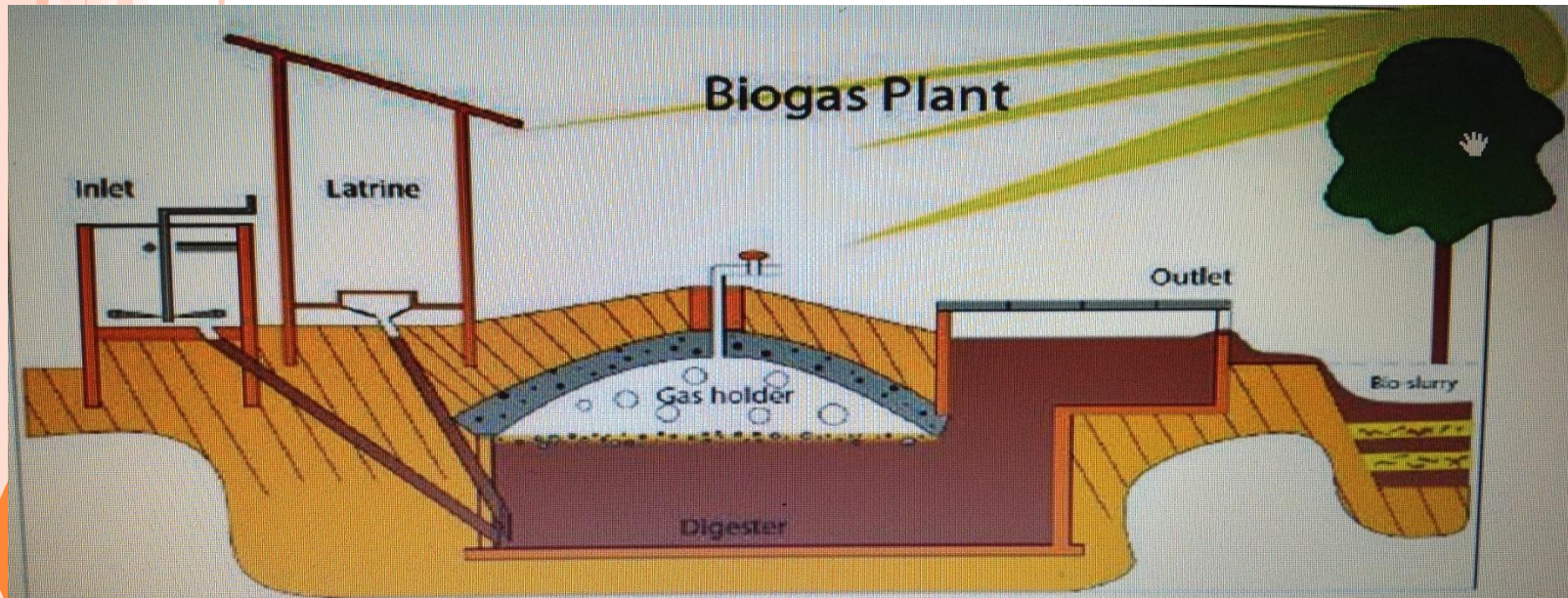


BUSINESS MODELS FOR ENGAGING MARGINALIZED FISHING COMMUNITIES IN WASTEWATER RECYCLING IN UGANDA



Waste from pits and tanks can be transported (through pipes or vehicles) to an anaerobic digester, a sealed container made from bricks or plastic that allows bacteria to break down the waste into biogas (with a high methane content) leaving digested sludge or bio-slurry. The bio-slurry has reduced pathogen content and can be used as fertilizer or dried and combined with charcoal dust or sawdust to make fuel briquettes.

Frederick Kakembo; Ndejje University, Uganda

ISSUES: SANITATION & THE MARGINALIZED GROUPS

Rising population and the growing informal settlements in landing sites culminate in decline of quality of water, sanitation and health

Marginalized fishing communities: women, children and youths

Case study: Kiyindi landing site (Buikwe district, Central Uganda)

SANITATION ISSUES AFFECTING MARGINALIZED GROUPS AT LANDING SITES

- Lack of gender-segregated toilets tailored to specific needs of women and children
- Disease incidences: women, children are hit more severely:
 - Women more susceptible to fungal infections from unhygienic toilets
 - Women and girls are housekeepers; use water more often
 - Time and energy spent looking for safe water; nearby supplies are contaminated

CONTAMINATION FROM SOLID WASTE DISPOSAL



ROCKY TERRAIN COMPLICATES PIT-LATRINE CONSTRUCTION



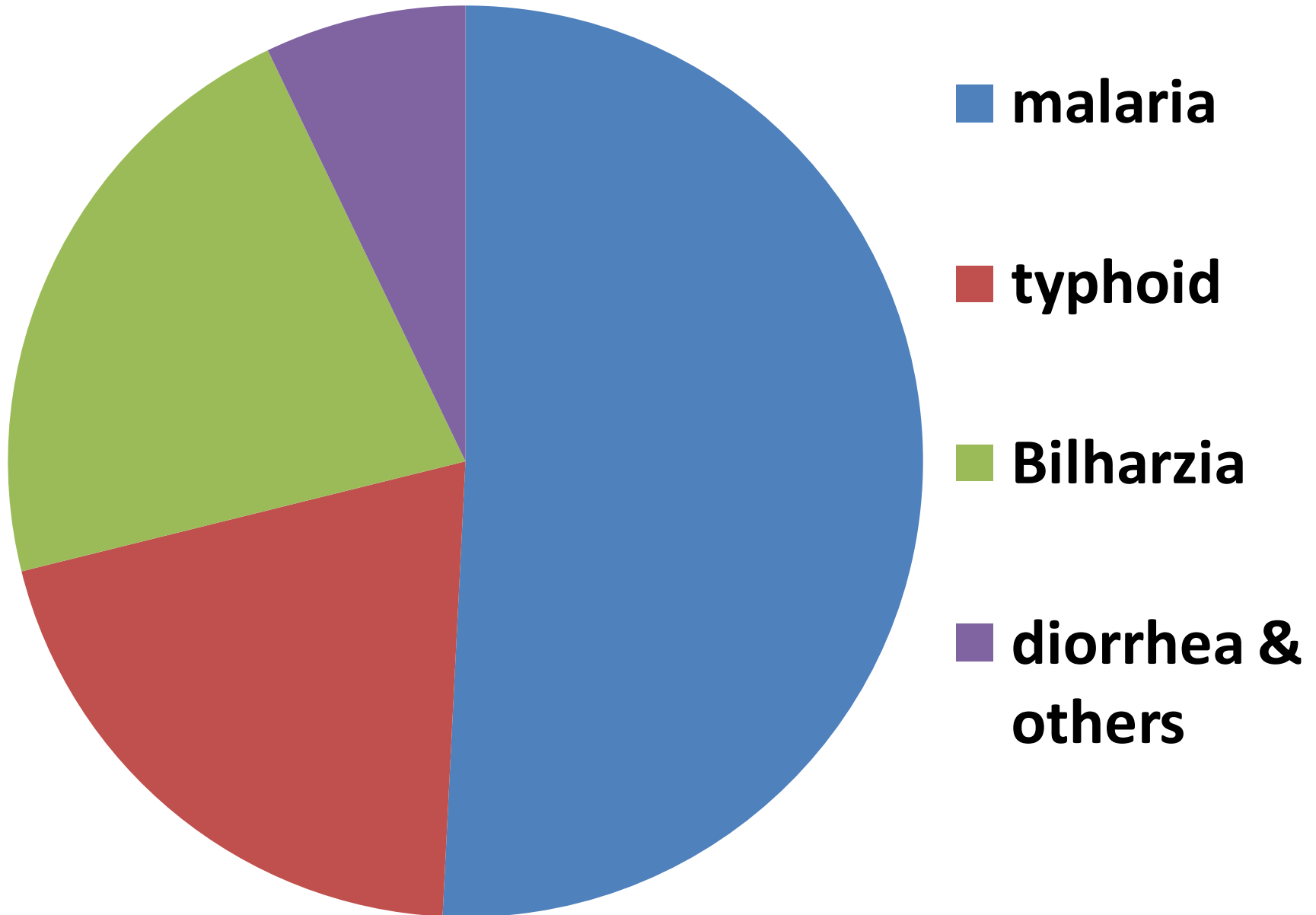
HOUSEHOLD WATER SUPPLY CONTAMINATED



MORE TIME & ENERGY COLLECTING WATER



DISEASE INCIDENCE

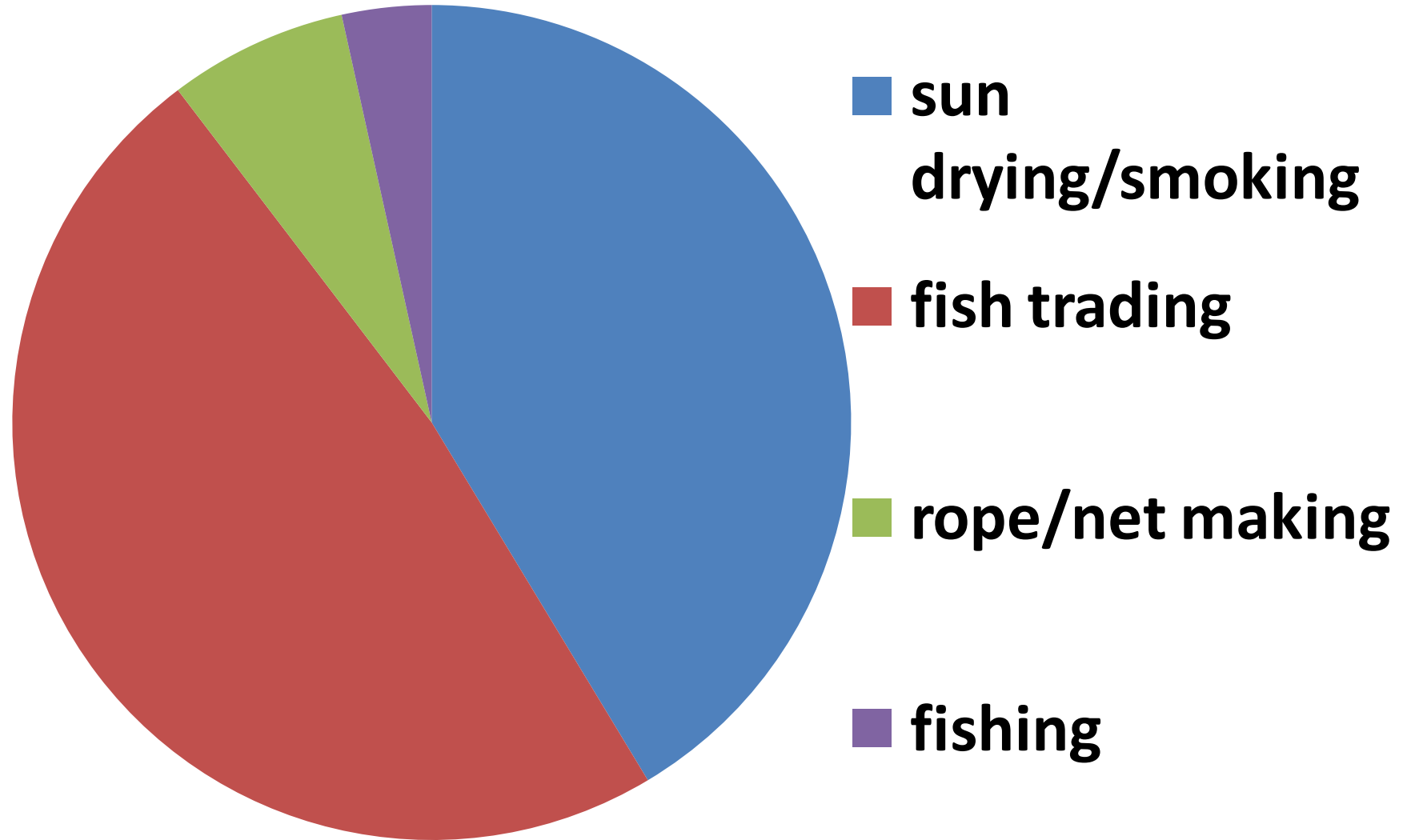


DOUBLE JEOPARDY; SOCIOECONOMIC MARGINALIZATION

Socio-cultural stereotypes bar women from mainstream fishing activities

Traditionally they engaged in *fish smoking, cleaning fishing equipments, repairing nets retailing of fish and other smalltime activities*

TRADITIONAL WOMEN PARTICIPATION IN FISHING



DOUBLE JEOPARDY

Intensive commercialization of fishing & use of sophisticated fishing gear continuously edge marginalized groups out of the traditional roles/activities

They resort to petty trading, commercial sex and selling of liquor; *ending up with severe consequences*

Youths also carry out very odd and unsustainable jobs

This project seeks to develop sustainable livelihoods for the marginalized, based on *sanitation as business*

SANITATION BUSINESS: RECYCLING

Engaging marginalized communities in waste recycling is to use

1 stone to hit **5 birds**:

1. Overcome disease incidences at the landing sites (reduce open waste disposal & manage solid bio-wastes & wastewater)
2. Employ women and youths; new jobs and/or business created by recycling projects
3. **Generate renewable energy from wastes (biogas, fuel briquettes); reduce use of wood-fuels & save forests**
4. Clean cooking/lighting energy reduces respiratory problems
5. **Produce soil implements (bio-slurry and composting) to boost food production**

APPROACH/METHODOLOGY

A baseline survey was carried out on;

- Existing knowledge, attitudes and practices on sanitation
- Existing practices on sanitation as business
- Opportunities to support waste recycling
- Potential barriers & predicaments for waste recycling
- Possible channels of Information, Education and Communication (IEC)
- Capacity building needs

LABORATORY TESTS

Biomethane Potential (BMP) for different biomass types were conducted to Evaluate the amount of methane generated per unit mass of Volatile solids (VS).

The feedstock tested included

- solid bio-wastes (fish-guts, food-wastes, water hyacinth)
- Wastewater from toilets

FEASIBILITY STUDIES CONDUCTED TO

- Establish existing costs of energy (firewood, charcoal, electricity); to determine viability of biogas and fuel briquettes
- Determine potential demand for biogas, briquettes and soil nutrients; *analyze potential socio-cultural sensitivities*
- Determine marketing processes; packaging/distribution
- Determine willingness and capacity of communities to meet costs of water and pay-toilet
- Establish needs for start-up financial facilitation and possible financing options

FINDINGS: SANITATION BUSINESS OPPORTUNITIES

- ❑ Daytime population at Kiyindi is 20,000;
- ❑ There is a big business community with capacity to spend on sanitation services
- ❑ Currently **0.8 Rand** is paid for each visit to toilet
- ❑ Due to difficult terrain (**rocky/sandy shore substrate**) Pit latrine coverage at the landing site is below 23% **compared with 90% in rest of the district**
- ❑ Communal use of toilets means that human fecal materials are collected in single units; **reduces operational costs of wastewater collection**
- ❑ Collections at pay-toilet could offset recycling costs

FINDINGS: SANITATION BUSINESS OPPORTUNITIES

20 litres of safe water cost 0.8 Rand

Solid Wastes of 1500 kg (70 % organic) & fish guts (from 12 tons of fish) are generated daily; feedstock for AD plants (for generating bio-energy and soil implements)

Electricity costs is 3 Rands for 1 kw/hr: *biogas could be cheaper energy for cooking and lighting*



METHANE PRODUCTION FROM VARIOUS FEED-STOCKS

Feedstock	Daily wet feed rate Kg/day	Est' daily methane production	
		M3/day	eq kw
Wastewater sludge	16,000	193	100
Organic food waste	1500	35	18.4
Fish waste	500	108	5.64
Water hyacinth	500	7.7	4
Total biogas generation			129 KW

SANITATION BUSINESS OPPORTUNITIES

- The cost of emptying one existing VIP toilet (using cesspool Emptiers) is high (**400 Rands**) for each trip. 20 trips needed in 6 month: ***in light of this, operation of AD plants is more cost-effective than emptying***
- Collection and disposal of wastes at Kiyindi is privatized; ***a system is in place for Public-private partnership (PPP)***
- PPP is coordinated by the Beach management Units (BMU). By legislation, at least *40% of members must be women*). ***This potentially addresses the gender mainstreaming aspect***

FEASIBILITY OF THE RECYCLING BUSINESS

Capital investment <i>(a hypothetical figure in USD)</i>	49,928
Annual operating costs	41,639
annual operating costs	25,410
Annual briquette revenue	68,822
Annual revenue (less operating costs)	32.593
Payback period (for initial investment)	0.59 yr

DIRECT BUSINESS PROSPECTS

- Feasibility studies reveal attractive returns on investment for smaller scale Anaerobic Digestion plants.
- It is estimated that the payback period on investment is less than a year
- Local/central government, NGOs, CBOs and other agencies could make the initial start-up investment
- Prospects make economic sense ***even in absence of social-benefit accounting***

SOCIAL BENEFIT ACCOUNTING

- ❑ Reduction of 96 tones of organic garbage per year
- ❑ Reduction in harvesting *unspecified* quantities of hardwood (for firewood and charcoal)
- ❑ A sanitary environment; natural water sources saved from wastewater contamination; *waterborne diseases*
- ❑ Reduction of respiratory complications; caused by cooking on firewood
- ❑ Potential to reduce water hyacinth population
- ❑ Improved Livelihoods; new jobs for women/youths

DIRECT ROLES OF/BENEFITS FOR WOMEN/YOUTHS

- ❑ Investing in/ being employed at pay-toilets facilities
- ❑ Producing/distributing/selling biogas & fuel briquettes
- ❑ Producing/distributing/selling soil implements
- ❑ Engaging in commercial agriculture supported by bio-slurry
- ❑ Collecting and sorting wastes at source (separating organic vs. inorganic garbage)
- ❑ Charging fees on households/business premises for collecting their garbage

GAPS AND BARRIERS TO ADDRESS

- General lack of awareness of value of wastes; regarded trash to be disposed of; this is due to absence of reliable IEC materials on waste recycling
- Socio-cultural sensitivities on reuse of wastes; *particularly human fecal materials*
- Lack of technical skills to operate/maintain AD plants;
- Low business/financial management skills
- Lack of a supportive national institutional framework; the few players in the country work in isolation
- Inadequate policy framework on waste recycling
- Lack of start-up/scale-up finances

START-UP AND SCALE-UP REQUIREMENTS

- Innovative use of IEC for awareness drives
- Applying psychosocial approaches (*such as Social Norming*) to regularize recycling and to overcome socio-cultural sensitivities
- Capacity-building (via training) for communities to overcome technical and financial management barriers
- Identification of affordable financing models
- Development of marketing frameworks; *cost-effective bottling (of biogas); distribution networks*
- Development of institutional frameworks; inter-agency collaborations and a supportive policy environment

WAY FORWARD

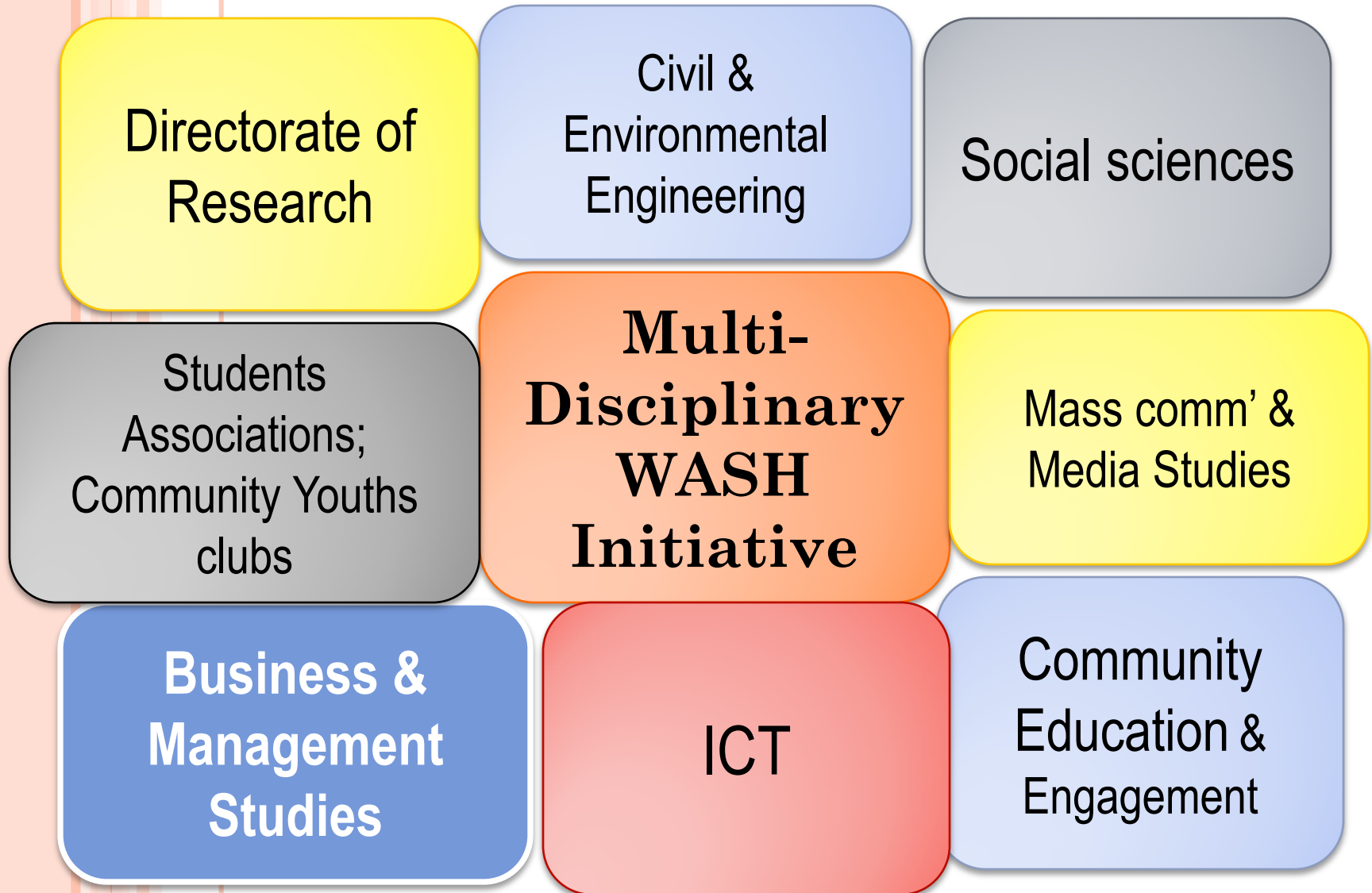
This presentation is based on a baseline/feasibility study funded by ***Grand Challenges Canada***; coordinated by ***United Nations University INWEH*** in Canada

Ndejje University invites collaborators for the 2nd phase; ***proof of concept; piloting/experimentation***

Success of concept could be instrumental in advancing ***Gender, Water and Development initiatives***



MULTI-DISCIPLINARY WASH INITIATIVES AT NDEJJE UNIVERSITY



GIVEN A CHALLENGE, RISE TO THE OCCASION



- [***fredkakembo@gmail.com***](mailto:fredkakembo@gmail.com)
[***www.ndejjeuniversity.com***](http://www.ndejjeuniversity.com)