RESEARCH PROJECT

INTRODUCTION TO A MULTILATERAL CO-OPERATION PROJECT

Research Project

Sustainable Sanitation for Vulnerable Peri-Urban Population in Ulaanbaatar, Mongolia

Length of the project

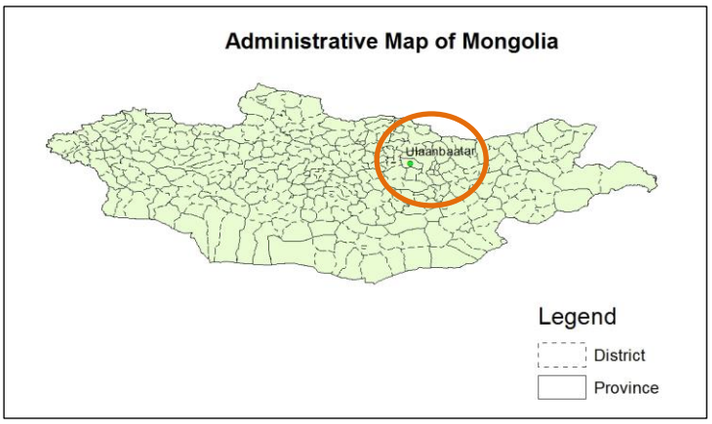
2011 to 2015

Intervention Zone

Ulaanbaatar, Mongolia

Project objective

To assess the technical feasibility, potentiality and social acceptability of different household greywater and human feces treatment technologies through onsite experiments, to explore alternative financial sources for up scaling household greywater and human feces treatment technologies, and to address strengths, weaknesses, opportunities and threats on integrating safe water supply and sustainable sanitation systems.



BACKGROUND

Mongolia is a landlocked country of three million residents, more than one third of whom living in the capital, Ulaanbaatar. Approximately one third of the urban population in Mongolia still lives in Gers (yurts). Poverty is generally concentrated in the "Ger districts" OF UB with deficiencies in basic infrastructure and services, namely inadequate water supply, extremely poor sanitation, improper solid waste collection, bad drainage, lack of central heating and bad roads. The issue of hygiene and sanitation, in particular in Ulaanbaatar's Ger areas without access to the centralized water supply, sewerage and drainage service system, is an emerging problem. Through waterborne diseases the health of the population, especially children, is affected. Most of the households use simple unsealed pit latrines that create an ever increasing threat to the groundwater. Very few systematic research projects have been conducted on the water, sanitation and hygiene (WASH) sectors in Mongolia and none related to the potential for achieving sanitation improvements utilizing the concepts of 'Sustainable Sanitation' (sanitation programs that utilize resource recovery to drive sustainability).

To focus on this particular need and to find a sustainable solution for sanitary improvement in peri-urban Mongolia, a research project, jointly executed by University of Science and Technology Beijing (USTB) and Action Contre la Faim (ACF), was initiated in 2011. Other project partners include MUST and MSUA from Mongolia.

Methodology

Onsite experiments such as prototype designs, site selections, constructions and monitoring (e.g. chemical and biological analysis) of different household greywater and human feces treatment systems were set up to assess technical feasibility and potentiality in Mongolia. Both qualitative (e.g. key informant interview, focus group discussion) and quantitative (e.g. knowledge-attitude-practice survey, structured questionnaire survey, water quality analysis) research methods were applied to assess socio-cultural acceptability, replicability and to explore alternative financial sources for up scaling household greywater and human feces treatment technologies

KEY NOVELTY STATEMENT

The sustainable sanitation system (SSS) that has been established through onsite household greywater treatment systems and eco-toilet oriented semi-centralized human feces composting systems has been verified and are feasible in Mongolian long winter cold climate and water stressed regions which can be replicable partly or fully in other parts of the world for better health, environment, and resource/nutrient recovery.

Household greywater treatment systems and eco-toilet oriented semi-centralized human feces composting systems are socially acceptable by the most vulnerable communities in the study area and can be replicable in other parts of the world.

Re-invented financial sources have been identified and clarified for potential fund generation to replicate the sustainable sanitation technologies and services at global level particularly in low and middle income countries.

Results show that an integration of Safe Water Supply and Sustainable Sanitation System as well as the sustainable sanitation technologies has high potentiality to reduce water, sanitation and hygiene (WASH) and greywater-borne hazards and vulnerability in the study area and other parts of the world by significantly reducing the contaminants and threats associated with WASH and greywater which can ultimately support in reducing the WASH and greywater-borne mortalities at global level.

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MAJOR FINDINGS & KEY RECOMMENDATIONS

MAJOR FINDINGS

- Overall removal rate of different parameters of both Greenhouse Greywater Treatment Unit (GH-GWTU) & Ice-Block Greywater Treatment Unit (IB-GWTU) & was satisfactory and a removal rate of over 90% was achieved for all parameters.
- Results from composting human feces in both Semi-Centralized Winter Composting Unit (SC-WCU) & Semi-Centralized Greenhouse Composting Unit (SC-GHCU) show that the required temperatures were maintained up to 70°C , which satisfies all the sanitation requirements including Germany standard.
- Biological test results indicated that there was not single Salmonella and E.coli found in the compost. In addition, there was no indicator bacteria found in the products (e.g. Spinach) produced by fecal compost. Conversely, the compost produced demonstrated qualities in term of productivity.
- Results showed that the greywater and human feces treatment units are technically feasible and socially acceptable, which may able to close the study area sanitation loops in a manner that could be replicable in other parts of the world.
- This system and the concept is proved to be feasible in the cold climate regions and also in a condition where people produce less greywater with high concentration of both chemical and biological agents.
- The findings support **the integration of Safe Water Supply (SWS) into SSS to decrease** the prevalence of waterborne diseases.
- Micro-finance, social capital, corporate WASH responsibility may be considered as potential sources of funding for replicating technologies and services in the study area and other parts of the low and middle-income regions.

KEY RECOMMENDATIONS

- It is recommended to further assess different potential options to overcome constraints connected with high initial up-front costs as well as with the running and maintenance costs.
- Thus onsite greywater treatment systems are encouraged to treat greywater before re-use or discharge to the environment and to protect human and environmental health.
- Further research on environmental and health consequences related to untreated greywater discharge is needed to assess the risks and hazards in this unique context.
- Monitoring of the treatment system throughout the year is suggested in order to examine the effect of temperature on the operation, maintenance and treatment process.
- Future studies could examine the effect of natural freezing conditions on removing physical and chemical contaminants but also to deactivate *E. coli* in the greywater. Such analysis would be particular relevant given the long winter season in Ulaanbaatar.
  A greenhouse can be combined with the IB-GWTU for extending the treatment period.

KEY LESSONS LEARNED

- Active involvement of capable local partners is very important for the country of interventions.
- Integrated/multidisciplinary awareness and educational programs in communities and schools may trigger the socio-cultural acceptance of the technologies and services including the reuse aspects of the sustainable sanitation products (e.g. fecal compost, treated greywater) in the study area and other parts of the world. .

Implementing agency

- Action Contre la Faim - Mongolia

Sponsor

- Action Contre la Faim – France

Scientific partners

- University of Science and Technology Beijing
- Mongolian University of Science and Technology (MUST)
- Mongolian State University of Agriculture (MSUA)

For more details…

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