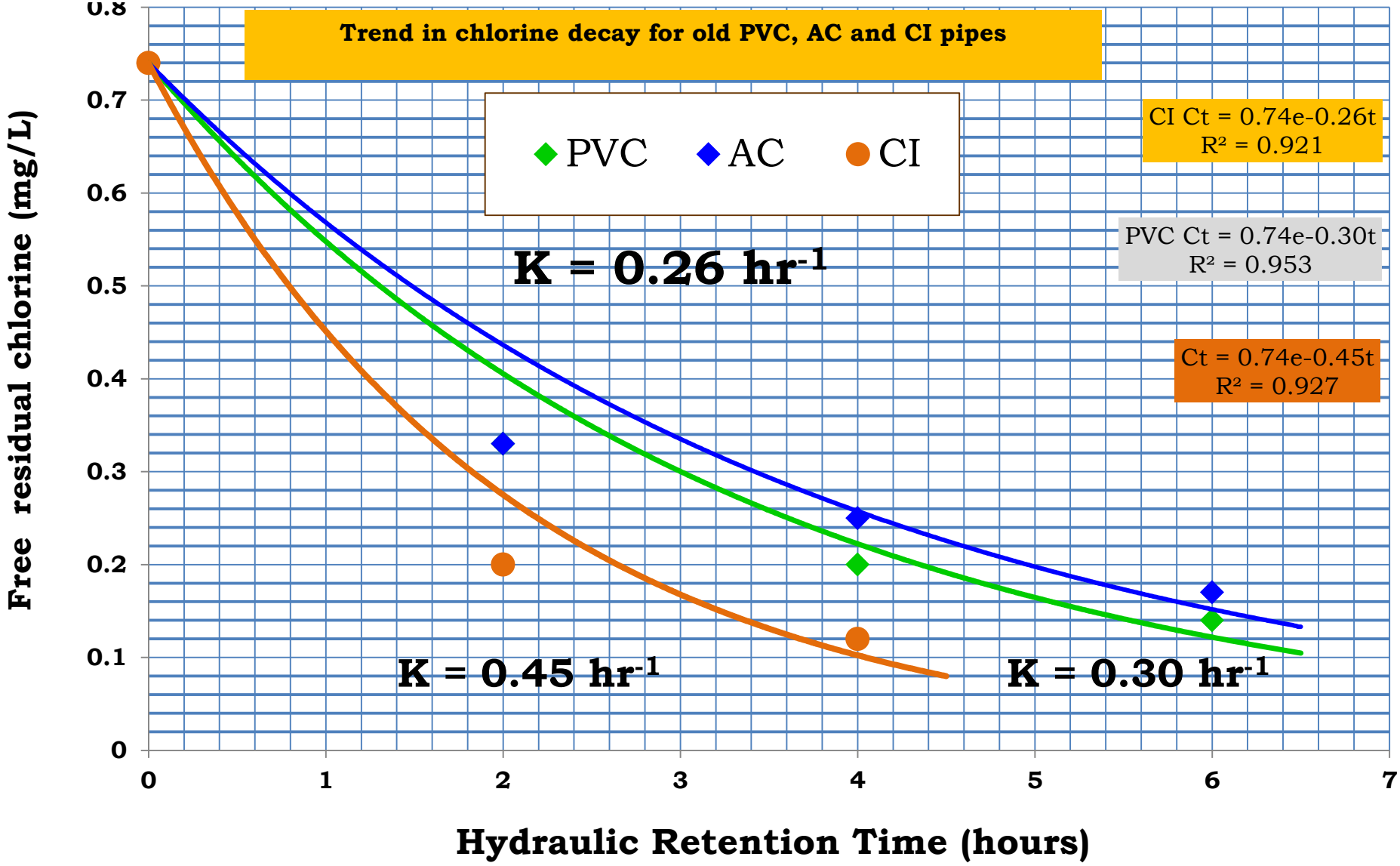
- Hydraulic and water quality modelling of water supply systems
- Water distribution leakage and non-revenue water reduction
- Life cycle cost of sustainable WASH service delivery
- Public Private Partnership in Small Towns' Water Service Delivery



Research output – Chlorine Decay Modelling

Hydraulic model to predict chlorine top-up quantities

Hydraulic Modeling of water distribution system: Overall Decay Coefficient (K)



Assessment of Water Losses in Urban Water Distribution Systems. Case Study, Ghana

- NRW estimating using IWA Water Balance Framework
- 50% Non-revenue water (NRW)
- 23.4% Real losses (pipe bursts, background leakages)
- 26.4% Apparent losses (12% illegal water use)

		Billed Authorised Consumption 1,133,178		Billed Metered (m³)	44.0%	1,000,818	Revenue Water
	Authorised Consumption			Billed Unmetered (m³)	5.8%	132,360	1,133,178
			49.8%				49.8%
System Input Volume	1,141,360.52	Unbilled Authorised Consumption 8,182.52	0.36%	Unbilled metered Consumption	0.25%	5,647.00	
				Unbilled Unmetered Consumption	0.11%	2,535.52	
2,274,174				Unauthorised use	12.3%	279,075	NRW
	Water Losses	Apparent		Metering Inaccuracies	5.2%	119,393	1,140,996
	1,132,813.48	601,063.82	26.4%	Errors in Estimate of Unmetered Consumption	6.4%	144,658	50.2%
				Errors throughout the Data Acquisition Process	2.5%	57,938	
		Real Losses 531,749.66	23.4%		23.4%		

Water Treatment Research

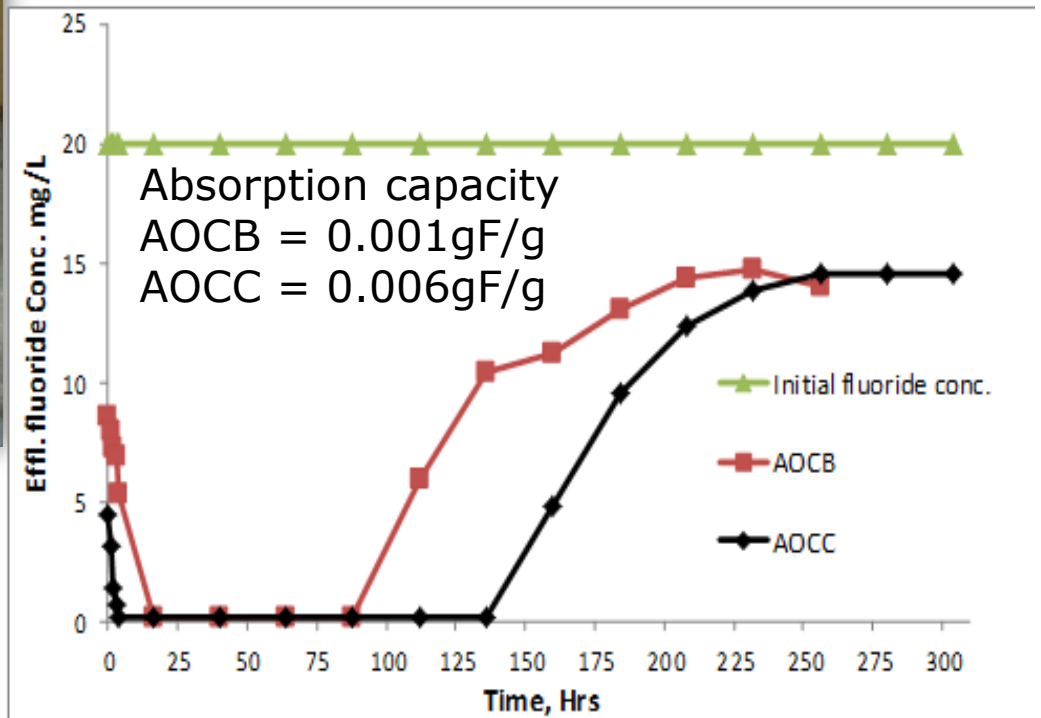
- Developing absorbent materials for removal of fluoride, arsenic, manganese from water,
- Development of MACAFE water filtration unit for adsorptive removal of high concentrations of iron and manganese from groundwater.
- Pilot scale results from these studies are promising,

Water Treatment Research

Adsorption of Fluoride onto:

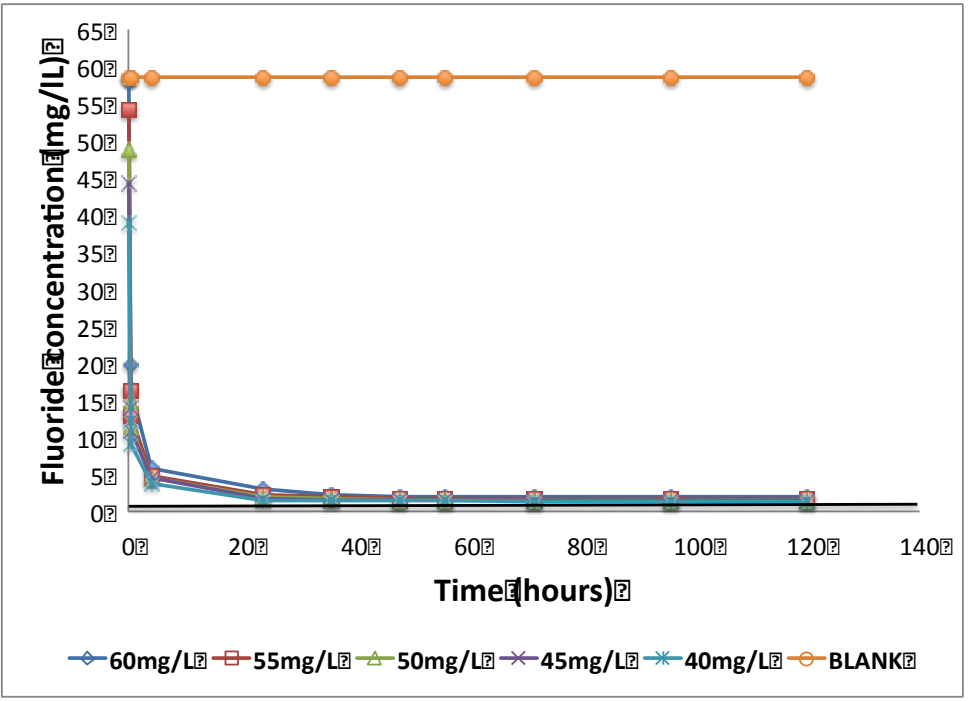
1. **Aluminium Oxide Coated Bauxite (AOCB)**
2. **Charcoal (AOCC)**

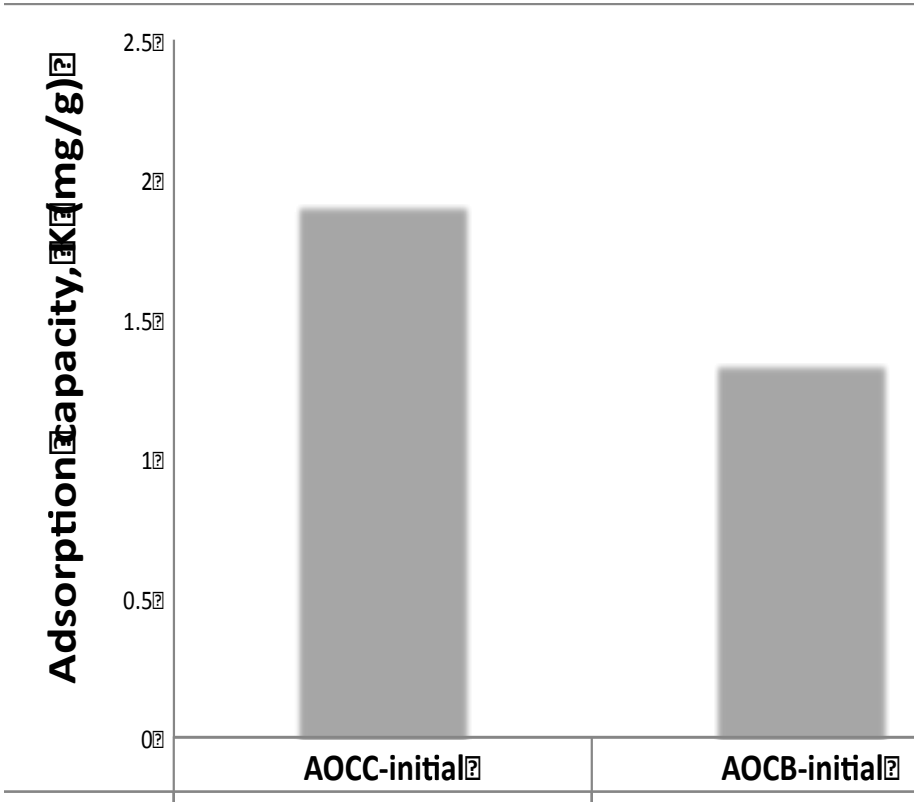
Objective: Removal of Fluoride using Coated High Aluminium Bauxite Ore and Charcoal

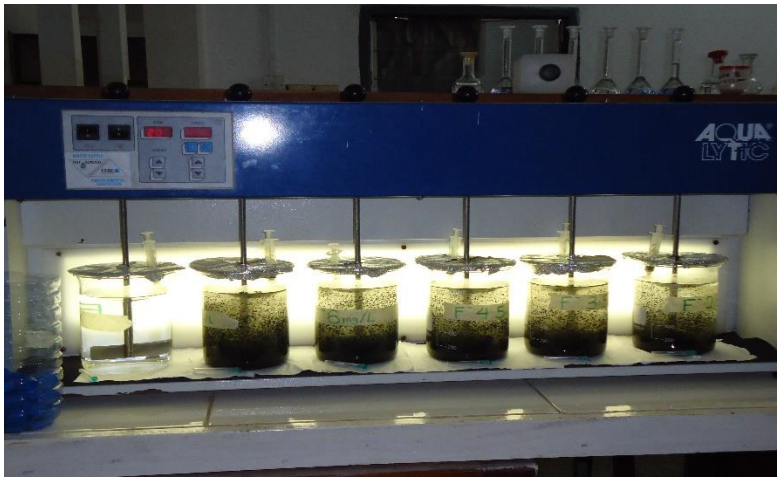


Initial Fluoride conc. = 20mg/L, pH = 7, Flow rate = 13ml/min, Bed depth = 10cm, mass of AOCB = 1002g, mass of AOCC = 353g

Adsorption of Fluoride onto Aluminium Oxide Charcoal (AOCC)



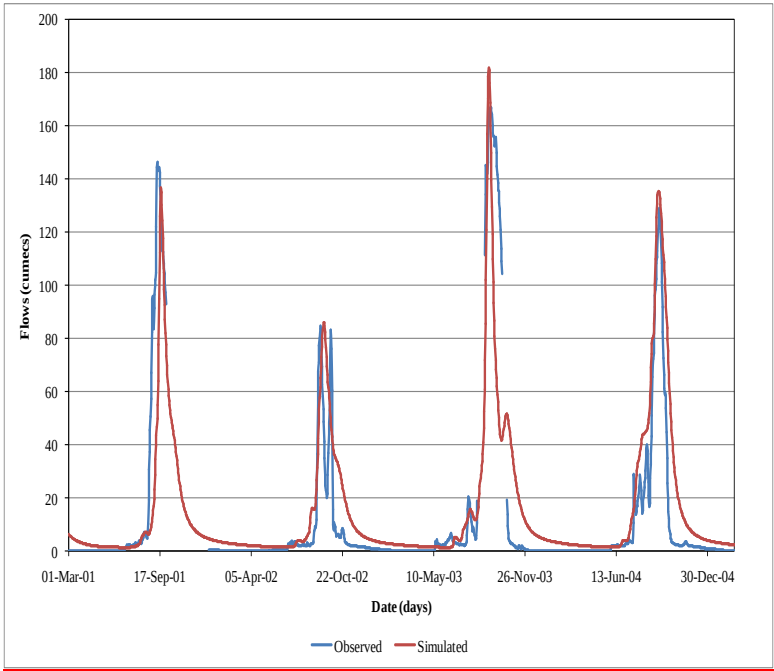


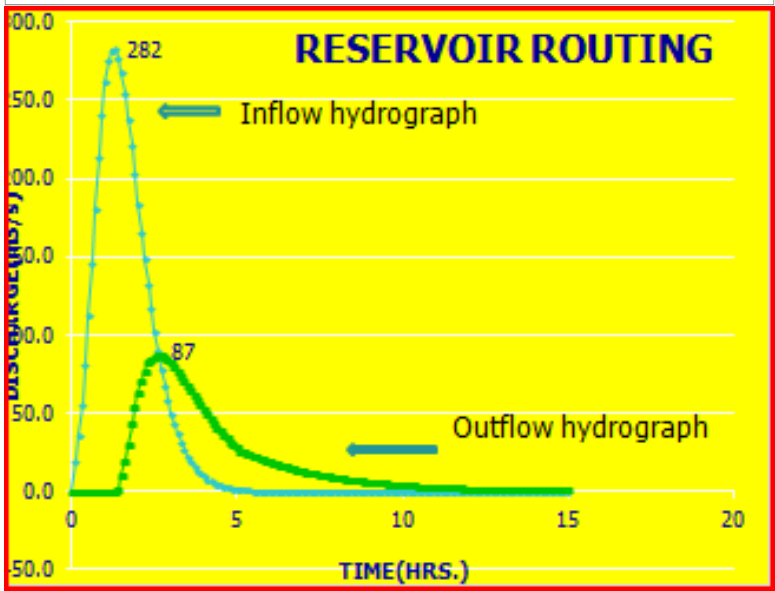


- Adsorbent- fresh AOCC
- Mass of AOCC -15g
- Equilibrium- 5days
- pH- 7±0.01
- Room temperature

Water Resources Research

- Urban flood, Rainfall-runoff and surface water modelling
- Groundwater modelling
- IWRM, Climate Change and Land use/land cover impact,
- Transboundary water allocation

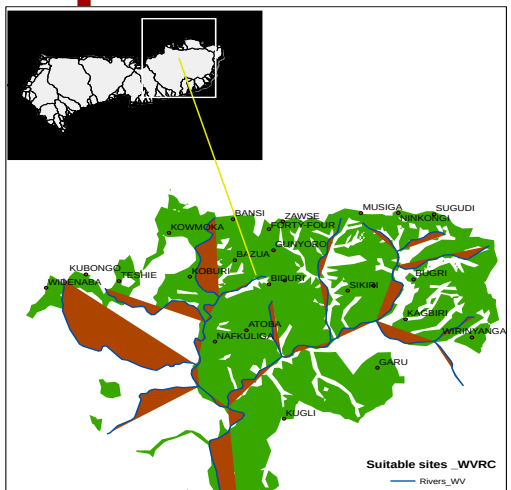




Water Resources Research

- Mapping small water bodies, & Soil moisture modelling using remote sensing and GIS,
- Determining water footprints and Irrigation water productivity

Mapping small water bodies and reservoir



Collaboration Opportunities with the Regional Water and Environmental Sanitation Centre

Academic, Sector and Industrial Partners from the Sub-region

National Partners and collaborations

WASH SERVICES

- Ghana Water Company Limited (GWCL)
- Community Water and Sanitation Agency (CWSA)
- National Disaster Management Organization (NADMO)
- Hydrological Services Department (HSD)

REGULATORY AND RESEARCH

- Water Research Institute (CSIR, WRI)
- Environmental Protection Agency (EPA)

EDUCATION AND TRAINING

- University of Cape Coast (UCC)
- University of Education, Mampong Campus
- NABPTEX, Accra

1. Capacity building
2. Joint applied research and development
3. Instrumentation and laboratory internship for students

Regional Partners and Collaborations

- University of Cheikh Anta Diop , UCAD, Senegal,
- University of Hopheit Boigny, Cote D'Ivoire
- National Water Resources Institute, Kaduna, (Nigeria)
- Fourah Bay College, University of Sierra Leone, Sierra Leone
- University of Benin, Benin City, (Nigeria),

Stakeholders' consultative workshop - 2016

Industry-Academic Partnerships – Internships

PhD and MSc students

16 PhD + 69MSc

CWSA

EARTH OBSERVATION CENTRE - UNER

GIDA

SAFISANA

Collaboration Opportunities with REWSCK

Strategic Partners

- ❑Industry Partners
- ❑Academic Partners
- ❑Development Partners

Partnership activities

- ❑Capacity Building for partners' staff (PhD, MSc, short courses)
- ❑Guest Lecturer appointments from regional faculty and industry,
- ❑Lecturers and students internships in industry
- ❑Joint applied research and development with industry
- ❑Joint proposal for grant funding

PhD & MSc Application Procedure

Please follow the KNUST link below:
https://apps.knust.edu.gh/admissions
(or go to www.knust.edu.gh and click **apply online**)

1. Click on generate login, and provide email
2. Go to your email inbox to pick the password
3. Come back to the link above and click on login
4. Provide detail following the steps, and upload all your academic documents (transcripts and certificates).
5. Print copy of the completed online application, attach your academic documents and post (by express mail) to the address below:

   The Secretary
   School of Graduate Studies
   Kwame Nkrumah University of Science and Technology,
   KNUST, Kumasi, Ghana,

6. Download the completed application form and send to RWESCK email (rwesckproject@gmail.com AND sokwarteng@gmail.com), attach all academic documents
7. Include motivation letter and research proposal if your are PhD applicant


Thank you!