Improve access to Water, Sanitation, Hygiene in the Ger areas of Ulaanbaatar, by providing proven and innovative solutions
Groupe URD (Urgence – Réhabilitation – Développement)

is a support structure for the humanitarian sector. For over 20 years it has endeavoured to improve the aid practices for the populations affected by crises, with several types of activity: operational research projects, programme evaluations, methodological tool design, institutional support and training processes, both in France and abroad.

Toilettes du Monde

has worked for more than 13 years in France and abroad with public and private sanitation players to improve the hygiene and living conditions of underprivileged populations by promoting the development of ecological sanitation (dry toilets, grey water) through professional training actions, action research, bibliographic studies, techniques, regulations, socio-cultural actions, lobbying the authorities.

Note on the authors

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Acknowledgements

I would like to express my appreciation and sincere thanks to all those who participated in this work, giving up their time to answer my questions, and for the logistic support that I received. In particular, each member of ACF’s WASH team based in Ulaanbaatar for their warm welcome and for the great trust they placed in me.

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The evaluation was financed by ACF.
The opinions expressed in this report are the exclusive responsibility of their authors.
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### ABBREVIATIONS/ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
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<tbody>
<tr>
<td>AE</td>
<td>Water Agency</td>
</tr>
<tr>
<td>AESN</td>
<td>Seine Normandy Water Agency</td>
</tr>
<tr>
<td>AEAP</td>
<td>Artois Picardie Water Agency</td>
</tr>
<tr>
<td>OSS</td>
<td>On-site sanitation</td>
</tr>
<tr>
<td>DAC</td>
<td>Development Aid Committee</td>
</tr>
<tr>
<td>WASH</td>
<td>Water Sanitation and Hygiene</td>
</tr>
<tr>
<td>Ger</td>
<td>Mongolian terminology for &quot;yurt&quot;</td>
</tr>
<tr>
<td>GTZ</td>
<td>German cooperation (currently GIZ: Deutsche Gesellschaft für Internationale Zusammenarbeit)</td>
</tr>
<tr>
<td>HLM</td>
<td>Low-Income Housing</td>
</tr>
<tr>
<td>OECD</td>
<td>Organization for Economic Cooperation and Development</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
</tr>
<tr>
<td>SDC</td>
<td>Swiss Agency for Development and <em>Cooperation</em></td>
</tr>
<tr>
<td>TDM</td>
<td><em>Toilettes du Monde</em></td>
</tr>
<tr>
<td>Tolgoit</td>
<td>Grassroots Community Organization with the name of the neighbourhood</td>
</tr>
<tr>
<td>UB</td>
<td>Ulaanbaatar</td>
</tr>
<tr>
<td>USUG</td>
<td>Water utility supplying water and sanitation services in the city of Ulaanbaatar</td>
</tr>
</tbody>
</table>
Executive Summary

Groupe URD – partnered with the NGO Toilettes du Monde – has been mandated by Action Against Hunger (ACF) to perform the external interim evaluation of Action Against Hunger’s project to “improve access to Water, Sanitation, Hygiene in the yurt areas of Ulaanbaatar, by providing proven and innovative solutions” in Mongolia. The main donors are the Seine Normandy and Artois Picardie Water Agencies1.

This project, established in 2009, aims to improve the poor health conditions of the vulnerable populations of the Ger neighbourhoods. These populations, often forced to move by extreme climatic events (duzuud), but also encouraged by a “classical” rural exodus phenomenon (attracted by the services and economic opportunities of the city), migrate en masse and settle on the outskirts of the Mongolian capital. They have to confront water supply difficulties (less than 10L/person/day), use latrines which pollute the groundwater table, and perpetuate hygiene practices inherited from their nomadic lifestyle, inappropriate in densely populated areas. ACF’s project has always been based on the idea that human excrement and wastewater are recoverable resources, more so in Mongolia where organic amendments are rare and the soil is very poor. It likewise aims to propose temporary solutions for the inhabitants (although it is likely that these ecological solutions will be sustainable in many cases) and to explore soft and hard alternative sanitation techniques in a periurban context. A partnership with the academic community has thus allowed a substantial “operational research” aspect to be added, this work contributing to the development of ACF’s project. A student thesis supervised by Beijing University and entitled “Sustainable Sanitation for vulnerable periurban population” will notably be defended in 2015.

An initial three-year “pilot” phase allowed the problems of this periurban context in an extremely cold climate to be analyzed and innovative solutions to be tested, in particular EcoSan and compost toilets.

Since May 2012, a second phase – currently in progress – has focused on the involvement of local players in the project (Mongolian authorities, the private sector, civil society) by extending the activities tested in the framework of the previous phase. The objective is to accompany the main Mongolian institutions and organizations concerned to help them to develop a large-scale decentralized water and sanitation system. In actual fact this accompaniment only started a few months ago.

The evaluation by Groupe URD -TDM intended to analyze the quality of the project with a view to proposing possible reorientations, or recommendations to optimize the long-term positive aspect, but also to appraise the added value of this coordination between research work and the evolution of the project.

The table below summarizes the key observations, linking them to the resulting recommendations.

1 A 2-year project funded by Swiss Cooperation (April 2012-April 2014) based on the same objectives has allowed the activities to be extended
<table>
<thead>
<tr>
<th>Criterion</th>
<th>Key observations</th>
<th>Main Recommendations</th>
</tr>
</thead>
</table>
| **External coherence** | The 1st official development plan for the Ger areas is established after the start of ACF’s project ACF’s decentralized solutions are still relevant when considering new urban development plans  
• It will probably not be possible to transform all the Ger areas into apartments connected to the mains  
• A model allowing the WASH needs of the inhabitants of the Ger areas to be met in the short/medium term  
• Preferably a light and flexible (adaptable) model for toilets and emptying service | ACF: Ensure regular coordination with the Municipality, and the appropriate institutions, in particular the Ger area development agency, and put the ACF partners who take over the activities in contact with these institutions  
Pursue integration of the tools (in particular hygiene promotion) and of skills at the heart of the different Mongolian institutions, and other WASH players |
| **ACF is a key player in WASH in Ulaanbaatar** |                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                          |
| **Internal coherence** | Three complementary components (AE + research + SDC) Good progress made thanks to the research (development cold climate composting technique, toilet survey, pledge of scientific seriousness...) But the research + operational set-up was very ambitious and insufficiently prepared with all the players, which led to misunderstandings and frustrations: it could have been better optimized. | For the next time: better prepare, clarify and communicate the objectives to all the players from the beginning: anticipate and explain how research and field activities will complement each other  
Ensure information is shared regularly between field and research in both directions  
Continue to share the research findings both in Mongolia and globally, use the findings in the advocacy phase  
Continue the applied research in Mongolia  
Pursue the search for simple low-cost grey water management solutions |
| **Relevance** | The project meets the essential WASH needs of the populations, although it does not cover public shower and grey water management needs The innovations developed by ACF are promising and adapted to the extremely cold climate | Use the multi-service kiosk:  
- As an example for the population, USUJ and other players intervening in WASH (social marketing, promotion of the multi-service aspect, EcoSan cycle, provision of EcoSan toilets, ...)  
- For experimentation (reuse of grey water in summer, recovery of compost from faecal material,...) In the framework of the advocacy strategy: collect the past and future lessons learned from the multi-service water kiosk experience, share, organize visits for WASH |
players and advocate a new multi-service water kiosk legal standard.

<table>
<thead>
<tr>
<th>Acceptance by the users is good and spreading gradually</th>
<th>Continue to improve the comfort of EcoSan toilet users to increase their acceptance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test the recovery of urine and grey water on the plot</td>
<td>Develop a compost promotion/sale strategy</td>
</tr>
</tbody>
</table>

More "refined" (more "development"-oriented) approaches would undoubtedly help acceptance and effectiveness:
- Creation of supply without working in parallel on the demand
- Expatriates wonder if they have "failed to understand Mongolian culture", feeling of having missed something

For a future project:
Include the expertise of a sociologist from the beginning of the project
Co-create the supply in a participatory manner so that it corresponds to the demand

The project will probably find it difficult to achieve the objectives of dissemination of the solutions tested between now and April 2015
Prioritize accompaniment and consolidation of reinforcement of the local players’ capacities for the last year of the project, and extend its duration

The transfer of the EcoSan branch to the private partners is coherent, but completely new, fragile and risks being rushed if the accompaniment is not extended beyond the remaining year

The project has contributed decisively to the changes of behaviour regarding the EcoSan approach
Extend the project beyond the 6\textsuperscript{th} year (3 + 3 years is insufficient for a development project of this nature)

The pilot project could not, and this was admitted from the beginning, be targeted at the most vulnerable households
In the future strategy, work on the question: what solutions for vulnerable households?

In conclusion, the main recommendations can be summarized in two pillars, which both insist on the need to extend the project’s duration:

1. **Consolidate the pilot project’s achievements and go "beyond them"**
   - Reinforcement/accompaniment of local partners, notably the private companies which take over the WASH services set up by ACF, should be a priority in order to consolidate the project’s achievements, and act as a foundation for the advocacy
   - Pursue the continuous improvement of the models tested and the search for simple low-cost grey water management solutions

2. **Optimize the advocacy strategy**
   - The advocacy phase being developed should take advantage of the lessons learned from the operations and from the results of the research aspect
   - The advocacy with the Mongolian institutional players should continue beyond 2015 in order to have an interesting impact
1 The project and its context

1.1 Characteristics of the area of intervention

1.1.1 A capital city confronting mass countryside-city migration

Mongolia is a country located in North Asia, landlocked between Russia and China. With almost 2.8 million inhabitants and a surface area equal to 3 times that of continental France, Mongolia has the world's lowest population density (1.7 inhab/km²).²

The country is mountainous and has an arid, almost desert climate. There is thus little farmed agricultural land and, at present, the population of nomadic or semi-nomadic herders is estimated as 30% of the Mongolian population. The recent evolution of the climate, with a reduction in the rainfall, combined with the development of industrial activity (significant exploitation of mineral resources and development of tanneries) has entailed a deterioration in the quality of the country's water resources.

In 2013, Mongolia was divided into 29 river basins, each eventually having a basin Agency (to date 25 Agencies have been created), a model very close to the water agency management in France. This initiative is new and the idea (provided by ACF) of supporting it through institutional cooperation with French agencies is promising.

In the 90s, Mongolia swung from an economy based on the Soviet model to a free-market economy. In addition to this major economic transformation and the weak environmental and industrial policies, there was a quick succession of particularly harsh winters (dzuuud), which decimated the livestock of numerous nomadic families. Mongolia now has to confront a crisis caused by a combination of many climatic, environmental and structural factors, which have led to rapid mass exodus of the populations to the capital.

² Main source: ACF project proposal for the Water Agencies
1.1.2 The specific situation of the Water-Sanitation-Hygiene sector in Ulaanbaatar

Administrative complexity
It is not easy to understand the coordination between responsibilities and regulations (even for the Mongolian institutions themselves). For example, the municipality of Ulaanbaatar and the government each has its own development plan for the Ger areas of the capital, but the coordination between the two plans is difficult to understand.

There is not really a functional WASH coordination group in Ulaanbaatar at present, which makes it difficult for ACF to coordinate with the “Major Players” (World Bank,…), often showing little interest in the modest scale of the projects undertaken by ACF. It is likely that this situation will change under the leadership of the National Water Committee which is currently working to establish a database of WASH players, in order to set up a coordination group.

Special climate conditions
Four seasons, but which can be summarized as two: a very cold winter period (temperatures going down to minus 50°C at night and often minus 35°C during the day), and hot in the summer. This is a central consideration in the Water, sanitation and hygiene sector, being both a technical constraint (need to bury the pipes deep or to insulate them considerably above a depth of 2.5 metres, all liquids freezing on the surface and at a shallow depth, making the ground slippery and dangerous, etc.), and also an opportunity (the sub-zero temperatures inactivate bacteria, for example).

In the Ger areas
There is a clear **disparity between the city centre and the Ger areas** in terms of access to basic services (water, sanitation, communication channels, electricity, health, education).

**Access to water** is mainly through around **500 water kiosks** (the overwhelming majority public, managed by USUG), of which about half are connected to the mains, the other half being supplied by water tankers. The management of the water kiosks located in the yurt area is loss-making for the USUG, because the operating costs are significantly higher than the income from the sale of water. In the winter, the absence of paved roads makes the journeys complicated and dangerous, especially those to transport water. In addition to the problem of quantity (some families live with less than 10L/person/day), there is the bad quality of the water consumed, notably due to contamination from the transport or in the home. The water containers used for transport/storage are often unsuitable, as they previously contained harmful substances (reuse of containers from the petrochemical industries).

**Sanitation** essentially consists of **basic latrines** which, once full, are "closed". They then dig another pit. On the one hand, the current system contaminates the land, and on the other hand it is not sustainable, due to the limited space in individual homes, preventing them from changing the pits regularly. The question of responsibility for sanitation in the Ger areas is always debated between the different players (and sectors), notably between the USUG and the municipality. The inadequacy or bad quality of the WASH infrastructures contributes greatly to the development of disease, in particular **hepatitis A** virus.

### 1.2 Objectives of the project evaluated

The project evaluated is formally the one financed by the Seine Normandy and Artois-Picardie Water Agencies, which began in May 2012 for a period of 3 years (ending April 2015). It would, however, make little sense to ignore the previous phase financed by the same Water Agencies (May 2009-April 2012), in addition to the project financed by Swiss Cooperation– SDC (with cofinancing by ACF) with a 2-year duration (May 2012-April 2014), and the "research" aspect. Indeed, these three projects were conceived as complementary. This is moreover one of the questions in this evaluation's terms of reference (what is the internal coherence of the three components of the project?). Thus, at ACF’s request, the three projects were taken into account, focusing on the "Agency" projects.

Furthermore, a "hygiene promotion" project financed by UNICEF was under way during the evaluation, but was not specifically analyzed.

**General objective:**

Improve access to water, hygiene and sanitation in the Ger areas of Ulaanbaatar, Mongolia, by providing proven and innovative solutions.

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3 Likewise including cofinancing by the Gisors commune, the community of the conurbation of Cap Calaisis, ACF.
Specific objective:
Accompany the provision of proven solutions permitting sustainable access to water and sanitation for the inhabitants of the Ger areas of Ulaanbaatar.

1.3 Contents of the project and its evolution

Basically, since May 2012, the project has mainly focused on consolidating, and transferring to the local partners, the activities carried out between 2009 and 2012: composting of faeces in a cold environment, social marketing, improvement of the design of ecological toilets and of the excrement collection service, construction of a potentially economically profitable multi-service water kiosk, multiplication of the educational approaches for training in schools and strengthening of the health clubs, construction of grey water treatment units and design of the container to transport water.

The two intervention districts already targeted by the previous research programme carried out between March 2009 and August 2012 are Bayanzurkh and Songino Khairkhan.

Map 1: location of the ACF intervention areas in Ulaanbaatar
Evaluation objectives and methodology

2.1 Evaluation objectives and expectations

The ACF head office and field teams had high expectations from this evaluation. This exercise is above all an opportunity for them to focus on the sustainability perspective of the sanitation aspect. It can also support the end-of-project advocacy strategy.

The expatriates on the ground explain their difficulties to take ownership of the project proposal on arrival, this being written in a way which does not clearly describe the reflections which guided past decisions. They did not know in what direction to set out without betraying the ideas of their predecessors. At present they still wonder whether they perhaps missed something, and for them the external evaluation can provide answers to this point.

The evaluation is late in the process to be able to offer useful food for thought to ACF just over one year before closure (or at least before the end of the projects currently being financed).

2.2 Methodology

2.2.1 An evaluation carried out jointly with the key players involved in the project

For us the evaluation, as well as allowing accountability, must be useful for the project stakeholders and their partners, enabling them to learn from their experiences and to improve their actions. It is thus essential to start from their concerns that the evaluation should be constructive, the players should take ownership of it and it must allow real progress to be made. It was thus important for future users of the evaluation to be able to discuss the terms of reference, perceive them as their own, explain the issues involved in the evaluation questions and express the priority objectives of the evaluation for them. This participatory process is all the more important as this is an interim evaluation, which could possibly redirect the project’s activities.

For us the evaluation’s main “targets” are:
  - ACF Mongolia Management team
  - ACF Paris head office (WASH expert, Asia pool, Scientific and Technical Office)
  - AESN and AEAP Agencies
The key points of this evaluation's terms of reference were explained to all the people we met during the evaluation, and they were asked for their opinion on the priority issues of the evaluation.

2.2.2 Evaluation team and distribution of roles in the team

The evaluation team was formed by a main external evaluator, the WASH evaluator from Groupe URD and President of TDM. She was supported by the project officer for social engineering and EcoSan in TDM. This support consisted of three Skype meetings during the field phase in Ulaanbaatar.

Each key stage of the evaluation was carried out – as well as being broadly shared with the ACF teams – by two people at the heart of the evaluation team (reflecting as a team stimulates thought and guarantees even more impartiality in the evaluation judgements).

2.2.3 Activities set up to collect information

The evaluation is based on a qualitative methodology and on the triangulation of the information (written and oral sources, and field observations) in order to draw the conclusions.

Interviews with a wide range of players

Types of different people interviewed in the framework of the evaluation (cf. appendix 3 for more details on the people we met):

- **People directly involved in the project:**
  - people having set up the project (expatriates and local personnel, mainly technical domain)
  - people having supervised the project in the head office
  - project beneficiaries
  - associations, partners and providers who collaborated directly with ACF during the project, including those who take over the operation of the services

- **People involved in the problem:**
  - institutional (Ministries, Municipality, ...)
  - NGO/international and local agencies, working on water and sanitation issues in the area.

Conducting the interviews

The evaluator used different semi-structured interview questionnaires depending on the interviewee, these evolving during the interviews. Questions of a more technical or more precise order were added in accordance with the evolution of the mission in order to test, refute or confirm the initial findings.

During the field visits and the discussions in the neighbourhoods, the evaluator was accompanied alternately by different members of the ACF team, allowing very enriching, live interactions (informal discussions).
Document collection and analysis
Several types of documents were analyzed (see appendix 4):
• project documents sent by ACF head office and collected at the site of the mission
• general documents on the country and the capital
• documents concerning the Mongolian and international regulatory and legislative framework in the water and sanitation sphere
• methodological and technical guides specifically related to ecological sanitation in Mongolia and elsewhere

Direct observation of the project’s achievements
The different activities of the project were observed. The field visits were coupled with interviews with the people we met on site (organized in advance or improvised). See appendix 4 for detail of the visits carried out.

2.2.4 A favourable context for conducting the evaluation
The evaluator especially appreciated the remarkable welcome provided by the expatriate and national teams.
Most of the Mongolian employees recruited at the beginning of the project were still employed at the time of the evaluation.
The constraints (and opportunities!) of the winter season, notably as regards EcoSan activities, could be appreciated.

2.2.5 Constraints and limitations
It was not possible to meet certain key people during the evaluation time, despite several attempts: in particular, the Tuul Basin authority, and the local authorities of the district and the sub-district.
We were not able to observe the green spaces of summer and the living spaces of the inhabitants of the Ger neighbourhoods in the summer. Also, no invitation to enter the housing (Gers or permanent structures), which would have allowed us to observe, for example, the home water conservation methods.
It was not possible to observe the activities during the summer season, but the notably “photo” analysis, mainly of the toilets, carried out by Ibrahim in June 2013 offers useful information on the problems which can arise in the summer (children who defecate in the open, solid materials or wastewater poured in the pit …). We could not see how the emptying service worked either, as no collection was planned during the two weeks’ presence on site.
3 Results classified by OECD/DAC criteria

3.1 Coherence/Coordination: the project is coordinated well with its institutional environment

*The 6th master plan of Ulaanbaatar, the first to integrate the Ger neighbourhoods (2012)*

We should recall that around 60% to 70% of the population live in them, mainly to the north of the city, sometimes having been there for more than 50 years. It is a classical urban development phenomenon, which has always existed since the foundation of the city.

When ACF began to design pilot WASH solutions for the Ger areas (2008-2009), no official Mongolian institution was interested in them.

A 6th urban development master plan for 2030, designed between 2010 and 2012, which integrates the Ger areas, is based on the “compact city” concept and is currently being implemented.

Broadly speaking, this plan describes three types of areas and foresees **three prospective development scenarios for each of these types** (central, middle, suburban):

Depending on two main conditions of ger district location, engineering infrastructure connecting status and apartment type, the ger district future developmental planning is divided into 3 zones like central, middle and suburban.

- **Central part ger district**: The ger districts that are able to connect to central engineering network is to be re-planned and constructed with tall and medium tall buildings, the middle part ger districts are to be constructed with shorter and medium taller buildings and connected with partial engineering network and the suburban ger districts are planned to reform the land with independent network step by step.
- “New Reconstruction” the short term objective program will be implemented at the beginning stage of the central part ger districts to be re-planned and developed as an apartment blocks.

---

4 Types based on: distance from the centre, built-up density, status of connection to mains  
5 Ministry of Construction Urban Development, City Governor’s Administrative Office, UB city development Master Plan 2030 (English volume IV final), 2013), chapter 3.3.8. Regarding developing ger district re-planning in stages
Middle part ger district: For the middle part ger district, starting from the currently establishing sub centers and around them the main infrastructure will be built, in each sub center, the sewerage, water supply, heating supply, road, dam and canal, power supply and solid waste complex project will be implemented. As well, the housing issues such as the different types of housing like care and rent houses will be solved at one point. In these sub centers economically capable employment opportunities will arise many. The sub centers of ger districts will be the main point of city spatial organization. It is planned at first to build roads to connect the sub centers and sub centers to the city centers.

Suburban area ger district: Stop expansion of ger district furthermore, evacuate houses and gers that have located in dangerous and unsuitable zones, reform the land of sustainable settlement with independent network, improve the condition and establish 2 sub centers and 24 micro centers, and it is planned to locate district administration offices and most public service agencies from state to the citizens.

The new area to establish ger district in city was planned to be in Takhilt and Baruun Turuu, but these are unable to provide the need for population growth. In the overall plan adjunct, the suburban khorooos, distanced districts, satellite and bordering towns and communities are to equally and intensely develop, new settling zones to be established, so that it planned to decentralize the over crowdedness in Ulaanbaatar city and reduce the rate of ger districts. The actions will be taken to develop ger district by green development mechanism and reduce the air, water and soil pollution. Upon planning ger district and developing, the initiatives and active participation of residents and citizens are very important. In it:

- Establish improved ger house district with unique Mongolian feature that meets the standard of sedentary and city life.
- Reorganize the planning mechanism and institutional organization,
- Re-plan the ger district privatized lands with the direct participation of the owners and collectively implement the activities of city planning to use land appropriately,
- Develop ger district sub and micro districts
- By implementing the approach of green chemistry base, purifying, non-waste technological program, eliminate pollution and diminish the harm of the environment,
- Support of developing the independent and partial infrastructure of high technology,
- Create possibility of developing independently by development program based on tenant and collective industry.
- Independent decision making, self-planning, self-creating, developing the environment, develop in harmony and government fully support all these,
- Provide all kinds of apartments and houses that meets their purchase ability,
- The actions taken by the state is to direct to private sectors, and especially to poor residents with low income.

A project which remains relevant with the new urban development plans

In general, ACF’s intervention in Ger area based on a decentralized logic (construction of a multi-service water kiosk, renovation of two kiosks, establishment of an EcoSan branch…) is still relevant when considering the urban development plans implemented by the Mongolian institutions (6th Master Plan) and consisting broadly of progressively transforming the Ger areas into blocks of apartments (whose appearance recalls our
former generations of HLM low-income housing) and connecting them to the centralized water and sewer mains.
It is indeed unlikely that it will be possible to transform all the Ger areas into apartments connected to the mains, especially as new families arrive regularly, and it will take several decades even for those that are transformed.

The two neighbourhoods for the implementation of ACF’s project (Songino Khairhan and Bayanzürkh) are the largest and most populated (in absolute terms), and therefore have areas belonging to all three categories of the plan: central, middle, suburban, thus representing a learning opportunity.

The solutions developed by ACF: “temporary” solutions and water-efficient alternatives, for the next 20-30 years ...

Numerous studies reach the same conclusion:
“In the long term, individual household connections to water and sewerage networks are the right solution in all but the most remote areas. In the short to medium term, ger areas classified for comprehensive or minimal upgrading (rather than redevelopment) will continue to rely mainly on kiosks and on-site sanitation.”

Indeed, for most institutions, the decentralized pilot solutions developed by ACF are considered to be very good “temporary” solutions, that is to say while waiting for the implementation of the urban development plans desired.

But can we talk about “temporary” solutions when they last for several decades? This ambiguity between the desire to carry out extremely ambitious urban development plans and a certain realism (linked to the colossal amount of time and funding necessary) is clear from what people say and from the study reports:

“Development of kiosks in fringe ger areas should be minimized, however, because of the possibility for relocation of residents, and kiosk water supply is very expensive to develop. Realistically, however, the majority of ger areas will remain in their current conditions because achieving higher-density development is very complicated.”

Conversion of central gers to apartments will take time: Converting center ger areas into apartment complexes has not progressed as fast as the government had envisaged. One reason is that most ger area residents cannot afford the cost of apartments in the city center. The lack of mortgage finance also makes buying large assets (such as apartments) difficult for many people. A third reason is that the absence of a functioning real estate market—including proper methods for determining prices for private land transactions—has impeded the development of new housing.

Retrofitting urban services in midtier gers is exorbitantly expensive: A majority of ger areas outside the city center are older establishments. Many residents have lived there for a long time and have invested in their dwellings, a large number of which are detached houses.

6 A comparative study of the results according to this periurban typology could be interesting.
7 All four khorooos targeted for the construction of toilets in the framework of the SDC project (2nd, 3rd, 7th and 26th) of the SKHD neighbourhood likewise belong to these three types.
8 PPIAF, Exploring Options for Management Contracting-out in Water Supply and Sanitation Services for Ger Areas in Ulaanbaatar, Final Report, March 2009
9 Do the authorities which support ACF’s approach advise the beneficiaries of this “temporary” nature of the solutions implemented? (point not covered in the interview; it seems unlikely)
Those residents are relatively content with their neighborhoods and would like to see improved urban services for their houses or the development of low-rise, small-scale apartment complexes. The areas are not suitable for conversion to large high-rise apartment complexes—at least for the midterm—mainly because they are not near network infrastructure except along the major transportation corridors.

**Room is needed for relocating Fringe ger residents:** The situation in the more remote Fringe areas of the city is slightly different. Gers in those areas are inhabited by recent migrants. Their income level is even lower than those of city center residents or the residents of long-established gers. They are farther away from the economic activities of the city and have little access to health and education services. Utility services also are even worse than for residents in established ger areas. Therefore, residents of the fringe gers are very dissatisfied with their living conditions and are ready to relocate, if affordable better housing is available elsewhere. But again, affordability is a very serious issue for the residents because of their economic circumstances services should be provided at the minimum humanitarian level. Because the future of these gers will depend, in part, on the social integration of new migrants, some lessons about social housing in Hong Kong, China, or Singapore might help Mongolia develop clearer policies.¹⁰

Moreover, if all the inhabitants of the capital were eventually connected to the water and sewer mains, the authorities would probably have to confront a serious problem of scarcity of the water resource which is showing signs of depletion. Even if the operation of a new supply source is foreseen in the framework of urban development plans to alleviate this problem, solutions using less water resources, such as those that ACF develops, are still very much in line with the "green development" spirit advocated by the Ministries.

Certain officials recommend extending the services developed by ACF, but starting with the suburban areas (in so far as they are the ones least likely to be connected to the centralized mains). However, this seems to run counter to the strategy described in the above-mentioned 2010 study by the World Bank, according to which the most remote (the most recent) areas would be relocated in priority, and therefore it is better not to invest in decentralized solutions (toilets, kiosks) in these areas...

In any event, the decentralized solutions tested by ACF are a model¹¹ which meets the short-term WASH needs of the inhabitants of Ger areas, and in this respect they are adapted to the situation.

**Recommendation:**
In any case, it is important to coordinate the extension of the service with the urban development plans being elaborated, designed and/or implemented.

- Ensure regular coordination with the Municipality, and the appropriate institutions, in particular the Ger area development agency, and put ACF’s partners which take over the activities in contact with these institutions.

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¹⁰ World Bank, Managing urban expansion in Mongolia, Best Practices, in Scenario-Based Urban Planning, 2010

¹¹ A model which is also quite light and flexible (adaptable) for toilets and the emptying service
**ACF is a key WASH player in Ulaanbaatar**

Optimal integration in the institutional environment can also be seen from the fact that ACF has become indispensable on WASH issues for all players: ACF’s know-how is recognized and its contribution to workshops, meetings and conferences is sought. The ecological solutions (EcoSan, environmental education: water saving,...) advocated by ACF fit in well with the search for “green” development by urban authorities and other Mongolian institutions.

### 3.2 Internal coherence of the project

3.2.1 The three operational components are more or less well coordinated

**Reminder of historical outline of the project:**
The first three years (2009-2012) were conceived without necessarily imagining a “continuation”, then at the end of 2011 discussions began with the Water Agencies on continuing the activities. A call by the SDC (beginning of 2012) and a visit by the Water Agencies (March 2012) endorsed the continuation and development of the project for a further 3 years (only 2 years with the SDC). Between the end of the first AE project (end 2011-beginning 2012), and the decision to continue with the operations in Ulaanbaatar, there was a moment of hesitation between the exit strategy and the new operational strategy, which could be called a “crisis”. This was at the beginning of 2012 and was marked, among others, by the fact that the expatriate team was completely renewed, and by several months without a coordinator (accompanied by a loss of institutional memory).\(^\text{12}\)

The three components of the project evaluated are currently as follows:

1. **Project financed by the Water Agencies, the regional authorities and ACF, April 2012-May 2015** “Improve access to water, hygiene and sanitation in the Ger areas in Ulaanbaatar, Mongolia, through the dissemination of innovative and proven solutions.”

2. **Project financed by Swiss Cooperation and ACF, April 2012-May 2014**: “Ger WASH project: Sustainable Water, Sanitation and Hygiene services - “Improving Access to Safe Water and Improved Sanitation, and Knowledge on Proper Hygiene Practices” for local population in Songino Khairkhan district – Ulaanbaatar / Mongolia”

3. **Research aspect**: “Sustainable Sanitation for vulnerable periurban population - Operational Research Study in Mongolia”

**Some financial figures:**
The project’s annual budget (including all funding) was in the order of €950,000 in 2013 and €720,000 in 2014.
The annual budgets of the AE projects are:

- Year 4 (May 2012-April 2013): €363,337
- Year 5 (May 2013 – April 2014): €373,754

\(^\text{12}\) The current Country Director arrived in May 2012, the programme manager in July 2012 and the head of the WASH department in October 2012
Year 6 (May 2014-April 2015): €286,280

The SDC project clearly allowed an extension of the activities which had been tested and validated in the previous research phase, with for example the recruitment of around 2/3 of the employees.

The thesis cost ACF €400,000 in total over 5 years.

It should be recalled that ACF has been undertaking projects in rural areas of Mongolia for more than 10 years.

**Combining a research aspect of this nature with activities in the framework of a “classical” programme is an innovation** for ACF, and in this respect a pilot experiment to be analyzed for potential learnings. Historically, ACF’s Mongolia mission has only been maintained since 2009 to be able to carry out action research. It was thus established from the outset that the work in the field would feed the research, rather than the opposite, even if, ultimately, the results would obviously be useful for the players in Mongolia.

The **organizational set-up of the PhD is remarkably ambitious**: students of different nationalities together with Mongolian students with a view to transferring the knowledge, and involving partnerships between different universities (Germany, China, Mongolia) and ACF.

The **positive points of the research aspect** include (i) important progress, notably in the winter composting technique for human faecal materials in an extremely cold climate, and (ii) the opportunity offered to students of different nationalities to collaborate on these subjects. (iii) The first research steps taken in 2009, before launching the thesis, allowed the conclusions of the GTZ report on the impossibility of developing an EcoSan branch in Mongolia to be called into question. (iv) Certain surveys carried out by the research team contributed directly to the project. This is especially the case of the one from July 2013 “ACF toilets’ analyses with their shortcomings and recommendations”. (v) The results of the research part of the project are consistent with the initial expectations.

The **difficulties** include:

- For the Mongolian employees of ACF participating in the research, the separation/combination of the two tasks (research and operational activities) was not very clear for all the players, and the priorities sometimes overlapped?
- Too short a time in the field for the students and interns to fully appreciate the local situation, interact with the field team, carry out the research unhurriedly and without logistic pressure on the field teams
- The turnover of the (expatriate) field teams which, although “normal” for a development project of this nature, is destabilizing in the framework of applied research
- The fact that the main university (the one supervising the thesis, Beijing) is not in the same country does not favour interaction with the operational activities
- The difficulty to recruit Mongolian students for the Master’s degrees
- The field team currently sees the “research” aspect as being “separate”, or at least detached from the operational activities. They have the feeling that the research “used” the project as a study site. Although it allowed a winter composting technique in an extremely cold climate to be developed, and knowledge to be gained, it did not contribute greatly to the project for several main reasons:

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13 See measurement of achievement of indicators in the report of the steering committee from January 2014
- The economic winter compost production model is not viable. It is better to pragmaticallly carry out the composting in the summer, this being the choice made in the course of the work by the field teams, and which is much better adapted.
- The time required for the scientific research (PhD, for example) and for the humanitarian projects is difficult to coordinate so that the research findings can be used in the project being undertaken.14
- The delayed start to the thesis accentuated the “time lag” with the operational activities.

Most of the Mongolian actors are awaiting the interim and final scientific results, and unanimously deplore the fact that this research was not undertaken by national students, which would have helped to keep the expertise acquired in the country.

Recommendations:
- Build upon the lessons learned from this innovative experience which consisted of combining a research aspect and activities in the framework of a “classical” programme15.
- For future occasions: better prepare, clarify and communicate the objectives with all the players from the outset; anticipate and explain how research and field activities are going to complement each other, and in particular clarify the “operational” expectations of the theses backed by ACF16.
- Raise the awareness of the field and research teams on their respective constraints and methods in order to prevent and defuse probable misunderstandings and tensions
- Ensure information is shared regularly between field and research in both directions, clearly defining the contents and a useful and efficient way of sharing in advance
- Continue to disseminate the research findings in Mongolia and globally, use the findings in the advocacy phase
- Continue the applied research in Mongolia in accordance with the systems still to be defined: numerous aspects still need to be clarified (recovery of the compost for different types of soil and plant, sustainable economic model for a mechanized emptying service, …)

3.2.2 An innovative project on the margin of the ACF’s humanitarian mandate of fighting against malnutrition

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14 In this case the phenomenon was accentuated by the fact that the start of the PhD was delayed by about 6 months.
15 Proposal of the mission: to have PHD activities operationally matching the field activities, maybe planning the field part of the PHD research as a project with objects, result, not as something overlaying or “accompanying” the field activities.
16 The Scientific and Technical Office of ACF recalls that the thesis is an exercise that was never directly connected to the operational aspect and that it has a different aim: Develop visibility for ACF; Further the research in the sector; Remain in contact with the academic community, for reasons of know-how and accountability; Develop the academic partners of developing or emerging countries; Reinforce the sectorial technical capacities of ACF, in a second phase, through the production of manuals linked to the thesis (the “4th chapters”).
It has been accepted from the beginning that this Mongolia mission does not come within the traditional mandate of ACF: neither malnutrition, nor humanitarian crisis (the dzuud endanger family economies but not human lives).

However, the entry point of the research aspect is the exploration of replicable adapted techniques for periurban sanitation with the aim of preventing the risk of Hepatitis A, prevalent in UB, and this does come within ACF's public health (and WASH) mandate.

Also, by developing and consolidating the recovery of compost, urine and grey water, to improve the quality of the soil in Mongolia (which is extremely poor and degraded), and thereby the food security of the populations, we come closer to ACF’s first mandate and thus close the loop....

3.3 Relevance: a project adapted to the Ger areas of the capital

3.3.1 A project which meets proven WASH needs

“Real” needs of the populations in the Ger areas
- Access to drinking water, improved sanitation, the promotion of hygiene -> in this respect ACF’s programme is relevant
- One of the main needs does, however, remain, namely the absence of grey water management solutions (unhealthy conditions and breeding ground for mosquitoes in the summer, dangerous ice patches on the roads in the winter), in addition to the lack of public baths.
- The other priority needs are solid waste management, the lack of coal for heating, the lack of schools and nurseries, unemployment, the bad condition of the roads, public lighting.

Focus on the needs for bath houses
“The majority of people said hot bath would be recommended as the most vital additional service at multi service kiosk” (source: ACF, Multi Service Water Kiosk, Survey Report, 2013).
It was with great regret that ACF was unable to investigate this activity, but the choice was guided by wisdom:
- The construction of public baths is technically very complex
- The budget necessary is high, and would have prevented numerous other activities from being carried out
- The legislation imposes formidable constraints (for example the need to have a water tank and electric batteries for power cuts)

Need to develop decentralized solutions
As indicated in chapter 3.1, the only solution for a large part of the Ger neighbourhoods is to develop and reinforce adapted decentralized solutions.
For ger areas, the existing system of public kiosks seems to be the most practical way to provide water. It would be exorbitantly expensive to connect detached houses in established ger areas to the central water supply systems.\(^{17}\)

### 3.3.2 Analysis of the “water” activities

**Multi-service water kiosk**

**Box 1: description of the multi-service water kiosk**

The multi-service kiosk model proposed has been subject to several reviews in order to achieve a reasonable size design, which can be replicated by USUG, or even private entities. The main idea is to rent three spaces to artisans, to thus share the heating costs, which are one of the biggest financial costs making the operation of traditional kiosks loss making. To reduce costs, specific attention was paid to insulating the building. A successful technical innovation was moreover implemented for wastewater management (there being considerable production thanks to the launderette service): an infiltration well, so that it is not necessary to pump the wastewater from the holding tank in the summer (cost reduction). The installation of this well for future multi-service kiosks will of course depend on the geological substratum, and on the groundwater table depth.

**History of the Tolgoit community organization**

It is difficult to state in such a short period of time whether it is really a solid and well-organized civil society, or whether the community organization's activities are restricted to managing the multi-service water kiosk. What is sure is that the organization was structured more than 10 years ago by World Vision for the purpose of developing the sense of living together in a better manner, helping each other and improving living conditions, values which are still promoted by the Tolgoit members we encountered during this evaluation. The organization currently has some 2,000 members\(^{18}\), for a population of around 150,000 people in this territory.

Tolgoit and the users are satisfied with the three services (hairdresser, launderette, sewing) proposed.

The budget is balanced, even if the soaring inflation in Mongolia makes regular price reviews necessary.

Broadly speaking, it is balanced like this:

<table>
<thead>
<tr>
<th>Inflows</th>
<th>Outflows</th>
</tr>
</thead>
<tbody>
<tr>
<td>50% sale of water</td>
<td>30% payment of salaries</td>
</tr>
<tr>
<td>50% rental of spaces to artisans</td>
<td>70% charges (payment of water to USUG, heating...)</td>
</tr>
<tr>
<td>(hairdresser, seamstress, launderette)</td>
<td></td>
</tr>
</tbody>
</table>

USUG could easily replicate this multi-service kiosk model, but the experience is considered to be too new, and the local players are prudent, preferring to wait for it to pass the test of time; institutional changes also need time ...

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\(^{17}\) World Bank, Managing urban expansion in Mongolia, Best Practices, in Scenario-Based Urban Planning, 2010

\(^{18}\) To become a member, you have to live in the area, be at least 18 years old, be interested in the development of the “community” and pay a fee of 200 Tugriks a month.
Comparison with another USUG public water kiosk\textsuperscript{19} shows that ACF’s is clearly more ergonomic for the users (the USUG employee did not want me to take photos).

The main criterion for choosing the kiosk for the consumers is its distance from their home.
Everyone is fully satisfied with the hairdressing and sewing activities.

On the other hand, the launderette encountered more problems, such as:
- The activity is not profitable (and only seasonal in the winter, after the Tsagantsar or Nadam festival), which led to the departure of the manageress, although the service continues, carried out by the other artisans (hairdresser and seamstress).
- The very long washing cycle (2h), compared to what they were used to, represents an unmanageable wait (the space is small and seasonal demand greatly exceeds supply); they were not used to leaving the machine running and coming back later
- Lack of training/awareness of the manageress and the users of the washing machines appears to be the cause of underuse, misunderstanding and bad use of the machines which are new and different to those known.

Even despite these initial difficulties, it is not planned to replace this launderette service with another as it is useful and appreciated, and this seems to be a wise choice, corresponding to a necessary optimization time.
"Even though they (Tolgoit CBO) have received proposals from potential tenants to lease the space for shoe repair and beauty salon, they feel that it is risky because it is completely new service which takes time for people to get recognized. They have intention of keeping the laundry to see if this can go well."	extsuperscript{20}

Sustainability factors according to Tolgoit: renting the space to highly skilled artisans, because there is high competition, even if the sale of water is the factor determining use (the kiosk’s additional services work less well on the days when the sale of water is closed).

Tolgoit suggests automating the sale of water with magnetic cards, like for the launderette, as the distribution of water is very difficult in any season. A coordinated reflection is thus needed on an improvement of working conditions, rather than an automation which sounds dangerous for an essential commodity such as water.

Recommendations:
- Make better use of the multi-service kiosk as an exemplar site (social marketing pole), both as regards the kiosk itself, and to promote other key activities and messages, for example:
  - Recovery of compost from faecal materials
  - Providing the users with EcoSan toilets in the framework of the advertising campaign to be developed in partnership with the artisans building the toilets, and MonESIC

\textsuperscript{19} Located in the Songino Khairkhan district, 3\textsuperscript{rd} koro, along the main “Tolgoit” road

\textsuperscript{20} Source: ACF, Multi Service Water Kiosk, Survey Report, 2013
• Transform this kiosk into an **experimentation site** (Tolgoit is eager to pursue the action research favouring ecological solutions adapted to the problems of the area), so why not by:
  o Documenting the alternative technique of infiltrating the grey water, and studying the potential positive impact on groundwater recharge
  o Testing the filtration and reuse of grey water in the summer to water trees, plants, flowers. This is not necessarily wastewater from the washing machines (stocked in the winter), due to technical constraints, but from the guard’s family. A standard is, however, currently being prepared for grey water reuse. Good coordination with the authorities in charge should be ensured in order to avoid any unnecessary obstruction.
• In the framework of the advocacy strategy, collecting the **past and future lessons learned from the multi-service water kiosk experiment**, disseminating, organizing visits for WASH players (for example for the volunteers from the Mongolian Red Cross network) and developing an advocacy campaign for a new multi-service water kiosk legal standard.

**Renovation of two water kiosks (project financed by SDC)**
The renovation (completed in December 2013) consisted of connecting one of the kiosks to the municipal mains and of expanding both kiosk buildings, in order to transform them into multi-service kiosks. However, for the moment (two months after the service resumed) the rental spaces are still empty.
The accompaniment by ACF to attract services to the two public kiosks renovated by the project will be pursued in the consolidation phase (i.e. 3rd year of the project).

**Training for USUG service agents is quite relevant and very successful**
The half-day training for the USUG service agents delivering the water to the kiosks is a great success\(^{21}\). This choice of strategic activity was made following the analysis campaign of June 2012, showing that the water was contaminated at kiosk level. The last analysis campaign planned for May 2014 will allow us to see whether this training had a direct impact on the water quality at kiosk level. For the moment the latest analyses do not demonstrate a change.

**Recommendation:**
• Develop and implement trainer training for the USUG trainers (contact the Director Mr Ulanbayar 70127015)

**Manufacture of Containers to transport drinking water**
Manufacture of containers: on asking certain members of the ACF team about the choice to manufacture the container for transportation rather than for home storage, they consider that the containers used for transportation have indeed often contained oil, but essentially edible oils, while those commonly used for storage have contained chemical products.
This is moreover what appears to emerge from the social marketing study performed by ACF in 2010: "**Poor water quality at the domestic level poses risks to health; as families use**

\(^{21}\) Example the 5th session this week which was intended for 30 people, brought together over 40 people!
old industrial chemical containers to store their drinking water, and the traditional method of ‘collecting by scooping’ is bacteriologically contaminating the water.”

However, after two weeks immersed in the context and several discussions, notably with Tolgoit, it appears that the choice to manufacture containers to transport rather than to store is wise, as it is better – for reasons of hygiene and disease prevention – to avoid transferring the water from one container to another and also to avoid storing the water for too long. The containers for transportation should be used for temporary home storage, rather than transferring it into a bigger container, moreover more difficult to wash and therefore rarely cleaned.

3.3.3 Analysis of “hygiene promotion” activities

All the players we encountered greatly appreciated the “hygiene promotion” aspect, characterized by a participatory approach. These activities contributed decisively to ACF’s visibility in Ulaanbaatar, in particular the events created for global handwashing, water and toilet days.

This “soft” aspect of the activities carried out by ACF is especially appreciated because it is different from other projects focused too much on the “hard” side: the training and education of young generations is essential for a sustainable change in practices. The targeting of schools and extracurricular establishments is appropriate as water-related diseases were clearly increasing at the time of the new school year in September. The two years of the project in schools financed by the SDC made it possible to consolidate the approach in a decisive manner, thanks to the development of games, training modules and very participatory techniques.

Recommendation:
- Continue the integration of tools and skills at the heart of the different Mongolian institutions, and other WASH players
- Ultimately reflect on the integration of an EcoSan approach, even in schools.

3.3.4 Analysis of “ecological sanitation” activities

Relevance of EcoSan to the technique, in extreme climatic context (very cold winter)

Box 2: History of Ecosan projects in Mongolia (non exhaustive)

Joe Jenkins (humanure) tested the introduction of bucket toilets managed 100% by the owner in 2006 in UB. He concluded that it would be more appropriate to set up an emptying service, and carry out the composting on a group site with a skilled team.

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22 See the work by Peter Mogan and Annie Kanyemba: Teaching Ecological Sanitation and Menstruation Management in Schools: http://www.ecosanres.org/index.htm
Project GTZ, 2007-2008
Pilot project which provided around 40 EcoSan toilets to the inhabitants of the Ger areas and to the institutions in Mongolia and concluded that the experiences and the results demonstrate that the ECOSAN concept is not appropriate for Mongolia. Extract from the conclusion:
"A pilot bathing house with clean sanitary facilities, energy-efficient, ecologically and hygienically friendly water-supply and -disposal and with associated services (hairdresser, launderette, internet café, etc.) can certainly contribute much better to the sustainable development of the Mongolian ger-settlements and their inhabitants than a well-intentioned, but not appropriate sanitation-concept"

Thankfully, ACF did not come to this conclusion! However, to qualify the criticism of this study, it should be specified that here the GTZ was referring to a "purist" approach to ecological sanitation, that is to say with the aim of reuse in agriculture for human food, an approach which is far from being easy to implement in Mongolia, or anywhere!

"Momo" project -> see ACF report by Ibrahim

ACF has succeeded where others more or less failed, or at least ACF has learned from and used past experiences to design its project.
It is also a project that has received great support from experts throughout its development, which was probably useful given the major challenge represented by the introduction of a complete EcoSan branch in a country where a priori it is not very well accepted culturally.

ACF’s continuous improvement of the design of the toilets has made it possible to achieve two solutions adapted to the natural environment, at the lowest possible cost (although it is still possible to make further improvements). The winter composting technique in a cold climate has been mastered by ACF. Summer composting has likewise been mastered, although the local partner taking over these activities will have to adapt to the introduction (a new and compulsory regulatory measure) of a concrete floor, and it is still possible to improve the technique for example by testing reinforced insulation of the greenhouses to extend the composting period.

It was very ambitious and, above all, very relevant to make the strategic choice of emptyable dry toilets in the Ger areas, associated with treatment of the faecal materials by ad hoc composting on a decentralized site, for the following reasons:
- The lack of adequate sanitation (discomfort of the rudimentary pit latrines, lack of space to dig new latrines when the one being used is full, pollution of the groundwater ...) is one of the main problems. 100% of the reports, studies consulted and players we encountered mention this problem of pollution of the groundwater table.
- Decentralized sanitation is the only option currently accessible in most Ger areas
- A dry toilet is much cheaper than a WC + septic tank

Example (one of many): Concerning the social marketing approach for the introduction of compost and emptyable eco-toilets into the market of Ulaanbaatar, external support and back stopping was provided by Ms. Elisabeth Maria Huba, Social Scientist at Technologies for Economic Development - TED Lesotho.
- There is high demand for soil compost and fertilizer in Ulaanbaatar (and in Mongolia in general), being a rare resource imported at a prohibitive price.
- Although agricultural reuse still poses problems concerning the resistance of local players, the composting treatment procedure remains the most appropriate/adapted (and bold) in this context, notably for the huge organic amendment needs (remediation of degraded soil, for example) albeit on the scale of the capital (green spaces, horticulture...).

It should be recalled here that the choice made by ACF to develop a compost branch, rather than an energy branch (dry materials used as fuel, on the same model as the yak dung traditionally used in rural areas) may seem unsuitable for both the very dry climate and Mongolian culture. This choice was made, on the one hand, because the AREED was already working on experimentation of the energy branch (see box below in this report) and, on the other hand, because there was a challenge in research terms of exploring the wet branch in a cold and dry climate (see box 3).

**Acceptance by the populations and the authorities**

100% of the people we encountered expressed their interest in EcoSan, despite different levels of commitment, and some nuances in understanding the approach. For example, Mongolian ministries and official institutions say that EcoSan is a perfect temporary solution in the Ger areas. On the other hand, for the populations and part of the authorities, there is an interest and an increasing confidence in the composting of human faecal materials, even if it is necessary to be patient to achieve full acceptance, as this necessarily requires time.

The determining factor for change is direct experimentation, to see or use EcoSan toilets, to use mature compost and observe the excellent result for plants. For instance, the interest of the first households having adopted EcoSan toilets arose from the meetings organized in the neighbourhoods promoting ecological toilets.

The participatory workshop at the end-of-mission debriefing in UB on Friday 28 February 2014 with the entire team confirmed that support and enthusiasm for the EcoSan approach is shared by more than half of the employees. It is difficult to know the real degree of support of the rest of the team.

**Recommendations:**

Improve the comfort of the users to improve their acceptance:

- In the summer period when the smell of urine is stronger, install a removable odour trap on the urinal. This odour trap can consist of a funnel which would be adapted to the PVC pipe currently used as a urinal (the funnel and the PVC would have the same diameter). It would thus be easy to install and remove. At the end of the pipe of the funnel, place a balloon/condom/latex cut in two along its length. This addition plays the role of letting the liquid pass (when someone urinates) and the two pieces of latex/plastic stick together when there is no more flow, creating an olfactory barrier between the toilet cabin and the storage/infiltration of urine.
- Place the toilets next to the house, for closer access (thus less cold in winter)
- Recommend the purchase of a small electric radiator to be connected in the toilet cabin in winter.
Technical recommendations

- Have two grey water management systems on the plot, depending on the season (winter/summer).
- **In winter**, experiment with grey water infiltration for groundwater recharge, based on the infiltration wells of the multi-service water kiosk and carry out advocacy with the authorities.
- **In summer**, experiment with grey water treatment and recovery on the plot. Several experiments are possible:
  - **Test the tower garden** (adapting it to the climate and to the composition of the grey water which is highly “loaded” here). It is a question of manually pouring the bowl of grey water at the top of the pile of stones situated at the centre of the tower. The treatment and recovery of the grey water for food production are carried out at the same time.
  - Experiment with the **treatment of grey water with constructed wetland**, with a pre-treatment upstream of the wastewater treatment and recovery system for irrigation of plants on the plot. The system is simple and uses gravel and local plants which like water. The flow in the constructed wetland can be vertical or horizontal. As regards the pre-treatment a grease trap (conventional or straw filter) must be installed. The straw filter appears to be more appropriate given local conditions (grey water poured manually in the pre-treatment, highly...
loaded, easy maintenance, few odours). The straw is composted and just needs to be changed for the system to continue working. This management can be carried out either by the inhabitants (recommendation = bury the straw + grease on the plot) or by the Écosan toilet management service).

Figure 2: Example of grey water treatment system with constructed wetland

![Figure 2: Example of grey water treatment system with constructed wetland](source)

Figure 3: Diagram of a horizontal constructed wetland

![Figure 3: Diagram of a horizontal constructed wetland](source)

Figure 4: Example of straw filter to trap grease and solids from the grey water

![Figure 4: Example of straw filter to trap grease and solids from the grey water](source)
Experiment with the treatment of grey water + urine with constructed wetland. In this case, the technical recommendations for the pre-treatment and the filter are the same as in (ii), but part of the flow of urine from the Ecosan toilets is added (from the urinal or from the separator seat). The fertilizing potential of the urine is thus used on the plot and the dilution is carried out with the grey water.

Relevance of EcoSan in a periurban context

The inhabitants of the Ger areas are owners of their plot called “khasha”: a particularity of Mongolian land legislation: installing your yurt and erecting a fence automatically entitles you to a surface area of 0.7 ha per person (to be multiplied by the number of family members) and official registration.

“Land and Housing: Private ownership of land and houses is generally high. In older and established ger areas, nearly 99 percent of families own their own dwellings and land. The ownership rate is lower (about 80 percent) in newer fringe ger areas where many new immigrants rent their land or houses. Private ownership of land is around 60 percent for apartments and 92 percent for single family housing”.24

The purchase of toilets is thus aided, as each potential beneficiary is the owner of their land.
The choice of emptying service rather than treatment on the plot by the households themselves seems to be the best possible for the periurban context, from a functional point of view.

Despite everything, the poorest are excluded from this system (despite a minimized cost), improved toilets not being their priority.
This is a service and a branch aimed at the middle classes, capable of purchasing a subsidized toilet and paying for the emptying service.

It is clear that the project developed by ACF could not target the poorest from the beginning. The technical, cultural and regulatory challenges were already sufficiently important. Now that the project is entering a consolidation phase, with dissemination of the model, it should be ensured that the poorest are not excluded from this system:
- Making them aware of the importance of having an improved toilet (dignity, health)
- Advocating subsidies, public aid, and coordinating these mechanisms with the service providers from the private sector
- Continuing to develop the recovery of compost and other by-products from the sanitation, to be used as a financial resource
- Integrating this “social approach” into the advocacy strategy for the last year of the project

24 World Bank, Managing urban expansion in Mongolia, Best Practices, in Scenario-Based Urban Planning, 2010
**Relevance of EcoSan in relation to agricultural opportunities**

The survey carried out by ACF in 2012 of the beneficiaries of toilets highlights that almost half are interested in using the compost produced, but according to a discussion with the ACF sanitation team, out of the around 370 households having benefited from an EcoSan toilet, only 3 households\(^{25}\) would be interested in the compost produced (horticulture and sale of flowers, small garden in summer or trees). Indeed, these households would have dug a borehole, as water is a considerable limiting factor here (that is, even the households which would like to grow vegetables at home lack water. They often live with 6L per day, and on average 10L/pers).

In 2010, ACF likewise undertook a market study on compost. It demonstrates that there are numerous potential opportunities in Ulaanbaatar. This was confirmed in the interviews, and by the other documents consulted.

A second market survey is being set up by ACF, and will be performed in the coming months. This study will be much narrower and more targeted than the previous one.

It should be recalled here that the choice of the compost branch for agricultural use was likewise motivated by the fact that the energy branch was already being tested by another organization in Ulaanbaatar (See box below).

**Box 3: other possible faecal material recovery systems being tested in Mongolia**

The NGO AREED has tested the drying of faecal materials for fuel (heating) in the suburban areas of Ulaanbaatar, supplementing or replacing coal (which has higher transport costs). A sludge drying plant has been built, with solar dryers. This experience has been used as a model for the project in Bulgan which adds a latrine construction aspect.

Financing: Artois Picardie Water Agency, Rhine Meuse Water Agency, Town of Rubrouck. According to the Director of AREED, the experiment succeeded on the technical level of desiccation of the faecal sludge (provided by USUG). A PhD is being carried out on this subject.

Currently in a "scaling up" phase started in Bulgan Khovd (a town in the extreme west of the country), with the following key elements:
- 2-year project: the lessons learned from the experience will be available end 2015/beginning 2016
- construction of water toilets (with septic tank) and of EcoSan double pit toilets with separation of urine
- raise awareness of 30 pilot families
- opportunities expected: heating of the pipes of the water kiosks during the cold period

(Source: AREED website and telephone interview with the Director)

**Recommendations:**

\(^{25}\) See list in appendix 3
Develop a compost promotion/sale strategy

- Reflect on the possibility of selling the compost in the water kiosk
- The emptying service could provide a little compost to each household at the time of emptying
- Recovery of the compost on the plot: It would be interesting to adopt a double approach for the recovery of the compost produced: wholesale on the one hand, and retail recovery on the plot, as if just 5% of people collect the compost, they will probably be the best ambassadors to develop the branch. It is indeed important to have specific examples (of plants which grow well): seeing it and experiencing it is a driving force allowing us to increase acceptance, acceptability and reproducibility.
- There is still plenty of space for scientific research in the field of reuse (for example through a partnership with the Faculty of Agriculture) → carry out action research

Box 4: worldwide phosphorus crisis

A parallel can be made between the end of phosphorus and the end of oil, the recommendation being that we should not leave it to the last minute! This is especially so because, unlike oil, phosphorus is a resource considered to be renewable (as it is present in urine). At present, phosphorus effluent is badly managed as it largely contaminates the aquatic systems. The challenge is above all better resource management (to anticipate the peak and the waste) and the effluent generated (to avoid pollution).

New phosphorus stocks have been discovered and new stock estimates shift the estimated peak phosphorus to 15 years' time (for two of the three scenarios) or the year 2100 for the third scenario [6]. This third scenario is completely dependent (74%) on the phosphorus resources situated in Morocco and the Western Sahara, geopolitically unstable areas.

As a reminder, 80% of phosphorus is used to produce crops. Its use as a fertilizer increases the yield of fields by 50%. In the end, it is a question of feeding man, but also of producing biofuels. There is a tough challenge of feeding the growing world population, and the need for phosphorus to meet these needs responds to a productivity-based model. The use of urine as fertilizer is therefore interesting, but should not be carried out against the principles of agro-ecology. Productivity-based abuses should be avoided, as replacing the phosphorus extracted from mines with urine would reproduce the principles of modern agriculture.

We also think that it is important to point out that Europe is at the forefront in phosphorus shortages, notably launching in 2013 the first European Sustainable Phosphorus Conference and creating a platform devoted to this issue: http://www.phosphorusplatform.eu. Finally, certain European regulations (notably in Sweden and Finland) already favour sanitation systems which recycle phosphorus.
Relevance of EcoSan in the legal/regulatory context

Box 5: What do the regulations say in other countries?

Dry family toilets are employed in numerous European countries for different types of use:
- In France, between 3,000 and 6,000 households use a dry toilet daily.
- In the Scandinavian countries, dry toilets are the main technique used in second homes (450,000 in Finland).
- In Germany, over 30,000 dry toilets are used in family gardens and several green developments have dry toilets in 3 to 4 storey buildings.
Outside these countries, dry family toilets are a minor technique unknown in Europe. Some research outside Europe has shown that this domain is relatively well developed in the United States and Australia.

The approaches vary greatly as regards regulations:
- In Finland, the Health Protection Act defines certain obligations. The 2003 OSS regulations only fix objectives and leave to the individual the choice of the most appropriate technique for their situation. This text indirectly favours dry toilets as the requirements for household water management are much lower than for all-water effluent.
- In Sweden, OSS is regulated locally by municipal by-laws. Certain groups have defined specific provisions for dry toilets.
- In Germany, dry toilets are not recognized as an OSS device but are authorized (and even recommended) in family gardens.
- In New South Wales (Australia), manufactured dry toilets must be approved by the State services before being marketed. The approval procedure foresees a test period and fixes the demands concerning quality of the material and of the by-products obtained. Self-built systems are authorized.
- In the United States, the regulations vary greatly from one state to another. Some only accept systems meeting the demands of standard NSF41, while others have established their own criteria.

The regulations or official recommendations for by-product management are likewise very different, going from the obligation to bury solid by-products or to evacuate them (in certain States of the US), to simple advice on the duration of composting (Finland). Some states limit their use to ornamental plants while others authorize their use in the vegetable garden (Sweden). The regulation of dry family toilets thus varies greatly from one country to another, from very strict regulations only leaving the users with few possibilities to more flexible approaches combining key principles to be respected with practical advice. Overall, these approaches represent a very interesting wealth of experience.

Source: Toilettes du Monde, Les toilettes sèches familiales, Etat de l'art, état des lieux dans plusieurs pays et propositions pour un accompagnement en France, Oct 2010 (see in particular the proposals of chapter 4)

Lessons learned:

- In a human faeces composting project, it is essential to clearly identify under what regulations this activity is classified
- For the composting of human excrement, it is better to take into account the legal framework, for example including a legal expert in the ACF team, involving the key official stakeholders earlier in the project (maybe ACF took too long to approach the Regulation Commission created two years ago)

3.3.5 Coverage

The geographic distribution of the 370 toilets in the targeted neighbourhoods was carried out in accordance with the motivation of people, not criteria for rationalization of the emptying service, which leads to a relatively scattered distribution, which does not help the rationalization of the service.

Having said this, in a pilot phase, the best choice possible was undoubtedly that of selecting volunteers, rather than convincing the inhabitants of the same road, for example. Each household owning an Ecosan toilet represents a site of dissemination/promotion, for example, of the innovation, and in this respect the geographic dispersion may be seen as an opportunity to extend the service to the largest number possible.

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26 The evaluators made an effort to include analysis elements close to the Coverage criterion, as this was requested by ACF for the DAC appendix, but they indicate that this criterion does not make much sense in the framework of such a pilot project, and even in general for Groupe URD the coverage criterion is not very relevant in itself as, according to the situation, it may be more efficient to concentrate the aid in a specific area, rather than seeking to cover the populations of a whole geographic area. These choices depend on the initial diagnoses. We thus prefer to talk about good allocation of the aid. The idea of coverage in this sense is included in the analysis of the relevance and efficiency. Reminder of the official definition of the DAC: “The need to reach major population groups facing life-threatening risk wherever they are”

27 See file GPS of the toilets soon available at the mission.
The cost-effectiveness of the service was sought in the framework of the SDC project, installing the new EcoSan toilets in the khoroos where other EcoSan toilets already existed, and endeavouring to interest all the households from the same road. In several cases word of mouth also worked well, allowing the installation of toilets grouped together on a neighbourhood level.

3.4 Effectiveness: an ambitious project which will find it difficult to attain all its objectives

The specific objective of the “Agencies” project is as follows:
Accompany the provision of proven solutions permitting sustainable access to water and sanitation for the inhabitants of the yurt areas of Ulaanbaatar

The expected results are as follows:
Result 1: Accompany the public and private players to develop decentralized water and sanitation branches with the aim of meeting the needs of the population of the yurt areas of Ulaanbaatar.
Result 2: The institutional framework of the water, sanitation and hygiene sector is analyzed and reinforced on the national level.
Result 3: The transfer of technical and economic skills in water, sanitation and hygiene, to public, private and association players contributes to attaining the Millennium Development Goals.

3.4.1 The project will probably find it difficult to attain the objectives and results by the end of the project in April 2015

Apart from the fact that the formulation of the project’s objectives was not very rigorous, as it is geared more toward results and activities, the project will probably find it difficult to attain the overall results, notably as regards the dissemination of innovations and the transfer of skills. Indeed, taking into account the ambitious nature of the project and the “normal” difficulties encountered (notably the 2012 national election and 2013 municipal election in Ulaanbaatar which brought about numerous changes in organization, responsibilities, personnel), between one and three additional years would appear to be necessary to truly achieve sustainable results.

3.4.2 Approaches and methods followed by ACF which did not aid acceptance

The EcoSan approach is quite relevant in this context, and to set it up ACF had an outline social marketing approach, creating the supply before taking an interest in the demand. ACF is now trying to stimulate demand and acceptance by the populations is at stake.
The expatriate teams observe that from the beginning (and this has not changed much) they have found it difficult to identify the community dynamics in their areas of intervention. This was likewise true with the teams from the “first phase” (see exchange of informal e-mails in 2011 between Groupe URD and F. Vanetelle, former head of the mission).

For example, the Ger areas are divided into administrative neighbourhoods (districts and khorooos): do these correspond to the territories of the experiments?

Furthermore, the project was initially a research project without intending to be operational, which explains why the numerous and complex Mongolian regulations were taken into account late. The expatriates search for an explanation for the administrative obstacles that they confront (what middle course should be adopted between respecting the rules which sometimes seem to be exaggerated and a form of rationalization based on common sense?). Certain expatriates wonder with humility whether they did not miss out on Mongolian “culture”, having the feeling that they “didn’t understand everything”.

Recommendation:

- Propose a realistic review of the logical framework of the project with the donors, taking into account the lessons learned since the beginning of the project, and allowing a better formulation of the objectives;
- Including the expertise of a sociologist since the beginning of the project would have made it more effective. Are there sociological studies (on the social organization, political change, migratory and territorial dynamics, the dissemination of innovation) carried out by other organizations in Mongolia? (The evaluation team did not find these studies within the time allocated).
- Co-create the supply in a participatory manner so that it corresponds to demand.

3.5 Impacts on the progress of knowledge and the development of replicable models

**Impact on health**

It is very difficult to assess the project’s impact on health, given that part of the areas for implementation of ACF’s WASH activities are not exactly the same as the medical data census areas, and moreover because it would be necessary to isolate the project from external factors.

“In general terms the incidence of communicable diseases incidence in ger area school compared to schools in apartment area due to lack of proper sanitation and hygiene. According to the statistics from National Centre for Communicable Diseases in above 10 schools the incidence of communicable disease reduced sensibly after the implementation of the project. We have to keep in mind anyway that hepatitis A is endemic in Mongolia and we can consider that the change of incidence is related not only to the impact of project but to other environment factors.”

28 Source: ACF, Post monitoring report on the Hygiene and Environmental Promotion activities Implemented in schools, Dec 2012
The expected impacts of the experimental EcoSan project on health, the groundwater table, the richness of the soil, are considered in the long term, after replication / extension of the project on a large scale, but it does not make much sense to assess them in the pilot phase. The true impacts of the project are measured above all in terms of progress of knowledge (research), acceptance and change of mentalities of the different categories of players.

**Impact on the changes in behaviour**

The beneficiaries of pilot infrastructures are satisfied, proud and talk about them to their immediate entourage (neighbours who come to see, family, friends). Word of mouth appears to work well. ACF receives requests from several districts of the capital and from other Provinces.

The use of compost produced at the same time by the ACF team and by the partners (member of the steering group) had a real impact on acceptance of human faecal material as compost thanks to experience.

**Degree of autonomy of the local structures to take over the kiosks, emptying services, composting areas**

As for the multi-service kiosk, it is worth highlighting the seriousness and the interest of Tolgoit, demonstrated during this first year of management of the service.

**Sustainability of the takeover of the EcoSan service + treatment of excreta by composting + recovery:**

At present 370 EcoSan toilets have been installed.

Two people are in charge of the emptying round, but they are not employed full time on this activity in so far as the rounds are carried out once a quarter and last around twenty days.

Figure 5: organization of the emptying cycle over the year
A composting site located on the outskirts of the city in a remote and isolated location (which is of concern in terms of efficiency).

The funding of the service has been guaranteed until the beginning of 2014. The future funding of the service is currently being organized in the framework of the handing over of the activities to MonESIC. It is mainly based on the payment by the users of 10,000 Tugriks for each emptying.

The choice of private (NGO/companies) rather than public partners has been well argued and seems appropriate. Initially, ACF considered passing on the baton to public institutions, in particular to USUG, but following an analysis of the handover failures of other NGOs/international agencies to the public sector, the strategy was reoriented toward a partnership with private bodies.

The MonESIC contact was sent to ACF by the Ministry of Agriculture, among others. The special characteristic of MonESIC is that it already has a composting activity in a rural area, and has land outside the city.

The construction of the partnership with MonESIC was carried out in an empirical and progressive manner. MonESIC was created in 2012 with the idea of working in the ecology and green economy sector. The first contacts with ACF concerned scientific interest (collaborate through exchange of data). It was not initially a question of taking over the activities. The takeover of the composting activities was then envisaged when ACF had to close its former composting site (by order of the regulating institutions, among others because it was considered as too close to housing). MonESIC had land available and...
offered it to ACF. This activity being based on an effective collection service, it was considered that MonESIC could likewise take over this service so as not to risk depending on another company.

In relation to the EcoSan toilets, there is still margin for technical improvement (this process is obviously continuous). For example, the pipe used as a urinal in the last generation of toilets sometimes becomes detached, and it is necessary to recover it. It is important to propose a very high quality service, and in this respect these technical details are significant.

The instructions in the oldest toilets have been rubbed out or have disappeared, this being deemed important for correct use by frequent visitors. It will be necessary to reflect with the private (or public?) partners on how to guarantee an updating and printing of these instructions and other guidelines.

MonESIC is currently committed to acting honestly and realistically, but it will need to be accompanied. Fragile aspects include:

- It can be observed that no one from MonESIC has ever seen or followed the collection round whereas they are about to sign a handover which will include taking over this service.
- MonESIC is not officially recognized by the regulating authorities because it does not have a licence to perform an emptying service. As regards the difficulties with the Mongolian administration, we can expect that MonESIC, as a national structure, will find it easier to have its activity accepted by the personnel from the different authorities (even if at present unknown by the managers we encountered in the water service regulatory commission, who are suspicious and sceptical).
- All the beneficiaries of the toilets we encountered declare that they pay (or are willing to pay) the 10,000 TGK for the emptying service, but the ACF teams say that in actual fact it was very difficult and that only a minority has paid.

The positive aspects include the fact that MonESIC wishes to begin to manage the composting site immediately and to make the concrete floor (compulsory according to the regulating authorities).

It is essential to immediately establish weekly ACF/MonESIC meetings to make regular assessments, take joint decisions and consolidate the business plan. For example, work is still needed on:

- Certain owners of toilets prefer to phone the emptying service when the tank is full, which goes against a rationalization of the service consisting of a single round for all the users.
- The transformation from manual collection to mechanized collection
- Consolidation of the service’s business plan with simulations of the recovery rates.

As regards the other players of the branch (construction, investment, institutional):

ACF and its private partners can count on the strong support of numerous people in the Ministries (generally the members of the "Project Management Unit"). This is very encouraging on continuing to develop the EcoSan branch. There are, however, some
concerns on the sustainability if the consolidation phase is not extended beyond one year: indeed, “everything is in place”, but it is not yet in operation:

- For example, there are currently no bank loans to buy a toilet
- At present three companies have been trained and are capable of building ecological toilets. We met one of them and they were particularly enthusiastic about the new market segment, even if for the moment no orders have been placed with any of them.

Recommendations:

- The last year of the project, devoted to advocacy, must be devoted as a priority to accompanying and reinforcing the capacities of the local players (MonESIC, authorities, toilet owners, toilet construction companies).
- (For the donors): ACF’s project is a development project, implying that it comes within a long-term strategy. Three years + three years is not, therefore, sufficiently long to guarantee lasting impacts and to consolidate the project as a replicable model.
- Put ACF’s private partners (MonESIC, Ecotoilet building companies...) in contact with the Administration Agency of Development of Ger Area (Director = Gankhuyag Sh.) to ensure good coordination, efficiency and sustainability.
- In the future strategy, it will be worth asking the question: what solutions for vulnerable and the poorest households (who cannot pay for the toilets and the emptying service)?
- Disseminate the new knowledge developed in the framework of this applied research project in Mongolia29 and internationally.
- The development of WASH projects in rural areas (secondary towns) is relevant.

No negative impact observed

No risk of accelerating urban growth by attracting candidates for migration/settlement on this scale.

3.6 Efficiency: resources which could probably have been optimized

No other similar projects in UB, so difficult to evaluate (except kiosk).
Not a priority criterion for ACF in the framework of this evaluation. It is, however, worth making some remarks/questions.

- Has the experience gained from other organizations in other extremely cold countries (Northern Europe, China, Russia...) been investigated and optimized?
- The experience of ACF’s project EcoSan + composting treatment + agricultural recovery of the compost sold in Kabul30 was not taken advantage of. It was not

29 In this respect the ACF Mongolia website is a good initiative, but which it would be worth optimizing
30 Project for composting and sale of the compost produced (from dry vault latrines) in Kabul run by ACF between 2001 and 2004, in district 7 of the Aqa Ali Shams neighbourhood which, at the time, without being in the suburbs,
known by the members of the ACF team we met in the framework of this evaluation. Although the conditions are not the same, the comparison could have been interesting.

- Monitoring and evaluation team: the activities do not seem to be completely efficient:
  - Turnover of the position of supervisor.
  - Were all these surveys useful? Could some of them not have been replaced with well-targeted semi-structured interviews, which would allow trends to be established?
For example, what is the use of collecting medical data, in so far as it does not really allow the impact of ACF’s activities to be monitored or measured? Is there no more efficient way of assessing the capital’s epidemiology (to be able to react very quickly in the event of an epidemic)?

- Loss of the project’s institutional memory related by the expatriate personnel, notably at the time of the gap in supervisory personnel between the project’s two phases: it is difficult to understand how/by whom the decisions were taken.
  - It is recommended to adopt an information management system, for example SIGMAH [http://www.sigmah.org/node/52](http://www.sigmah.org/node/52)

had the special characteristic of having cultivated plots inside the same neighbourhood, allowing the movement of the night-soil collectors between the roads and the plots to be minimized.
Conclusion

To conclude, the evaluators would like to highlight both the relevance of the overall project and its completely innovative nature in several respects, which logically leads us to encourage the consolidation of the models developed and the dissemination of the lessons learned.

**Relevant** because it: i/ offers alternative solutions adapted to the context and meeting the needs of the inhabitants of the Ger areas, whether temporary (in view of the capital’s major urban development plans) or sustainable; ii/ can respond to the mass installation of new migrants (estimated as 30,000 families a year) in the suburban areas. Ecological sanitation is also justified by the water shortage that is expected in Ulaanbaatar.

**The innovation** lies mainly in:
- The institutional set-up which links operational activities to scientific research
- The exploration of soft and hard alternative sanitation techniques which could support an institutional advocacy strategy geared toward a standard for environmental pollution, in particular:
  - The successful development of a complete pilot ecological sanitation branch in an extremely cold and arid climate (even if the last stage for recovery of the products has not yet been launched)

The challenge now is to *consolidate and validate the model proposed*, then to *disseminate / transpose it*, in particular the ecological sanitation aspect, which is the focus of this evaluation and which generates a certain enthusiasm.

**From a strategic point of view as regards Mongolia**, the development of projects aiming to improve health conditions in other provinces and secondary urban centres should be encouraged, as should the advocacy for an improvement in access to WASH in rural areas, in so far as this type of action could help to curb the mass rural exodus, which could lead to an urban crisis, at the same time as the disappearance of the traditional nomadic culture.
APPENDICES

Appendix 1: Best practice: introduction of an EcoSan service (branch) for 370 periurban households from the Mongolian capital Ulaanbaatar

Appendix 2: DAC ranging table

Appendix 3: Schedule of the evaluation and of the people we met

Appendix 4: Bibliography and documents consulted

Appendix 5: Review of the phosphorus crisis

Appendix 6: Matrix for management of recommendations
Appendix 1: “Best practice: introduction of an EcoSan service (branch) for 370 periurban households from the Mongolian capital Ulaanbaatar

<table>
<thead>
<tr>
<th>TITLE</th>
<th>Development of an extremely cold climate ecological sanitation branch for 370 periurban households from the Mongolian capital Ulaanbaatar</th>
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| INNOVATIVE FEATURES AND CHARACTERISTICS | - The idea of a complete branch: the added value of ecological sanitation is to think of the branch as a whole, which unfortunately is rarely the case in traditional sanitation projects.  
- Adaptation of this branch to a cold climate  
- Training / accompaniment of local partners to take over the service  
- Institutional set-up of the project: work with the universities, with the Mongolian partners, notably the Ministries, identification of barriers and levers in the country for the acceptance of an ecological sanitation branch.  

THE DIFFERENT SEGMENTS OF THE BRANCH can be broken down as follows: collection, transport, treatment then recovery/disposal.  

1-COLLECTION  
Construction of Ecosan toilets with separation of urine adapted to the extreme cold in winter, with different accessories: separator seat, urinal for men, containers receiving the faeces and infiltration of urine in the ground.  

Focus on certain interesting elements:  
- Continuous improvement in the design of the ecological toilets, for example: reduction in the space of the cubicle to reduce costs, modification of the urinals to prevent the urine from freezing in the pipes.  
- Design of the zip-zap: super-structure sliding on a rail, allowing access to people with reduced mobility without steps and permitting, as with other ecological toilets, the collection of excreta in manually removable containers.  
- In winter, the urine freezes under the super-structure and infiltrates the ground, when it thaws. *Note, however, that an infiltration of urine can in the long term create a source of contamination due to the nitrates of the subsoil and/or of the groundwater table.*

2-TRANSPORT  
Introduction of a faeces emptying service, using containers which are emptied into the collection trucks.  

*In winter:* the container is left on site with the user once emptied. This avoids cleaning the container and is practical because the faeces are frozen.  

*In summer:* the faeces are more liquid (infiltration of water, bad
separation of the urine at source): the full containers are transported in the truck to the composting site, and a new container is installed for the user. A (mechanized collection) pumping system is going to be tested in the summer of 2014.

3-TREATMENT
Technique for faeces hygienization by composting in cold climate mastered. However, it appears that composting all faecal materials in the summer is more economically viable.

Focus on certain interesting elements:
Isothermal composting bin to mitigate the heat losses + Canadian well system (but not economically viable for temperatures so far below zero).

4-RECOVERY/DISPOSAL
(currently being implemented)

<table>
<thead>
<tr>
<th>SPECIFIC RECOMMENDATIONS FOR DISSEMINATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Mongolia:</td>
</tr>
<tr>
<td>- through a social marketing campaign (the water kiosks can be used as a centre to disseminate / promote EcoSan)</td>
</tr>
<tr>
<td>- through an advocacy campaign intended for the national authorities, and by helping the Ministries and competent agencies to implement a compost standard</td>
</tr>
<tr>
<td>- by recovery of the compost from human faeces for arboriculture/horticulture/green spaces in spring/summer</td>
</tr>
</tbody>
</table>

Internationally:
- by capitalizing on and spreading the lessons learned on the ground (publications, conference, forum...)
## Appendix 2: DAC RANGING TABLE

<table>
<thead>
<tr>
<th>Criterion</th>
<th>mark</th>
<th>Reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2</td>
<td>x Pass the EcoSan branch to the private partners is coherent, but very new, fragile, and risks being rushed if the accompaniment is not extended beyond the remaining year.</td>
</tr>
<tr>
<td>Sustainability</td>
<td></td>
<td>x The project has contributed decisively to the changes in behaviour (in acceptance) of the EcoSan approach, but for the moment the scale is that of the pilot experiment.</td>
</tr>
<tr>
<td>Impact</td>
<td></td>
<td>x ACF’s decentralized solutions are still relevant on considering the new urban development plans.</td>
</tr>
<tr>
<td>Coherence</td>
<td></td>
<td>x The coverage is interesting from the point of view of dissemination of innovations (although it is difficult for the economic model of the service to have emptyable toilets spread all over the district).</td>
</tr>
<tr>
<td>Coverage</td>
<td></td>
<td>x The project meets the basic WASH needs of the populations, although it excludes the public shower and grey water management needs.</td>
</tr>
<tr>
<td>Relevance/adequacy</td>
<td></td>
<td>x The innovations developed by ACF are promising and adapted to the extremely cold climate.</td>
</tr>
<tr>
<td>Effectiveness</td>
<td></td>
<td>x More refined (more development-oriented) approaches would no doubt have aided acceptance and effectiveness.</td>
</tr>
<tr>
<td>Efficiency</td>
<td></td>
<td>x The resources could probably have been optimized (many time-consuming surveys with questionnaires, loss of institutional memory, ...).</td>
</tr>
<tr>
<td>1st week</td>
<td>2nd week</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td><strong>morning</strong></td>
<td><strong>morning</strong></td>
<td></td>
</tr>
<tr>
<td>Briefing with Christian, Eric and Julien</td>
<td>Compost site visit with sanitation team</td>
<td></td>
</tr>
<tr>
<td>Ger area visit with Baysgalan (sanitation head of department) Various ACF toilets design + informal talk with beneficiaries</td>
<td>Interview with Ariuna, HP manager</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Hand-over meeting at MonESIC -Head of Tolgoit</td>
<td></td>
</tr>
<tr>
<td><strong>afternoon</strong></td>
<td><strong>afternoon</strong></td>
<td></td>
</tr>
<tr>
<td>Briefing + coordination team meeting</td>
<td>Meeting USUG</td>
<td></td>
</tr>
<tr>
<td>interview with Shijirtuya, sanitation manager</td>
<td>Meetings Faculty of Agriculture Meeting with M&amp;E whole team</td>
<td></td>
</tr>
<tr>
<td>Meetings -Water Service Regulatory Commission -MEGD</td>
<td>-office of national water committee -Skype meeting with JICA -Toilet building Company</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Meeting with: Mongolian Red Cross Skype meeting with UNICEF</td>
<td></td>
</tr>
<tr>
<td><strong>ev morning</strong></td>
<td><strong>ev morning</strong></td>
<td></td>
</tr>
<tr>
<td>Informal interview with Julien Eyrard</td>
<td>Skype meeting with TDM</td>
<td></td>
</tr>
<tr>
<td>Data analysis + biblio</td>
<td>Data analysis + biblio</td>
<td></td>
</tr>
<tr>
<td>Informal time with the team</td>
<td>Informal interview with Christian</td>
<td></td>
</tr>
</tbody>
</table>

**Data analysis + biblio**

**Informal interview with Christian**

**Departure to Paris**
**List of people interviewed:**

**ACF expatriate personnel:**
- Christian Ferrier: Country Director
- Pier Francesco: WASH PM
- Eric Rheinstein: WASH HoD

**ACF Mongolian personnel:**
- Bulganchimeg.B: Ecosan Officer
- Ariunaa: Hygiene Promotion Manager
- Munkhtuul: Cleaner, lives in Ger area
- Shijirtuya: Environmental Sanitation Manager
- Bat-Erdene: Sanitation Officer
- Odnemekh: Empty service technician, lives in Ger area
- Khaliunaa: Communication officer
- Amarjargal: Data Collector M&E department
- Ankhtuya: Translator
- Baysgalan: Sanitation head of project
- Javzansuren: Water supply manager
- Bayrmaa.E: Field officer
- Nanjid: Data collector M&E department
- Akherke: Data collector M&E department
- Purevragchaa: Driver
- Enkhtuvshin: Driver
- Khulan: Liaison officer/Assistant CD
- Bolor-Erdene: Data Collector M&E department
- Battseren: Environmental Sanitation Manager, former Monitoring evaluation HoP
- Gaala: translator, former ACF staff

**Mongolian authorities and institutions:**

**Water Service Regulatory Commission:** Mrs NARANTUYA Gantumur, officer of licensing department

**Water Service Regulatory Commission:** Mrs DOLGORSUREN P.

**Ministry of Environment and Green Development:** Prof. BATTSETSEG Ishjamts, senior officer, Division of River Basin Management

**Ministry of Construction and Urban Planning:** Mrs BATCHIMEG Renchinsuren, officer housing and public utilities policy, implementation and coordination department

**USUG (Ulaanbaatar Water Supply and Sewerage Authority):** Mrs MUNGJUNTSOOJ Gongor, Foreign cooperation specialist

**Faculty of Agriculture:** Mr Buyanbaatar

**National Water Committee Mongolia:** Mr PUNTSAGSUREN Choimpog

**National Water Committee Mongolia:** Mr BADAMDORI Purev

**Administration of development Ger area (implementing agency of Governor):** Ulaankhhuu URANBILEG, head of international relations and cooperation division
**ACF beneficiaries and partners:**

**Tolgoit CBO:** Mrs ENEBISH (member)

**Tolgoit CBO:** Mrs Suuri (head of CBO)

**Water seller guard from the multi-service kiosk**

**MonESIC:** Bayanselenge (head of the NGO)

**MonESIC:** Gochoosuren (deputy director)

**Guard from the composting site,** Monday 24th February

**Company trained in the construction of EcoSan toilets** “UDA” (the English-speaking Manager: Oogii)

**Other NGO/development organizations:**

**Mongolian Red Cross:** MYADAGMAA Tserendagva, Water & Sanitation Project Manager

**Mongolian Red Cross:** ARIUNTUNGALAG Danielsson, Hygiene & Sanitation Project Manager

**UNICEF Mongolia:** Bishnu Pokhrel, Water, Sanitation and Hygiene (WASH) Specialist *(by phone + email)*

**JICA:** KANEDA Keiko, Project Formulation Adviser *(by phone + email)*

**Research aspect:**

Nazim Uddin, PhD researcher, University of Science and Technology Beijing *(by Skype & mail)*

Ibrahim *(by Skype & mail)*

Shijirtuya (sanitation)

Javzansuren (grey water)

**Other players:**

**Licensed (=officially recognized) emptying company:** Aziin zavod LLC; Battulga N., 4th khoroo of Chingeltei district

**AREED (Association Réseau Expert Environnement Développement):** Gérard Bolognini, Director *(by phone)*

**List of visits made:**

**EcoSan toilets subsidized by ACF (list of owners below):**

1. Tsedevdorj, Songinokhairhan district, Bayanhoshuu area, 7th khoroo, 12th street, № 16. 2009, eco toilet, Water Agencies project.
3. Dolgormaa, Songinokhairhan district, Bayanhoshuu area, 3rd khoroo, 19th street, № 22. 2011, zip zap toilet, Water Agencies project.
4. Namuunyanga, Songinokhairhan district, Bayanhoshuu area, 7th khoroo, 6th street, № 48. 2013, eco toilet, SDC project.
Informal discussions with the neighbours present during the visit

**Multiservice Water Kiosk built by ACF (3 visits)**

**Training for Water Kiosk service ladies**, at USUG training center, Thursday 20th February

**Health Club training at school; 42**, Friday 21st February

**ACF/MonESIC Compost Unit**, Monday 24th February

**Appendix 4: Bibliography, webography and documents consulted**

**Documents ACF projects**
- All the document provided by Julien Eyrard in France (link to dropbox: https://www.dropbox.com/l/gcmH0LKBiBcf5rzQQKVCmc)
  - Water Agency project proposals
  - SDC project proposals
  - A “research” dossier on EcoSan+compost, grey water treatment, economic analysis aspects, with all the scientific publications
  - The 2014-2015 strategy
- ACF, EAH Institutional Analysis, draft, 24 January 2014
- ACF, Customer survey about Compost market, relative to the second step (STEP2) study conducted in October 2010, 2012
- ACF, Customer Survey about Emptyable Eco Toilet and Emptying Service, related to STEP 2 of the ACF EAH Project Mongolia, 2012
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- ACF, Post monitoring report on the Hygiene and Environmental Promotion activities Implemented in schools, 2013
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- ACF, Results of Water container users’ phone survey, These beneficiaries were taken subsidized water containers in spring 2012
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- ACF Lapègue J., personal notes on the Steering Committee n°4 & the EAH research project (Mongolia), 26/06/2013
- ACF P.F. Donati, emptying service & compost protocol, Jan 2014
- ACF P.F. Donati, activity planning, March-June 2014

Other documents Mongolian context

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  [link]
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- World Bank, USIP2 project, 2006:
  o Community Dialogue Tool Kit For Ger Areas, Mongolia, Resource Materials For Community Dialogue
  o Manual on Promotion of Hygiene and Sanitation in Ger Areas, Mongolia
  o Hygiene and Sanitation Situation Report For Ger Areas, Mongolia
  o Manual on Low Cost Sanitation Technologies For Ger Areas, Mongolia

Other documents international context

- Toilettes du Monde, Household Dry Toilets, An overview of current theory and practice in various countries, with suggestions for supporting the sector in France, 2010 [link] (summary in English); complete study in French: [link]
- American legislation on composting faecal materials: APPENDIX 3, State Regulations (US), Compiled in 1999, Composting Toilets, Graywater Systems, and Constructed Wetlands, [link]
- Ministry of public health and social assistance of El Salvador, Technical health standard for the installation, use and management of dry latrines without water, October 2004: [link]
- French legislation: On-Site Sanitation technical order 7 Sept 2009: + appendix III which comes from the order of 27 April 2012

31 PPIAF : Public-Private Infrastructure Advisory Facility
- Urine Diverting Toilets in Climates with Cold Winters, Technical considerations and the reuse of nutrients with a focus on legal and hygienic aspects: http://www.susana.org/lang-fr/library?view=rcbtypeitem&type=2&id=807
- EcoSanRes Factsheet n°11: Sweden-China Erdos Eco-Town Project Dongsheng, Inner Mongolia

Websites
ACF Mongolia: http://www.acfmongolia.mn/
Joe Jenkins website:
AREED (association réseaux d’experts environnement développement): http://www.areed-nancy.org/Scripts/accueil_photo.php
MONGOLIAN PARLIAMENT RESOLUTION: www.uuluurhai.mn
http://www.ipit.eu
http://www.ulaanbaatar.mn/en/##panel1-1
http://www.ger.ub.gov.mn/ (currently only in Mongolian)
http://www.mpa.ub.gov.mn/ (currently only in Mongolian)
Appendix 5: Review of the “phosphorus crisis”

In the literature, estimates before we “run out” of phosphorus range from 50 to 130 years. This date is conveniently far enough in the future so that immediate action does not seem necessary. However, as we know from peak oil analysis, trouble begins not when we “run out” of a resource, but when production peaks. From that point onward, the resource becomes more difficult to extract and more expensive [5].

Phosphorus and its compounds are used in fertilisers, animal feed, detergents, and metal treatment operations (Steen, 1998). More than 80 percent (Steen, 1998; Cordell et al., 2009; Van Vuuren et al., 2010) of the phosphorus produced is utilised in fertilisers to assist in crop production, resulting in increased yields of up to 50 percent (Stewart et al., 2005). Without the use of fertilisers it would be difficult to provide sufficient food for an expanding world population, which is projected to grow from around 0.9 billion in 1850 (Kremer, 1993) to 9 billion in 2050 (U.N., 2008). Corresponding to the increase in population has been an annual increase in phosphorus production, from less than 1 Mt (P)/y in 1850 to 22 Mt (P)/y in 2012. Currently, the current cumulative production of phosphorus, mined from phosphate rock and guano, is estimated to be approximately 954 Mt (P). Phosphorus is a finite resource and cannot be substituted for agricultural uses (USGS var.). Other reserves of rock phosphate with lower concentrations of P2O5 do exist, but, just as with tar sand for oil production, they are more costly to exploit - economically, energetically and environmentally [5]. Hence it is essential that the resource be managed in order to avoid, or mitigate at least, any future supply limitation. To do this, reliable estimates of future demand and realistic projections of production rates are required based on the amount of phosphorus that remains [6].

In some ways, the problem of peak phosphorus is more difficult than peak oil. Energy sources other than oil are available, though they all have their own shortcomings. In addition, the sun provides a steady input of energy. Unlike fossil fuels, phosphorus can be recycled. However if we waste phosphorus, we cannot replace it by any other source. Currently we are running through the limited supplies of concentrated phosphates. Phosphate fertilizer is often applied carelessly, leading to waste and pollution. Food from agriculture goes to consumers and animals, who excrete most of the phosphorus. The phosphorus in sewage mainly goes to sea or is otherwise dispersed [5]. The key response to a phosphorus peak is to re-create a cycle of nutrients. F.H. King in his classic Farmers of Forty Centuries: Organic Farming in China, Korea and Japan [11] describes how returning human and animal manure to the soil enabled Asian agriculture to continue to be productive for millennia.

In 2010, the IFDC (International Fertilizer Development Center) made new, considerably higher, estimates of reserves, based on information provided by the sector of activity, and, in 2011, the USGS (United States Geological Survey) consequently updated its estimations of resources32 [1].

World phosphate rock production capacity was projected to increase by nearly 20%, from 215 million tons in 2011 to 256 million tons in 2015, with most of the increases occurring in Africa. The largest increase was expected from the Moroccan producer, which planned to increase

annual production incrementally from about 27 million tons to 50 million tons by 2017. Other significant new mines were planned in Australia, Brazil, Namibia, and Saudi Arabia. World consumption of P2O5 contained in fertilizers was projected to grow at a rate of 2.5% per year during the next 5 years, with the largest increases in Asia and South America [3]. For the World Resources, the domestic reserve data were based on USGS and individual company information. Phosphate rock resources occur principally as sedimentary marine phosphorites. The largest sedimentary deposits are found in northern Africa, China, the Middle East, and the United States. Significant igneous occurrences are found in Brazil, Canada, Finland, Russia, and South Africa. Large phosphate resources have been identified on the continental shelves and on seamounts in the Atlantic Ocean and the Pacific Ocean. World resources of phosphate rock are more than 300 billion tons [3]. For example, Morocco, China and the United States control 85% of mines. In 2008, the price of ore increased by 800% [7].

Minerals information country specialists at the U.S. Geological Survey collect and analyze information on the mineral industries of more than 170 nations throughout the world. The specialists are available to answer minerals-related questions concerning individual countries. The country specialist in Mongolia is Susan G. Wacaster [4].

Since 2007, Patrick Déry and Bart Anderson have monitored coverage of the subject. In 2013 a detailed projection of phosphorus production by two Australian researchers indicates that world phosphate rock production will most likely peak in 2027 [6]. For predicting future supply the ultimately recoverable resource (URR) is commonly used and is equal to the combined sum of all historic and future production. Estimates of URR values for phosphorus currently range from 1,000 to 36,700 Mt (P) (Cordell et al., 2009; Déry and Anderson, 2007; Ward, 2008; Van Vuuren et al., 2010). Such a broad range in URR estimates highlights the uncertainty in the quantity of phosphorus-bearing material actually available. Future production projections also have a wide variation as they are dependent on both the amount of the recoverable resources still remaining as well as external drivers, such as droughts, wars, famines, etc., that influence annual production [6].
The Low scenario used Hubbert Linearisation to determine the Ultimately Recoverable Resources (URR). The High scenario combined the highest resources estimates and a 60% recovery factor with historical production. Finally the Best Estimate scenario reflected the authors’ best estimate as to the correct URR values. The URR estimates used were: 2010, 4181 and 9197 Mt (P) for the Low, Best Estimate and High scenarios, respectively [6].

Both the Best Estimate and Low scenarios indicate that peak phosphorus will occur within 15 years. Although the High scenario peaks after 2100 it is important to recognise that Morocco/Western Sahara accounts for almost 70% of the High scenarios URR. Indeed the World excluding Morocco/Western Sahara production peaks in 2030. Further by 2100, virtually all of the world’s production will occur from Morocco/Western Sahara only [6].

33 Is based on IFDC and USGS reserve numbers combined with cumulative production. For countries not listed by IFDC and USGS, the URR is determined by cumulative production to 1988 plus the country-by-country resource estimates and assumed deposit grades reported by Notholt et al. (1989) with a 60 percent recovery. [8]
The vulnerability to any kind of disruption in Morocco/Western Sahara after the rest of the world has peaked has been investigated by implementing a hypothetical 10 year disruption to supplies in the country starting in 2040 [6].

It can be seen that the 10 year disruption for the Morocco/Western Sahara region results in an annual decrease of 6-11 Mt (P)/y in world phosphorus production that continues for many decades after the cessation of the disruption [6].

As for Mongolia, based on the data from the electronic supplement of the article “Projections of Future Phosphorus Production. Mohr, S. & Evans, G. (2013)”34, we have the following data: 23.7 NH35 of rock phosphate (Extract from Table 1: Low, High and Best Estimate URR Estimates [8]) and the peak phosphorus estimate for Mongolia is 2063 with the end of the curve in 2108. [9]

<table>
<thead>
<tr>
<th>Country</th>
<th>Type</th>
<th>Low ref</th>
<th>BG ref</th>
<th>High ref</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mongolia</td>
<td>Rock</td>
<td>23.7 NH</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Extract from Table 1: Low, High and Best Estimate URR Estimates [8]

And then
- Phosphorus is an essential daily component of our diet and agriculture system and the world is dependent on finite fossil sources. Most of the world’s farms do not have or do not receive adequate amounts of phosphate. Feeding the world’s increasing population will accelerate the rate of depletion of phosphate reserves [5].
- Commercial sources are dominated by only a few countries
- Rock phosphate extraction is not monitored by either the UN or the EU
- Geopolitical changes could affect the stability of supply
- Global demand mainly from the developing countries is increasing currently at 5-6% per year and prices are increasing
- Only about 16% of the mined P-rock is traded
- Only 20-25% of the mined P-rock ends up in the food we eat
- Now important to become more efficient with how we use the mined sources and secure and reuse the P we have in manure and solid and liquid waste streams. [10]

Historically, almost all of the phosphorus has been utilised as a single use from mined resources. As shortages occur, as the modelling has shown, alternative approaches will be required, including increased recycling, greater efficiency of use in the food production cycle, and finding replacements for non-essential uses such as detergents, chemicals, etc. [6].

35 NH= Notholt et al. resources assuming 60% recovery factors
Sustainable phosphorus use is now the subject of numerous investigations. In particular, there is great phosphorus waste. The equivalent of 52% of the matter provided by mineral fertilizers is indeed lost each year, washed away by runoff water. Last year the European Commission launched a public consultation on the recycling possibilities [7].

Key phosphates supply issues in the future are: (i) price volatility for fertilisers (ii) market power of large fertiliser producers, (iii) potential for technological development and more efficient phosphate application and phosphate recovery (which would increase supply security), (iv) rising energy and water costs, (v) domination of supply by a small number of countries potentially causing insecurities [2].

REFERENCES


http://www.phosphorusplatform.eu

European Sustainable Phosphorus Conference 2013
## Appendix 6: Matrix for management of recommendations, for ACF

<table>
<thead>
<tr>
<th></th>
<th>Need for supplementary funding?</th>
<th>Reply from the Management (accepted/partially accepted/rejected) + comment</th>
<th>Action(s) to be carried out</th>
<th>Person(s) responsible</th>
<th>Deadline</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RECOMMENDATION 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RECOMMENDATION 2</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>