FSM Scholarship Programme

Building young professionals in Khulna

WaterAid

SNV

KCC - FSM Scholarship Programme

This brochure compiles brief summaries of the research findings conducted by the students, of Khulna University (KU) and Khulna University of Engineering and Technology (KUET), who were awarded by the Khulna City Corporation (KCC) - Faecal Sludge Management (FSM) Scholarship Programme led by KCC, with support from SNV. Through this initiative, KCC is expanding the potential professional base for faecal sludge management and is enlarging the scope in the search for innovative solutions to long-standing and complex FSM challenges. In turn, interest in FSM as a research and livelihood opportunity amongst students is increasing, for both male and female. It is produced as part of SNV's Urban Sanitation and Hygiene for Health and Development (USHHD) product, with funding from the Bill & Melinda Gates Foundation project, Citywide Inclusive Sanitation Engagement (CWISE).

SNV Netherlands Development Organisation

SNV is a not-for-profit international development organisation that makes a lasting difference in the lives of people living in poverty by helping them raise incomes and access basic services. We focus on three sectors and have a long-term, local presence in over 25 countries in Asia, Africa and Latin America. Our team of more than 1,300 staff is the backbone of SNV.

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Special thanks to: Khulna University, Khulna University of Engineering and Technology and Khulna City Corporation.

Citation: SNV in Bangladesh, *KCC-FSM Scholarship, A joint venture of Khulna City Corporation and SNV in Bangladesh*, 2021, Dhaka, SNV in Bangladesh.

Contents

51% of the 30 million urban residents have 'improved sanitation' (latrines or septic tanks), the vast majority of waste still goes untreated.

Background

Bangladesh

The bulk of human waste in some of the world's fastest developing cities is dumped untreated in local waterways, on marginal land or in open drains close to people's houses — polluting the local environment and posing a huge health risk to communities.

In Bangladesh, while 51% of the 30 million urban residents have 'improved sanitation' (latrines or septic tanks), the vast majority of waste still goes untreated. As a result, ground water reserves are increasingly contaminated by salinity, faecal matters, arsenic or industrial chemical waste, with statistics showing that over 25 million people in Bangladesh lack access to an 'improved' water source.

Khulna

The characteristics Khulna context make it suited to pilot citywide and inclusive project for safe sanitation. The absense of systemic and planned Faecal Sludge Management (FSM) is challenging, yet the city's size is manageable, and the cooperation with local and regional authorities is stimulating.

Additionally, Khulna's location is challenging. In the lowlands next to the Sundarbans, Khulna is sitting in the most vulnerable part of an already climate sensitive country. The high water table in the surrounding area means flushing commonly does not work.

Most households in Khulna have access to toilets. Depending on their quality and location, toilets are either connected to a drain or suface water, or to a pit or septic tank. It is not uncommon for septic tanks to not have been emptied for over 3 years, and when they are, 81% are emptied manually. All this means that safe disposal and treatment of faecal sludge is mostly absent.

SNV

SNV Netherelands Development Organisation has been active in Bangladesh since 2006. Through impact-oriented and future scalable programmes it has since helped turn poverty into prosperity.

SNV specialises in supporting the resourcefulness of development actors. We support people to access and develop the capabilities, services and opportunities needed to live a fulfilling life, while sustainably using the natural resources they depend on.

Because of Banagdlesh's rapid urbanisation, programmes focussed on Water, Sanitation and Hygiene (WASH), and specifically FSM are increasingly important. We conducted a baseline study of FSM in 3 urban centres of Southern Bangladesh. Khulna's situation stood out from Kushtia and Jhenaidah Paurashavas.

KCC - FSM Scholarship Programme

From 2013 to 2017, SNV piloted the pro-poor market-based solution for faecal sludge management project in Khulna, funded by the Bill & Melinda Gates Foundation.

The project put in place important building blocks to improve the health and well-being of the urban population. Yet, there still is a long way to go for real impact to be seen on the ground. Therefore, the City Wide Inclusive Sanitation Engagement (CWISE) project was started in 2018, also funded by Gates Foundation.

SNV finds it important to engage youths in FSM, and stimulate potential. Therefore, both projects include a scholarship programme. The scholarship is a joint effort of KCC, the city's two leading public universities: Khulna University of Engineering and Technology (KUET) and Khulna University (KU). If selected, students are awarded a 20,000 BDT (230$) monthly grant and technical research support for a 3-semester period. Three batches of the scholarship were awarded in 2016, 2017 and 2019.

In 2016, applications were evaluated by a scrutiny committee from each university; from 2017 this was done by a technical review committee with practitioner of urban sanitation. Only fulltime postgraduate KUET or KU students with a CGPA over 3.00 can apply. Their applications are then scored based on their (i) potential impact in the field of FSM, (ii) the quality of the proposal, and (iii) the academic merit of candidate. The top-4 students from each Univeristy are selected, with a total of 8 students awarded per batch. Apart form academic suitability, SNV applies a gender equity approach: half of the selected students half of the students must be female, else the seat remains vacant.

KHULNA CITY CORPORATION FSM SCHOLARSHIP - SUMMARY STATISTICS

TOP PUBLIC UNIVERSITIES
KUET & KU

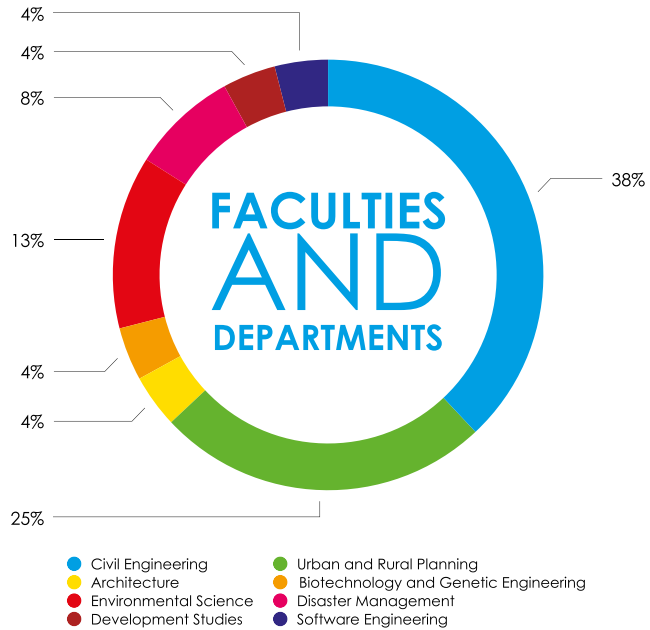
50/50
MALE / FEMALE

41 APPLICANTS
24 AWARDED

AVERAGE SCORE (/100)
APPLICANTS **64**
AWARDED **69**

38% papers published

1/5 now works in academia, **10%** in Urban and Rural Planning



Talukder Abdul Khaleque

Mayor, Khulna City Corporation

"As FSM is a new challenging field where still the sector is lacking experienced workforce and learnable practical research documents which could be adapted in further development. It is highly appreciated that KCC in association with SNV has launched the KCC -FSM scholarship since 2016 to explore different technical, socio-economic issues for FSM related multifaceted research in postgraduate level for the students of two leading universities of Bangladesh: Khulna University of Engineering & Technology and Khulna University to resolve many long-standing FSM challenges. Being Mayor of the city, I would like to take the privilege to congratulate SNV, for such initiative and city officials along with both university & postgraduate students that would contribute to produce a bunch of meritorious students who have the capability to resolve many long-standing complex challenges by successfully applying of their inventive insights to achieve "Sanitation for all, no one to be left behind". I would also request other development partners to come forward with contributions in the field and for the sustainability of the great programme named KCC -FSM scholarship programme."

Dr. Muhammed Alamgir

former Vice-Chancellor Khulna University of Engineering & Technology
Member of University Grants Commission of Bangladesh (UGC)

"Environmental sustainability in the cities of Bangladesh is jeopardized due to rapid urbanization despite the are certainly associated to appropriate Faecal Sludge Management system, in which Bangladesh is struggling to meet the expectation. To reach the target, the country needs a FSM system based on its inherent socio-economic settings and technical capabilities developed through the assessment of traditional system, best practices and innovations. To meet this endeavour, Research in tertiary level is a must. It is highly appreciated that the SNV in Bangladesh has launched the KCC-FSM scholarship scheme to support faecal sludge related multifaceted research in postgraduate level for the students of two leading universities of Bangladesh: KU and KUET. As a member of UGC and the former Vice-Chancellor of KUET, I would like to take the privilege to Sanitation for all, no one to be left behind."

Dr. Kazi Saiful Islam
Professor and Head
Urban and Rural Planning Discipline
Khulna University

"Fecal Sludge Management having immense academic potentiality is a much-neglected issue in Bangladesh. KCC-FSM scholarship is a time-befitting initiative to popularize this subject among faculty members and students aiding them with necessary organizational and financial support to create knowledge and skill. I believe such an initiative will help Bangladesh to achieve target 6.2 of Sustainable Development Goal (SDG). I hope this will encourage many other organizations to adopt this model to embolden innovation to solve complex multi-dimensional issues like FSM."

Prof. Dr. Quazi Hamidul Bari

Department of Civil Engineering, KUET, Khulna

"I am very glad to mention that the efforts and services offered by SNV are obviously helpful to the community of Khulna City especially to support them in health and Sanitation sector. The graduate scholarships jointly offered by SNV and KCC to the students of the universities in KCC is one of the remarkable sign in the development programme. I really appreciate this scholarship which has created a thoughtful mind among the students to manage the faecal sludge in appropriate way. In future, I hope an excellent continuation of this kind of scholarships and active collaboration with the universities in KCC to activate more research based programmes ."

KCC-FSM Scholarship Programme: A summary from 2016 to 2019

Year	Sl#	Students' names	University	Professors	Research Title
2016	1	**Noman Al-Hafiz**	KUET	Prof. Dr. Muhammed Alamgir	Study on Faecal Sludge Management in Kushtia Municipality and its Future Development and Sustainability
	2	**Fatima Naznin**	KUET	Prof. Dr. Khondoker Mahbub Hassan	Performance Evaluation of Faecal Sludge Treatment Plant at Khulna City and Proposal for Sustainable Development
	3	**Md. Alamin**	KUET	Prof. Dr. Quazi Hamidul Bari	Seasonal Variation on Extent of Stabilization of Faecal Sludge for Safe Disposal during Co-composting in Forced Aeration and Passively Aeration Process
	4	**Sabok Mondal**	KUET	Prof. Dr. S.M. Moniruzzaman	Faecal Sludge Management in Khulna City: An Approach for Safe Emptying
	5	**S.M. Tafsirul Islam**	KU	Prof. Dr. Md. Ahsanul Kabir	Sanitation System Risk Assessment for Slums of Urban Khulna, Bangladesh
	6	**Irfan Shakil**	KU	Prof. Dr. Tanjil Sowgat	Faecal Waste Containment and Emptying in Slums of Khulna: Scope for a Community Driven Model
	7	**Md. Nazmus Sakib**	KU	Assistant Prof. Dr. S.M. Abdul Awal	Effects of Faecal Sludge Compost on the Growth and Flowering of Marigold (Calendula officinalis)
	8	**Sarder Shakil Ahmed**	KU	Professor Dr. Anirban Mostafa	Socio-cultural Acceptability of Community Sanitation: The Case of Bastuhara, Khulna
2018	9	**Prottusha Mondal Reya**	KUET	Prof. Dr. Shamim Mahabubul Haque	Developing Corporatisation Model for Faecal Sludge Management in Khulna City
	10	**Zannatul Ferdous**	KUET	Dr. Abdullah Yusuf Al Harun	Ecologically Sustainable Management of Effluent from Faecal Sludge Treatment Plant, Rajbandh, Khulna
	11	**Sheikh Enjamamul**	KUET	Abul Kalam Azad	Recycling Effluent from Faecal Sludge Treatment Plant for Home Yard Gardening

Year	Sl#	Students' names	University	Professors	Research Title
2018	12	**Tahsin Reza**	KUET	Prof. Dr. Shamim Mahabubul Haque	Developing a Model for Pro-Poor Sanitation System Engaging Private Operators in Khulna City
	13	**S. M. Sagor**	KU	Dr. Hamidul Bari	Application of Innovation Idea "Waste to Energy" for Sustainable Disposal of Faecal Sludge by Producing Biofuel
	14	**Asma Ul Hosna**	KU	Dr. Kh. Mahbub Hassan	Comparative Performance Study on Faecal Sludge Treatment Plants at Khulna, Kushtia and Jhinaidah Districts
	15	**Israt Fatima Easha**	KU	Saima Rahman	Developing a Sustainable Model of Faecal Sludge Management for the Slums of Khulna city
	16	**Nazifa Anjum**	KU	Prof. Dr. Muhammed Alamgir	Study on the Potential Reuse of Faecal Sludge through Co-composting and Vermicomposting Process
2019	17	**Md. Bashirul Islam**	KUET	Dr. Md. Khalekuzzaman	Feacal Sludge to Green Energy: Production of Biocrude from Mixed Culture of Microalgal Biomass and Faecal Sludge
	18	**Md. Al Amin**	KU	Dr. Md. Abduullah Yousuf Al Harun	A Comparative Study on Groundwater Microbial Contamination Surrounding Unmanaged Dumping Site and Faecal Sludge Treatment Plant
	19	**Sumaiya Akbar**	KU	Dr. Jagadish Chandar Joardar	Biochar Production from Faecal Sludge, Its Effects on Plant Growth and Soil Quality.
	20	**Nur-E-Zannat Pollen**	KUET	Dr. S. M. Moniruzzaman	Study on Strength, Weakness, Opportunity and Threats of Three Faecal Sludge Treatment Plants in Bangladesh
	21	**Nazifa Zia**	KUET	Dr. Khondoker Mahbub Hassan	A Role of Faecal Sludge Management on City Wide Inclusive Sanitation (CWIS).
	22	**Sakina Afroz Bithi**	KUET	S. M. Tariqul Islam	Current Practices and Challenges of Faecal Sludge Management: A Case Study of Railway Slum Area in Khulna City
	23	**Pial Banik**	KU	Sk. Kamrul Hasan	Assessing the WASH Behavior of the Residents concentrating on Faecal Sludge management: A Comparative Study between KCC and Kushtia Municipality
	24	**Farzana Akter**	KU	Dr Abul Kalam Azad	A study on Occupational Health Hazards and Socio-Economic Conditions of Sweepers of Khulna City, Bangladesh

KCC-FSM Scholarship Year 2016

Noman Al-Hafiz

Study on Faecal Sludge Management in Kushtia Municipality and its Future Development and Sustainability

Faecal sludge management in Kushtia

Noman Al-Hafiz analyses FSM in Kushtia Municipality. The treatment and proper disposal of Faecal Sludge (FS) can be an expensive and environmentally damaging process. He determines that the majority of FS in Kushtia is discarded back into natural waterbodies. This situation leaves much to be desired. Therefore, he researches options for the development of FSM in Kushtia as well as different end-use options. Specifically, he tests the efficiency of drying bed dewatering and coco peat filter treatment as treatment methods.

A usable fertiliser

Both drying bed dewatering and coco peat filter treatment are efficient treatment methods. All analysed parameters are within national standards. To test this, Noman collected raw and dried FS, and wastewater for laboratory tests. After dewatering the FS and co-composting the remaining organic solid waste, he managed to produce a usable fertiliser. The fertilisers's physiochemical, microbial and heavy metals parameters are within Bangladesh compost standards and World Health Organization (WHO)'s guidelines.

Ministry permission needed

Noman concludes that there is a lot of potential for FSM in Kushtia. He recommends more drying beds and/or another treatment plant to upgrade FSM performance to keep up with population growth. Most importantly, residents are familiar with FSM and the positive effects of composting. Ministry permission, though, is lacking.

Performance Evaluation of Faecal Sludge Treatment Plant at Khulna City and Proposal for Sustainable Development

Fatima Naznin

Lack of faecal sludge management

Fatima Naznin proposes options for the sustainable development of Khulna City Faecal Sludge Treatment Plant (FSTP). To do this, she firstly evaluates the plant's efficiency, and then identifies difficulties in operation and maintenance.

Khulna FSTP

In Khulna, faecal sludge still is discharged into waterbodies in nearby lowlands, polluting the environment and posing serious health risks to locals residents. In this light, KCC decided to establish a FSTP in 2017.

Acceptable effluent

Fatima tested FSTP effluent. She finds that the biochemical oxygen demand– this is the amount of oxygen needed to break down organic material in water– varies between 16-25 mg/L. The allowed limit for inland surface water bodies is 40 mg/L. At between 30-80 mg/L the total suspended solids concentrations also are were well within the 100 mg/L limit. Additionally, Fatima finds that nitrate, phosphate, and E.coli concentrations far below the limit. All this pleads in favour of Khulna's FSTP.

Long-term sustainability

In operation and maintenance there are steps to be made. To ensure long-term sustainability of Khulna's FSTP, Fatima recommends adjustments of water levels, maintenance of flow uniformity, vegetation management, odour control and berm maintenance.

Seasonal Variation on Extent of Stabilization of Faecal Sludge for Safe Disposal during Co-composting in Forced Aeration and Passively Aeration Process

Md. Alamin

Year-round co-composting

In his thesis, Md. Alamin researches the extent to which co-composting processes are affected by wet and dry seasons. Co-composting is degradation of organic material using more than one feedstock, such as faecal sludge and organic solid waste. To do so, he determined the temperature of the co-composting process with, both with forced and passive aeration.

Experimenting with active and passiveaeration

To conduct his experiments, Md. Alamin collected organic solid waste from, amongst others, student's halls. This was mixed with vegetable and food waste, and sawdust. He then ran composting tests in 3 stages, 15—30 days each. The maximum temperature reached using passive aeration was 65°C, and 67°C using forced aeration. Temperature patterns, degradation of organic matter, and stability index were almost identical for passive and forced aeration. This means that co-composting with FS can be done year-round.

FSM a viable option

Md. Alamin concludes that co-composting is a viable year-round option for FSM in Bangladesh. He further notes that passive aeration systems produce good quality compost and are more economical to operate and maintain.

> "I'm so glad to be a part of this scholarship. This scholarship play an important role in making masters programme more accessible and affordable to me. This scholarship also reinforced my self-confidence and gave me a greater power of resilience."

Effects of Faecal Sludge Compost on the Growth and Flowering of Marigold (Calendula officinalis)

Md. Nazmus Sakib

Alternative to chemicals

Pot marigold is a popular ornamental plant and widely cultivated in Bangladesh. Large quantities of chemical fertiliser are used to accelerate growth and flowering. This leads to soil infertility and upsets ecosystem balance. In this context, Md. Nazmus Sakib researches using Faecal Sludge Compost (FSC) as a cost efficient and more environment friendly alternative.

Finding the right ratio

The aim of Nazmus' research is to assess the effect of FSC on the growth and flowering of pot marigold. Additionally, Nazmus compares the growth and flowering of pot marigold treated with chemical fertiliser, FSC, and a combination of both. He experimented with different FSC-fertiliser-soil ratios to determine the optimum concentration required for growth and flowering. In doing so, farmers may be able to overcome their sole dependency on chemical fertiliser and its associated negative effects.

Promising results

Nazmus' experiments show that low a concentration of FSC in the soil has relatively promising benefit to growth and flowering. Too high quantities of FSC reduces the plant's health and limits its development. Nazmus recommend a combination between reducing the use of chemical fertiliser and increased use of FSC.

Faecal Sludge Management in Khulna City: An Approach for Safe Emptying

Sabok Mondal

On-site containment management

Sabok Mondal assesses on-site containment management practices at 3 different types of settlements in Khulna City Corporation : Muzgunni Second Phase, a residential area, Boro Boyra, a mixed-use area, and Rail Junction Bosti, a slum. He gathered data using surveys, key informant interviews and focus group discussions.

Connected, accessible and safe?

His results show whether or not a bathroom is connected to a septic tank or pit, if septic tanks are connected to a drain, how often containments are emptied, and if emptying is done manually or mechanically. The results are listed in table 1.

Overall

In all three areas, FS is disposed of in nearby drains if septic tanks or pits are emptied manually. FS is only disposed of at Khulna's faecal sludge treatment plant if tanks or pits are emptied mechanically. The overall quality of emptying is 42% in residential areas, 36% in mixed-use areas, and 17% in slums.

Law enforcement

Sabok Mondal concludes that safe emptying is possible in all types of areas in Khulna. He recommends : enforcing laws pertaining to septic tanks during design and construction, introducing smaller emptying devices, and awareness campaigns for local residents.

Table 1: Results per area (%)

		Residential area	Mixed-use	Slum
Tank / pit has been emptied		58	41	5
Mechanical emptying possible		81	41	22
Emptying is done	Mechanically	31	7	
	Manually	13	50	100
Emptying is	Safe	56	45	25
	Partially safe	12	13	13
	Unsafe	32	42	62

Sanitation System Risk Assessment for Slums of Urban Khulna, Bangladesh

S.M. Tafsirul Islam

Health risk

Slum areas in Khulna are disproportionately disadvantaged, also when it comes to sanitation. Municipal services in these areas are generally nonexistent, they have an informal identity, informal security tenure, and no formal recognition by the public sector. As a result, people living in slum areas cannot practice basic sanitation. In his research, S.M. Tafsirul Islam, views improper sanitary service in slum areas as a health hazard and quantified this risk.

Multilayered assessment.

In his thesis, Tafsirul developed a sanitation risk assessment framework (SRAF). This framework consists of 23 indicators divided over 3 variables: hazard, exposure, and vulnerability.

The SRAF was applied to a study area followed by a survey per household. In tot 339 household from 10 slums participated in the survey.

Table 2: Composite risk score per slum (%)

Slum name	Low	Medium	High
1. Alamnagar Bazar		52	
2. Boroi Tola			58
3. Islamia Maholla			58
4. LabonchoraSluice-Gate	49		
5. Moylapota Horizon		52	
6. Mirer Danga	45		
7. NabolokHelal		56	
8. Padma-Meghna		53	
9. Rupsha Char	48		
10. Sornali Colony		57	

Composite score

On the basis of the 3 variables – hazard, exposure, and vulnerability– Tafsirul calculated a composite risk score per slum. This is a weighted composite: 59%, 25% and 16%, respectively. The scores per slum are listed in table 2. Overall, Khulna slums are at medium risk. Tafsirul indicates that these scores sever as a source for city-wide sanitation planning as well as urban utility planning.

"I have got an excellent exposure to different living standards of society. I also learned how multi stakeholder engagement can benefit a community through proper advocacy and planning.I am now capable of identifying issues, know how to search for information in specific point of interest. Moreover, I have enriched my social network in my study city through this Scholarship programme.

The scholarship also provided me with support in doing field works in terms of allowing links to the slums and city authority. The workshops also helped me to increase my knowledge of new quantitative tools. I totally felt relaxed due to the excellent support from SNV staffs."

Irfan Shakil

Faecal Waste Containment and Emptying in Slums of Khulna: Scope for a Community Driven Model

Engaging slum communities

In light of its rapidly progressing urbanisation, Bangladesh is looking for new ways to safely empty sceptic tanks or pits and efficient FSM. Poor containment of FS contributes to increasing prevalence of diseases and environmental pollution. This is especially relevant to slum areas. Irfan Shakil explores the scope of engaging slum communities in emptying and FSM.

Obstacles

Irfan did 4 casestudies, representing small, large, private, and public slums in Khulna City. The results shows that the containment infrastructure in slums is under pressure. This is because of the large number of people the use the same community toilets. Currently, the slums lack community initiatives and financial support to address this situation. Moreover, there is a social taboo against emptying.

Opportunities

Many of the people living in slums work in the construction sector. They work as day labours or masons. This availability of manpower, skill, and knowledge is an opportunity for the slum communities. Additionally, despite social stigma and financial constraints the communities are highly motivated when it comes to cost-reducing programmes which involve the whole community.

Model

Irfan proposes a community-based model for emptying and FSM in slums. He highlights the mobilisation of the community, utilising their abilities and opportunities, including them in decision making, and engaging them in construction and maintenance of sanitary facilitates in their own communities.

> **"Training on FSM ToolBox was another scope created by SNV from which I have learnt several tools and research approach. Exposure visit arranged by SNV at the starting period of this programme introduced different FSM system in different districts of Bangladesh. That enriched my personal knowledges related to this field."**

Socio-cultural Acceptability of Community Sanitation: The Case of Bastuhara, Khulna

Sarder Shakil Ahmed

Little knowledge

Hygiene and sanitation are crucial development issues in Bangladesh. Several development organisations are advocating for community sanitation in Bangladesh's increasingly dense urban areas. They focus their effort on slums. Surprisingly little is known about socio-cultural acceptance of community sanitation among people who live in slums. Also, it is unclear whether community sanitation changes the users' hygiene and sanitation behaviour.

Bastuhara colony

Sarder Shakil Ahmed examines which types of shared facilities are acceptable to given low-income urban communities. He does so by determining what people who live in 'Bastuhara Colony' think of community sanitation. Bastuhara Colony is a legally recognised slum in Khulna City. Shakil's objectives are the following. (i) To understand attitudes and approaches of stakeholders of shared sanitation in informal settlements. (ii) Assesses the availability of sanitary facilities in Bastuhara. (iii) Investigate what determines the acceptance of shared sanitation by the people who live in Bastuhara. (iv) To develop a culturally responsive community sanitation (CRCS) framework.

Suitable alternative

Shakil determines a general lack of toilet buildings in Bastuhara. More importantly, through his research, he is able to reflect on the practices and the perceptions of people who live in Bastuhara to fit in the appropriate community sanitation approaches. On this basis, Shakil suggests shared sanitations facilities as a suitable alternative to in-house toilets in dense informal settlements. Moreover, he recommends that it should be included in national policy guidelines. Here a big part is to be played by the different layers Bangladesh's government.

KCC-FSM Scholarship Year 2018

Prottusha Mondal Reya

Developing Corporatisation Model for Faecal Sludge Management in Khulna City

Corporatising FSM

Prottusha Mondal Reya proposes (partly) corporatising FSM in Khulna City. Her objective is threefold : documenting existing FSM in Khulna, identifying the possibilities of corporatising FSM, and developing a corporate FSM model detailing supply chain, financial marketing and operational plans.

Creating business opportunities

She expects to find that improving livelihood in Khulna, ultimately, is best served by creating business opportunities in the FSM service delivery process. Engaging the private sector ensures financial sustainability. And to ensure efficient service delivery, Reya proposes to engage and empower local manpower.

Zannatul Ferdous

Ecologically Sustainable Management of Effluent from Faecal Sludge Treatment Plant, Rajbandh, Khulna

Effluents as irrigation?

Zannatul Ferdous researches the suitability of using treated and untreated effluents as irrigation. He does so by using effluents from Khulna's Treated Faecal Sludge Treatment Plant and illicitly discharged effluent to grow certain agricultural crops. He also characterises the physicochemical and microbial characteristics of both types of effluent.

He expects to find that treated effluent is a better fertiliser than illicit, untreated discharges. Additionally, no microbial contamination may be found in crops which were irrigated with FSTPdischarges.

"Due to this scholarship, I was able to attend an international conference WasteSafe which was a wonderful experience for me. In that conference I met many people, I was able to describe my work to them, their comments, appreciation helps me a lot."

Sheikh Enjamamul

Recycling Effluent from Faecal Sludge Treatment Plant for Home Yard Gardening

Characteristics of FSTP effluent

Sheikh Enjamamul sets out to characterise the physicochemical and microbial parameters of Faecal Sludge Treatment Plant effluent. Also, he evaluates the applicability of this effluent in Marigold cultivation.

Enjamamul expects the outcomes of his experiment to show that the effluent discharged by Rajbandh FSTP is not harmful and is suitable for irrigation. He further expects FSTP effluent to be a better option for irrigation in Marigold cultivation than water is. He suggests that using effluent for irrigation may be beneficial to some vegetable species, too.

> "attributes such as better communication skills, logical thinking capability, team oriented working capability, better leadership quality, conceptual and analytical skills and ability to work within definite time frame."

Tahsin Reza

Developing a Model for Pro-Poor Sanitation System Engaging Private Operators in Khulna City

Sanitary solutions

Tahsin Reze provides sustainable solutions for different sanitation problems in poor urban communities. Her proposed outcome is a model for sustainable sanitation in poor areas. She will identify carriers that make the present sanitation system vulnerable, and provide possible solutions.

> “It made me realize as a planner how important this sector is for the general people and for the city as a whole.”

Application of Innovation Idea 'Waste to Energy' for Sustainable Disposal of Faecal Sludge by Producing Biofuel

S. M. Sagor

Faecal to fuel

Sagor develops a method to make charcoal briquettes from faecal sludge. In doing so, he plans to eliminate faecal sludge as a vehicle for the transmission of infectious diseases. He tests different moisture and ash ratios, evaluating energetic value as compared to conventional fuel.

The two most important questions Sagor needs to answer : are all dangerous pathogens killed for the faecal sludge killed in the process of making briquettes. And, is the energetic value of the faecal briquettes comparable to that of conventional ones?

Suitable alternative

Sagor produces his briquettes at temperature between 300~500°C, this kills all pathogens. Moreover, he determined that the maximum energetic value in his briquette samples is 13~14 MJ/kg. He finds that the faecal briquettes can be used as an alternative for conventional briquettes, which have an energetic value of 14.5MJ/kg.

Comparative Performance Study on Faecal Sludge Treatment Plants at Khulna, Kushtia and Jhinaidah Districts

Asma Ul Hosna

Faecal Sludge Treatment Plant efficiency

In her research, Asma monitors the efficiency of Faecal Sludge Treatment Plants in Khulna, Kushtia and Jhenaidah. Specifically, used the quality of the treated effluent as an indicator. In doing so she plans to identity difficulties in operation & maintenance of the FSTPs, and propose strategies for the improvement.

Based on the research she has conducted so far, Asma has determined a number of practical proposals.

- Organise awareness campaigns focussed on FSM and sludge emptying services.
- FSTPs should install CCTV.
- The site fo the Jhenaidah FSTP should be replanted with Canna, Heliconia, and Cyperus.

Israt Fatima Easha

Developing a Sustainable Model of Faecal Sludge Management for the Slums of Khulna city

Properly managed faecal sludge

In her thesis, Israt develops a sustainable model to properly manage faecal sludge. Her research has three components. Firstly, investigating the existing FSM system and impediments of a good faecal sludge management system for slum areas. Then, determine the impacts of poor FSM on the life of slum people. And finally, developing a sustainable FSM model for Khulna's slums.

"I have seen that not much students are interested in this so my comment for new students: Faecal Sludge Management is an important field in the context of Bangladesh. It is very important in the global world also as the world is working together for the betterment of faecal sludge management. And yes, this scholarship programme is a big opportunity in Bangladesh which will open many doors for your research and your career. So, do not hesitate to work in this field. Just grab the opportunity and you will be highly benefited by this."

Nazifa Anjum

Study on the Potential Reuse of Faecal Sludge through Co-composting and Vermicomposting Process

Environmentally friendly reuse

Nazifa's research maps out option for the environmentally friendly reuse of faecal sludge, such as soil conditioners and organic fertilisers. If successful, the research outcomes will help reduce the costs of converting faecal sludge into a safe and stable material.

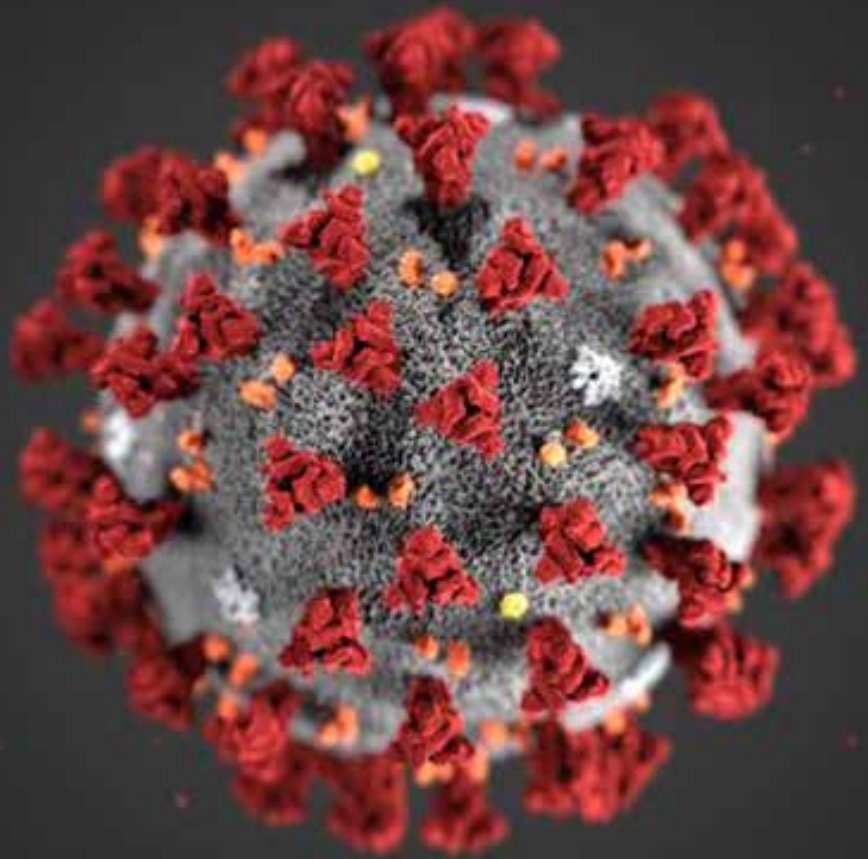
Nazifa hopes her research will encourage people to empty their septic tanks regularly. Also, she hopes it will help preserve health and the environment, and help create jobs.

Covid-19

During the final stages of their research, the 8 recipients of the 2018 scholarship have had to deal with the effects of the Covid-19 pandemic. This has led to expected delays, but also opportunities.

Most of the students' research contains one or more experiments, which are to be conducted in university laboratories. In response to the pandemic, universities were closed throughout Bangladesh. For most students this meant they have had to redo many —if not all— of their experiments.

Other commonly expressed obstacles were : being unable to collect data, lack of stable internet connectivity, in most cases it was impossible for students to meet their supervisors face-to-face. Some students, though, did mention the lockdown gave them the opportunity to reflect on their research and develop it further. In some cases this lead to better outcomes.

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KCC-FSM Scholarship Year 2019

About the scholarship in year 2019

For the year 2019, through a competitive process eight students were selected by the scholarship committee. Among them four students are from Khulna University and four from KUET. As briefly mentioned in below table, their chosen research works cover a diverse aspect of and related to FSM which are so crucial for the sector to draw needful attention for the betterment of FSM in urban and rural slums in Bangladesh. Their research work is ongoing and nonetheless to say that Covid-19 outbreak and series of lockdown delay their field and laboratory works. Universities assume that by end of 2021 the research works of this batch will be completed successfully.

	**Sumaiya Akbar**	Biochar Production from Faecal Sludge, Its Effects on Plant Growth and Soil Quality
	**Md. Bashirul Islam**	Feacal Sludge to Green Energy: Production of Biocrude from Mixed Culture of Microalgal Biomass and Faecal Sludge
	**Nur-E-Zannat Pollen**	Study on Strength, Weakness, Opportunity and Threats of Three Faecal Sludge Treatment Plants in Bangladesh

	**Nur Mohammad Ha-Mim**	A Comparative Study on Groundwater Microbial Contamination Surrounding Unmanaged Dumping Site and Faecal Sludge Treatment Plant
	**Sakina Afroz Bithi**	Current Practices and Challenges of Faecal Sludge Management: A Case Study of Railway Slum Area in Khulna City
	**Nazifa Zia**	A Role of Faecal Sludge Management on City Wide Inclusive Sanitation (CWIS)
	**Pial Banik**	Assessing the WASH Behavior of the Residents concentrating on Faecal Sludge management: A Comparative Study between KCC and Kushtia Municipality
	**Farzana Akter**	A study on Occupational Health Hazards and Socio-Economic Conditions of Sweepers of Khulna City, Bangladesh

Ways Forward:

SNV believes in youth capacity who can make tremendous contributions to the development of our country if proper opportunities are offered to this potential group. They have the capability to resolve many long-standing complex challenges by successfully applying of their inventive insights. FSM is a new subject and there is a lack of expertise even at an international level. Considering the urgency to initiate effective and safe management of faecal sludge demands, innovation and upgradation of existing practices are essential. With the aim of developing youth in FSM sector in Bangladesh and identifying innovative alternate solution for the context of urban Bangladesh through research work, KCC-FSM scholarship programme remains as an impactful intervention by encouraging the youth force in the multidimensional aspects of FSM.

SMART DEVELOPMENT WORKS

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