Mir Mohammad Hamza

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I am a sustainability enthusiast with a strong research interest in industrial ecology and systems-based approaches to sustainable development. Proficient in systems thinking and modelling, with experience gained in numerous professional consultancy and research projects, I am keen to further strengthen my technical skills and deepen my theoretical understanding of socio-ecological transitions and circular industrial systems.

Research Interests

- Material Flow Analysis (MFA) of Plastics, Metals, Construction & Demolition Materials, Textiles
- Life-Cycle Analysis (LCA) + Techno-Economic Feasibility Assessment (TEA) of Plastic Alternatives, Textiles & Alternatives, Energy Systems, Food-Agriculture Systems
- Stock-Flow modelling of waste management systems (MSW, plastics, metals) and socio-ecological systems

Academic Background

Msc. in Environmental Science and Management

Department of Environmental Sceince and Management
School of Life and Health Sciences
North South University, Dhaka, Bangladesh
CGPA: 3.95 out of 4.00
Expected Completion: December 2025
Thesis Project: Evaluating Future Trajectories and Costs of Plastic Waste Management in Bangladesh using a Dynamic Material Stock-Flow System
Supervisor: Dr Mohammad Sujauddin

BSc. in Economics (minor in Mathematics)

Department of Economics,
School of Business and Economics
North South University, Dhaka, Bangladesh
CGPA: 3.65 out of 4.00 (90%)
Credit completed: 120 credits (Degree Requirement)
Duration: 2019- 2023

A Levels

British Council Muscat
1A (Business Studies), 1B(Economics)
Session: 2015 - 2017

IGCSE-O Levels

Sri-Lankan School
4As (Economics, Mathematics, English Language, Accounting), 2Bs (Business Studies, ICT)
Session: 2013 – 2015

Research and Academic Experience

Research Assistant

Decoupling Lab
Department of Environmental Science and Management
North South University
Supervisor: Dr. Mohammad Sujauddin, Associate Professor, ESM, NSU
Duration: January 2023 - Present

Projects in Decoupling Lab

(1) Developing a decision support system to optimize recycled content selection in yarns by balancing environmental, technical, and economic tradeoffs:
Duration: November 2023-June 2025
Description: This study investigated the environmental impacts, technical feasibility, and economic viability of incorporating pre-consumer textile waste (PTW) into yarn production for Bangladesh's knitwear industry. The research employws Life Cycle Assessment (LCA) to quantify the environmental impacts of various yarn compositions, ranging from 100% virgin cotton to blends with up to 80% recycled content. Technical evaluations of yarn quality were conducted using standardized testing methods, while economic assessments considered factors such as material costs, availability, and designer preferences. The study integrated these diverse criteria using the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) multi-criteria decision-making method to identify optimal yarn compositions under various scenarios. Additionally, the research explored potential future scenarios, including the adoption of organic cotton, shifts in energy sources, and projected raw material scarcity and how they impacted yarn selection. Results were published in the journal Modeling Earth Systems and Environment (Title: *A modular framework for modeling anthropogenic and environmental trade-offs in sustainable textile material choices* Link: https://doi.org/10.1007/s40808-025-02632-4).
Role: Appointed as lead researcher and author by Dr Mohammad Sujauddin
Responsibilities:

- Designed and coordinated the overall research project
- Conducted primary data collection and analysis
- Performed Life Cycle Assessment and technical evaluations
- Implemented the TOPSIS multi-criteria decision analysis
- Interpretated results and wrote manuscript

(2) Modelling future pathways for urban plastic waste generation in Bangladesh using a dynamic stock-flow system.
Duration: June 2025 – On going
Description: The objective of this study is to model plastic waste generation in urban centres in Bangladesh using a dynamic stock-flow system. The system architecture encapsulates plastic waste generation to final disposal as well as intermediary processes such as collection, sorting, and recycling. A baseline scenario is developed which assumes no interventions and the pathways for 3 types of plastics are modelled over a temporal bound of 25 years at discrete one-year intervals. 8 interventions are then modelled along with their associated economic costs and applied under 4 scenarios; (i) Collect and Dispose (CDS), (ii) Recycling (RES), (iii) Reduce and Substitute (RSS), and System Change (SES). The study is expected to provide insights into the dynamics of plastic waste generation in Bangladesh at a national level, including the leakage rates and accumulations of plastic waste in terrestrial and aquatic environments, as well as the costs associated with various combinations of interventions. The model is built using MATLAB and data inputs such as per-capita waste generation, flow coefficients, stock capacities, and costs are collected from field surveys,

literature review, and national documents.
Role: Appointed as lead researcher by Dr Mohammad Sujauddin
Responsibilities:

- Research Design and Methodology
- Model coding, documentation, and validation
- Overseeing data collection, data cleaning and validation
- Model output analysis, statistical testing, and interpretation
- Writing the manuscript

(3) Investigating the potential of Closed-Loop Metabolism of Textile Fibres in the Textile and Apparel Industry in Bangladesh
Duration: November 2024 – Ongoing
Description: The objective of this study is to conduct a static Material Flow Analysis (MFA) of the textile and apparel industry in Bangladesh using Economy-Wide Material Flow Analysis (EW-MFA) indicators. The system boundary encompasses raw material inputs through production, consumption, and final disposal, including intermediary processes such as recycling and reuse. The analysis focuses on quantifying material flows, waste generation, and recycling/reuse rates for the base year 2021. The study aims to provide insights into the current state of material flows and the potential for implementing closed-loop metabolism in the textile-apparel sector. Key indicators such as Direct Material Input (DMI), Total Material Requirement (TMR), and cyclical use rate are calculated to assess the industry's resource efficiency and circularity. Based on the static analysis, projections for future scenarios and potential interventions are discussed. The analysis is conducted with data inputs on material flows, waste generation rates, and recycling capacities collected from UN Comtrade, industry surveys, expert interviews, and literature review. The study provides a comprehensive snapshot of the textile-apparel material flows in Bangladesh, forming a basis for future policy recommendations and sustainability strategies.
Role: Research assistant appointed by Dr Mohammad Sujauddin
Responsibilities:

- Conduct Economic Valuation of Textile Material Flows
- Perform uncertainty analysis on Material Flow parameters
- Conduct policy analysis to identify gaps in existing policy landscape in Bangladesh and identify opportunities for closed-loop metabolism

(4) Assessment of the present and future state of municipal solid waste management of Dhaka, Bangladesh: A material flow and life-cycle approach
Funded By: North South University. Grant ID: CTRG-22-SHLH-48. Grant amount: USD 5,000
Duration: October 2025- On going
Description: The objective of this study is to build a comprehensive picture of the MSW landscape of Dhaka City. This will include quantifying both the present solid waste generation characteristics and investing its socio-economic determinants, as well as forecasting future trends in waste characteristics. An assessment of existing waste management governance in Dhaka will be carried out as well. The goal is to help decision-makers understand the long-term needs, prospects, and challenges of the solid waste management system in Dhaka and assist in the formulation of effective waste management policies.
Role: Research Assistant
Responsibility:

- Survey and collect data on demographic and socio-economic factors affecting waste generation in Dhaka.
- Conduct an in-depth review of existing strategies, plans, policies, practices, legislation, and the institutional capacity of relevant entities.

- Building and estimating an econometric model for determinants of MSW waste generation
- Manuscript writing.

(5) ***Development of Policy and Financing Strategy/Mechanisms to Implement the National Action Plan for Sustainable Plastics Management in Bangladesh and PPP Model for Investment in Plastic Recycling***
Funding By: The World Bank
Duration: January 2023 – July 2023
Description: The primary objective of this consultancy assignment was to identify and draft relevant policies and regulations to support the activities included in the action plan for sustainable plastic management in Bangladesh. It included harmonizing with existing work plans and draft regulations and recommending public institutional structures. The policy engagement part of this assignment involved outlining the pathway to implement Extended Producer Responsibility (EPR) in plastic management, and identification of circular economy actions to tackle plastic management issues. The project also aimed to propose circular business models for sustainable plastic production using the principles of industrial symbiosis. Alternatives to single use plastics were also analysed and suitable alternatives are proposed based on environmental impact analysis and economic feasibility assessment.
Role: Appointed as Research Assistant by Dr Mohammad Sujauddin
Responsibilities: The project was segmented into 4 different tasks. I worked as research assistant for Tasks 1 & 2. I was part of the research team that supported the Department of Environment (DOE) in the identification and development of national policy regulations for sustainable plastic management.

- Conducted a comprehensive analysis to identify existing national policy regulations pertaining to plastics. Identified gaps in the current regulations and determined areas requiring further development.
- Researched and gathered best practice examples of policies from around the world, specifically focusing on areas aligned with the identified gaps. Analyzed these examples to extract valuable insights related to accountability structures, communication and dissemination plans, and the involvement of the private sector.
- Utilized the gathered information and insights to contribute to the development of national policy regulations for sustainable plastic management. Collaborated with stakeholders to ensure the inclusion of anti-litter regulations and guidelines aimed at minimizing plastic packaging. Explored options for Private Sector Participation (PSP) within the policy framework.
- Contributed to the creation of a comprehensive set of national policy regulations that addressed the identified gaps and aligned with international best practices. These regulations aimed to promote sustainable plastic management, reduce plastic waste, and establish effective accountability measures.

I was involved in designing the Extended Producer Responsibility (EPR) guidelines for Task 1 (Support the Department of Environment (DOE) to identify and develop national policy regulations for sustainable plastic management) of the project. These guidelines were to assist the Government of Bangladesh in formulating EPR regulations for plastic waste management in Bangladesh. I also assisted in the analysis of alternatives to single-use plastic products for Task 2 of the project which looked at circular business models for the Plastic Industry. I conducted a techno-economic analysis to understand the economic feasibility of various alternatives to single use plastic applications.

Teaching Assistant

I am serving as a Teaching Assistant (TA) to Dr. Mohammad Sujauddin in the Department of

Environmental Science and Management, North South University since Spring 2023. I am dealing with several advanced level undergraduate and graduate courses. I generally give lectures on the following topics in these specific courses:

1.) **ENV 455: Research Methods**
    a. Experimental Design
    b. Sampling Methods
2.) **ENV 418: Conservation and Sustainable Development**
    a. Life Cycle Assessment
    b. Material Flow Analysis
3.) **ENV 414: Waste Management**
    a. Circular Economy
    b. Industrial Symbiosis
    c. Material Flow Analysis
4.) **ENV 501: Fundamentals of Environmental Science and Management**
    a. Circular Economy

Publications

- **Hamza, M.M.**, Biswas, M.K., Noor, K.M.A. *et al.* A modular framework for modeling anthropogenic and environmental trade-offs in sustainable textile material choices. *Model. Earth Syst. Environ.* 11, 448 (2025). https://doi.org/10.1007/s40808-025-02632-4

Peer Review Activities

Peer Reviewer, *Discover Sustainability* (Springer Nature), 2025

- Reviewed manuscript titled *"Is the Load Capacity Curve hypothesis valid in the context of South Africa amidst energy transition, digitalization, and resource rents?"*

Professional Experience

Financial Analysis Consultant, Infrastructure Investment Assessment for Plastic Waste in Urban Growth Centers, funded by World Bank**,** implemented by Maxwell Stamp Ltd. *(January 2023 - February 2024)*

- Designed and implemented dynamic Stock-Flow system using P2O Modelling
- Estimated infrastructure needs for sustainable plastic waste management
- Developed cost estimation models for waste management systems
- Conducted GHG emissions analysis

Consultant, Green Earth Quest, Funded by the World Bank, Implemented by EATL, (*September 2023-February 2024*)

- Prepared Question Sets for environmental and climate change related topics for school, college, and university levels of the competition.
- Designed and prepared educational material for participants of the competition.
- Judged submissions for second round of the competition at the university level.
- Judged grand finale for the school level of the competition.

Data Analysis Consultant, Technical and Business Advisory Support for RUSTIC, Tetra, and Plenary Aqua as part of Feed the Future project of USAID, Implemented by Abt Associates, Triangulum Consulting, and Rural Access (*October 2024 – February 2025*)

- Analyzed business and process data to create process inventory for the client businesses to conduct techno-economic assessment, business and financial planning, and GHG emissions inventory.
- Assessed Carbon-Credit potential through GHG emission inventory, constructed using IPCC methodology and assessing Scope 1, 2, and 3 emissions.

- Prepared Cash flow projections, financial statements, and ROI analysis to assess financial viability of investment opportunities to aid in business strategic planning
- Analyzed market research data and prepared market research plans with cash flow projections and ROI calculations.

Quantitative Modeling and Sustainability Consultant at Rural Access, (October 2024-Present),

- Prepared quantitative actuarial assessment framework for microinsurance projects as part of Rural Access's project proposal for BMMDP climate adaptive microinsurance project funded by Swiss Contact.
- Provide technical methodological support for project proposals surrounding value chain analysis, sustainability assessment, monitoring and evaluation, and strategic business advisory.

Skills and Expertise

Research-Focused Computer Skills	*Office and Productivity Software Skills*
R Programming Language (Intermediate)	MS Word
LaTeX (Intermediate)	MS Excel
STATA (Advanced)	MS PowerPoint
Python (Advanced)	G-Suite Applications
MATLAB (Advanced)	MS Access

Communication skills

I have strengthened my communication and leadership skills through serving two terms as an Executive Member (Treasurer & President) of the Young Economists' Forum. In this role, I coordinated club activities, liaised with university authorities, and engaged with potential funding agencies—experiences that refined my abilities in communication, organization, and diplomacy. I have also hosted several university events, including the National Conference on Current Economic Challenges held in February 2023 at North South University.

Organizational and managerial skills

- Served as the President of the Young Economists' Forum (2022-23) of North South University where I had to coordinate the club members and organize vents and seminars.
- Served as the Treasurer of the Young Economists' Forum (2021-22) where I was in charge of overseeing the club's budgets and finances.
- Adept at organizing and coordinating conferences and competition events.
- An active member at my university department, where I have helped organized various seminars and conference events.

Organizational Experience

- *Executive Board Member of Young Economists' Forum (YEF) of North South University (Treasurer, President) (2021 – 2023)*

a) Coordinated the activities of the club to be inclined with the mission and vision of the club.
b) Collaorated with various organizations: Bangladesh Bank, National Board of Revenue (NBR), Ministry of Finance
c) Conducted a series of events such as Econsilium (Bangladesh's first economic consultancy-based case competition), National Conference on Current Economic Challenges, Brown Bag Seminars for the Department of Economics where various esteemed researchers from around the world presented their research, and various other seminars and webinars

designed to promote the field of economics.

d) Oversaw the administrative and financial responsibilities of the club.

- *Host of the National Conference on Current Economic Challenges held in February 2023 at North South University, in my capacity as President of the Young Economists' Forum (the organizing body of the event).*

Private Tutor – Mathematics, Science, Economics, English

2015 – Current

- I tutor students from grade 8 up to grade 12 in the IGCSE, IAL, and IB curriculums.

Honours and awards

- Edexcel High Achievers Award for outstanding results - O Levels (2015)
- Edexcel High Achievers Award for World highest in IAS Business Studies (2016)
- Second Runner Up at SDG Policy Challenge Competition organized by ICCAD and Embassy of Sweden in Bangladesh (2023)
- First Place, ACCA Accounting Case Competition, British Council Muscat (2016)

English Proficiency

I possess a strong command of the English language, having pursued my schooling as well as undergraduate and graduate studies in English-medium institutions. I achieved an **A grade in IGCSE English Language**, an **IELTS band score of 8.5 out of 9 (2018)**, and a **TOEFL score of 113 out of 120 (2024)**.

Referees

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