Swedish International Agriculture Network Initiative (SIANI)

The Challenge of putting Agriculture aspects into Sanitation Planning

Expert group

Survey of Stakeholder Perspectives (Activity 1)

Working Group Report

By: Jennifer McConville, CIT Urban Water

May 2011

I. Introduction to working group

While Sweden has an established history of research and development in ecological sanitation and urine-separating systems, we have so far failed in linking agriculture and sanitation on a large-scale within the urban context. In order to manage nutrient flows and strengthen the link from households to agricultural reuse it is necessary to bring such closed-loop thinking into the urban planning processes. This means that sewage products/components need to be treated as a resource instead of simply "waste". Dialogue linking agriculture and sanitation planning is needed early in city planning processes so that the connections are made at all institutional levels from centralized treatment and collection plans to household users and finally reuse. This means that there is also a wide variety of stakeholders that must be involved and whose needs must be met if an effective and profitable link between agriculture and sanitation is to be established.

The objective of this working group is to outline the key challenges of introducing closing-loop sanitation planning into conventional city planning processes. It will identify criteria for stakeholder involvement and leverage points for adapting the planning process. It will do this through a series of activities which are intended to build on each other: i) survey of stakeholder perspectives and criteria, ii) validation of recommended criteria for a closed-loop planning process, and iii) pilot planning process implementing the recommended process.

II. Aim of report

The aim of this activity is to understand how key stakeholders view the potential for linking sanitation and agriculture in a closed-loop urban planning process. It will link to on-going projects in Stockholm, Södertälje, and Örebro which are working with closed-loop ideas. Interviews with key stakeholders from these projects will be interviewed regarding their vision of a closed-loop planning process, criteria for stakeholder involvement (incentives, guarantees), and potential risks. The objectives of this initial study are to (i) deliver a synthesis report of criteria needed for a closing-loop urban planning process, focusing on inclusion of agricultural aspects; and (ii) recommend a number of ideas for subsequent working group activities.

III. Stakeholders in a closed-loop society

Closing the loop on resource use in society means bringing together stakeholders in new partnerships and including a wider variety of actors in planning processes. Traditional water and wastewater management has been controlled by municipal authorities (e.g. city planners), and technical departments (e.g. water and sewage utility). However, a more comprehensive picture of stakeholders should also include households, real estate owners, construction companies and developers, solid waste companies, and the eventual end-users of waste products, the farmers and food industry. All of these stakeholders have a stake in how systems are designed, implemented and operated as well as an interest in the products of such systems. Implementing a new policy for closed-loop would mean that all of them should at least be informed of if not more actively involved in the planning process.

A short overview of key stakeholders in a closed-loop society are:

- *Politicians* – provide a mandate and a budget.
- *Municipalities and technical departments* - they set the rules and can make incentives for closed-loop. Aim for cross-departmental collaborations- solid waste should be involved too!
- *Agriculture and the Food Industry* – both as recipients for waste products but also as implementers (they have the equipment to dig and install on-site systems).
- *Building developers* – they are in charge of informing the eventual users/home-owners about the closed-loop systems. Important that they can pass the message.
- *Technology/Product developers*– they make the technology.
- *Contractors* – they build and implement plans.
- *Home-owners*

IV. Swedish perspectives

This report is based on a number of interviews and focus group discussions with Swedish actors. Intreviews were conducted with Ingmarie Ahlberg (Stockholm Exploateringskontoret (Development office)), Anna Calo (Telge Nät, water and waste utility, Södertälje council), Karl-Axel Reimer (Södertälje environment office), Karin Karlsson (Örebro council), Gösta Andersson (LRF Mälardalen, Regional council, Swedish Farmers Federation), and Sunita Hallgren (LRF, Swedish Farmers Federation). A focus group was held with consultants Maria Lennartsson, Karin Emilsson and Elisabeth Kvarnström, all of whom have long experience working on these issues. The interviews were aimed at identifying opportunities and challenges for establishing closed-loop sanitation systems.

A. Common vision for closed-loop sanitation planning

There was common agreement among those interviewed that closing the loop on sanitation means *recirculation of nutrients and organics back to farmed land/agriculture*. In other words, it is the return of unused nutrients in food waste (including excreta) back to where it was originated. However, it was also recognized that there can be different levels of closed-loop (returning different percentages and fractions of waste), and that a completely closed-loop will not be achieved overnight. In addition, different actors in the sector work with different waste fractions and define closed-loop systems based on their personal experience. For example, the solid waste management department collects and composts organic waste which they see as closed-loop; while at the wastewater treatment plant they are focusing on meeting quality standards for being able to return their sludge to agricultural land. (Note that Sweden's national environmental objectives contain a goal of returning at least 60% of phosphorus from wastewater to productive land, and half of this should be to farmed lands).

In any case, whatever the waste fraction, the stakeholders were in agreement that planning for a closed-loop sanitation system means that the process must start from the end product. It needs to start with what is required for land application and design the system backwards to the toilet. This means that agricultural stakeholders need to be involved from the very beginning. It also means that planning discussions will need to include representatives from many other sectors that may work with food waste during its life-cycle from household to field (housing, environment, water/waste management, etc). Interested and effected stakeholders should be identified, as well as any existing or potential recycling systems. Efforts need to be made to bring the affected stakeholders into the discussion and provide information/discussion to anchor the desire for recycling in society, not least with the political decision-makers.

B. Leverage points in the planning process

Swedish stakeholders feel that a major leverage point is to include agriculture from the beginning of the planning process. Allowing the agricultural sector to steer demands for quality, delivery and timing of the products can open new opportunities for collaboration and logistical solutions. This also means that there will be a consumer of the end-product, which strengthens the economic drivers and sustainability of a recycling system.

At the same time it is still the municipality that owns the process, and should take ownership of the question. Politicians and municipal workers need to be aware of the need for more efficient resource management and be committed to action. Local and regional authorities can offer financial incentives for implementation of closed-loop systems. However, they should also be supported by national level initiatives. There should be national standards and laws that would guarantee quality control and bring together knowledge on technologies and organizational options. Political stakeholders at local, regional and national levels are all important leverage points for spurring action.

Another potential leverage point is through identifying new partners and innovators. Working with alternative technical solutions and organizational structures for separate waste streams can also present opportunities for getting a recycling system up and running. For example, it may be easier to

work with the solid waste sector (instead of wastewater) since they are used to sorting their waste and working with different products which each have to be handled and treated differently. Linking this knowledge to handling for former "wastewater" products may be the needed entry point for a closed-loop system. In general, the technologies and knowledge is available, it just takes some pioneers to get the ideas right and then the crowds will follow.

In summary, the leverage points will vary depending on the stakeholder group:

- *For politicians*– create guidelines and steering incentives, subsidies and clearer standards for what is needed.
- *For municipalities* –closed-loop systems can fit into their environmental and climate goals. Cities have problems today with how to be rid of solid waste. Recycling can alleviate some of the problem. Plus closed-loop systems have been shown to be cheaper!
- *For agriculture* –get a complete fertilizer (including P other nutrients and organics), plus from a global perspective on peak phosphorus they have the responsibility to do the right thing.
- *For building and technology developers & contractors* – new market opportunities
- *For home-owners* –may need political steering, including subsidies, tax breaks, reduced fees if they have closed-loop systems, etc. Education on recycling can also give them confidence to do right thing.

C. Criteria for closing the loop

In addition to leverage points for stakeholder involvement and spurring interest in recycling, there are a number of technical and organizational criteria that interviewees identified as requirements for a successful urban closed-loop sanitation system.

Technical criteria

Since the link to agriculture is the key for a functional closed-loop sanitation system, it is reasonable to start defining design criteria from the agricultural perspective. It is necessary to produce a product that agriculture is interested in using. The centralized sewerage sludge from wastewater treatment plants is not attractive to agriculture today because the quality and fertilizing concentrations are questionable. Farmers are interested in high quality fertilizing products that would be cheaper or comparable in price to commercial products. There are limits to how much material can be applied to fields; therefore farmers need concentrated fertilizer products. Too much water can be problematic and especially greywater which often contains higher concentrations of heavy metals and other undesirable chemicals than excreta.

In order to improve the fertilizing potential of waste products, Sweden's national farmers' association (LRF) has defined the following criteria as guidelines for suitable waste products. They recommend source-separation as the easiest way to meet the first three requirements, although they do not specify technologies. The aim is to have the cleanest fertilizing product possible, with the understanding that it will not be perfect yet – quality can be improved as we learn!

- *Quality guaranteed* – backed by a monitoring plan
- *Sanitized* - free from bacterial contamination and medical waste
- *Concentrated* - so as to be more interesting as a fertilizer – more nutrients per volume

- *Source-separated* (e.g. excreta from greywater) – this is to help with quality control and guarantee

The technologies to meet these criteria exist, although many of them have not been tested in large-scale systems (e.g. low-flush urine-diversion toilets, wet composting and urea hygienization). Many technical problems need to be ironed out before these systems will provide a robust service. Medical residues in human excreta are a prominent issue, and research is on-going regarding actually risk analysis and techniques exist to remove them; so those interviewed did not see them as the biggest challenge. In general, it was felt that achieving a robust and user-friendly technology was not a major barrier to implementing closed-loop systems.

Organizational criteria

From an organizational perspective achieving a functional closed-loop sanitation system requires both long-term thinking and a vision for large-scale implementation. We need to take the concept beyond the eco-village project and integrate it into society. If it is not planned at scale then it is hard to convince important stakeholders to be involved and the sustainability is questionable. By planning on a large-scale it is easier to see the market opportunities and convince stakeholders to invest time and resources. It worth noting that there are several councils in Sweden that have this system for single dwellings and on-site sewage systems, but that it has not been applied to areas centralized sewerage.

Unfortunately, since large-scale recycling systems are still in the pioneering phase, there also needs to be an economic mandate backing implementation and supporting costs for research and development. Planning and implementing new innovations for closed-loop systems will initially cost more so politicians need to be supportive. However, as technical and practical experience grows the costs and implementation time will shrink and the system become economically viable/competitive.

D. Challenges

The major challenges facing closed-loop systems are related to logistics, organizational structures, and social resistance. There were some differences in opinions regarding which challenges were the greatest threat. Many saw social issues as a major risk, followed by the costs of implementing new innovations. Logistics and technology needs to be improved but are generally not the biggest concern.

Organizational challenges

One of the greatest challenges in implementing closed-loop systems lies with leadership and organizational structures. A closed-loop planning process requires actors from many different departments (water, environment, solid waste, etc.), all of whom have their own special interests and established modes of operating. It can be hard to start a cross-sectorial collaboration, negotiate new divisions of responsibility and create change. In addition, the legal conditions have strong influences on organization's ability to impose requirements or take responsibility. For example, a big challenge for small-scale sewage in Sweden is that it is unclear if councils can demand recycling of nutrients with existing legal framework.There is need for an overall leader who can work across sectors and departmental-divisions. This person should have political support and a clear political mandate that defines the intention for a closed-loop system. How this leadership and organization

will be structured will depend on the local municipality. The critical question is to define ownership and organizational responsibilities, especially for O&M, and get these actors involved from the beginning. It may be an advantage to recruit an external leader to work in this situation. It must be the right person though - leadership is critical!

A particular stumbling block in several cases has been getting the current wastewater authorities to collaborate on innovative systems. They are happy working with the current systems that they are used to and have invested time and energy into developing. Yet, they are a critical stakeholder and can pose a serious stumbling block if they decide to resist change. The central government is also stuck between improving existing systems and pushing for new systems. Finding ways to get them involved and striking a balance between upgrading and innovation will be critical for the success of a closed-loop system.

A final organizational challenge can be to establish a long-term commitment from the agriculture, as this means assuring the quality of the final product and a transport/delivery chain to get the products there. The trouble is also that agricultural planning is by nature not so long-term (e.g. 1-2 years) and it can be hard to get a farmer to sign the 5-year contact that the municipality would like to have in place.

Community resistance

There are always people who will resist and fight change. Particularly with issues such as the reuse of waste products, there will be skeptics. There is a risk that the community will not accept the closed-loop idea for different reasons (e.g. the disgust factor). Households need to be able to believe in the system and understand the importance behind it. This means that information and promotional efforts will be needed to get the message out. Opportunities here can focus on environmental stewardship and lifestyle improvements.

In addition to feeling good about their choices though, households want a comfortable and easy experience with their toilet. The technology has to provide this. Therefore, it will be necessary to prove that the chosen technologies are reliable and that the quality will be high. If the technology and quality (service and product) is not right there is risk of developing a bad reputation. For example, there have been troubles with urine-diverting toilets (from user perspective), which can make people reluctant to install such a system in their own home. Linked to the disgust factor is the need to guarantee that the system takes care of the products and that the users don't have to be involved in its success. In addition, there should be guarantees that the nutrient loop is actually closed, otherwise people lose faith in the program – need their support and trust!

Partly to overcome these social barriers and partly as backing for a political decision, many homeowners and real estate developers will probably require some incentives. For example, land for development could be sold cheaper in areas that are to be developed as "ecological", in order to off-set higher costs for meeting the environmental requirements in the area. Or there may be subsidies to homeowners for closed-loop systems.

Logistics & technology development

One of the greatest technical concerns with this sort of system is the increase in costs. Some worry that the costs for investment and O&M (collection and transport, treatment of more fractions of

waste) will be greater. This means higher taxes and user-fees, which can create resistance to the system from users and politicians. While this is a risk in the short-term with newer systems, there is also evidence that closed-loop systems can actually be cheaper than traditional ones.

On the other hand, closed-loop systems do present a larger logistical challenge, especially when waste fractions are separated. In addition, there are still technical challenges to be overcome as many closed-loop systems have not yet been implemented at scale. For example, smell from urine-separating toilets is still a problem. However, several of the Swedish stakeholders who have worked with these issues have been surprised how easy it was to get the technical and logistics pieces in place and build on the old system.

V. International perspectives

Although the interviews with the Swedish actors were more practical and action oriented, they do mirror some of the international discussions that have taken place regarding closed-loop sanitation. Globally, sanitation solutions are struggling to move from small-scale projects to large-scale implementation. One of the major challenges is bringing ideas from theoretical designs in policy and demonstration projects to mainstream implementation. The following tips on bringing policy to action have been summarized from a workshop[1] on sanitation reuse policy held in 2009 by the EcoSanRes program of the Stockholm Environment Institute. Participants in the workshop represented 22 organizations working with these issues in 14 different countries.

A. Know the "institutional landscape" and involve all actors

A thorough knowledge of the legal, financial and social settings is needed to get an understanding on how different policy alternatives might function or not. One needs to have a clear picture of the "institutional landscape". A common barrier is that all important actors are not involved in the policy development, implementation and financing. To mitigate this, an analysis of relevant actors and persons must be performed at an early stage. Every country will vary and have its own set of norms and key actors that must be involved.

Once the key actors have been identified, it is critical to develop ownership on the part of all stakeholders, carefully considering the social and economic contexts that will affect their involvement. First, actors need to recognize the need to change. Initial discussions can focus discussions on drivers for reuse (e.g. agriculture fertilizers or business opportunities) and the availability of different options. Further discussion can then take up important issues such as quality control (user education, certification, barrier approaches), an enabling environment (i.e. legal documents that support reuse activities), and the economic responsibilities (who pays). Again, all actors should be involved in order to get a comprehensive understanding of the issues at stake.

[1] Proceedings from the Policy workshop for EcoSanRes nodes 24-25 August 2009 Stockholm, Sweden - Sanitation Policies and Regulatory Frameworks for Reuse of Nutrients in Wastewater, Human Excreta and Greywater.

B. Initiate parallel processes

Policy development is needed at national, regional and local level. This is often developed as a top-down or bottom-up process. Much can be won by initiating parallel policy development at several levels at the same time. This will also help creating better policy at all levels and experiences can be shared in between these levels.

An important lesson learnt from working with reuse systems in a variety of contexts is that they are more complicated and have much more social interaction than conventional small-scale and large-scale sanitation systems. There may be a need to develop ways to change the norms among people on the local level – which in turn creates demand for reuse systems and makes it easier for politicians to support and enforce innovative policy. Affecting the attitudes and intentions of one stakeholder group can thus affect another group. This underlines the need to keep all communication channels in mind when making policy aiming at implementing reuse systems.

C. Strategy needed to support policies

There is a gap between national legislation and policies at national level and local enforcement. Strategies and activities needed to bridge levels to ensure that policies on national and regional level can be useful and creating incentives on the local level. An enabling legislation, such as the one in place in Sweden, does not alone steer towards sustainable sanitation systems (Swedish regulation is seldom used and lack a certain level of clarity). There are other processes and attitudes that affect whether systems are used: cultural attitudes, low prioritization, increasing complexity in urbanization, etc. There is a need to make the legislation and the policy understandable both for regional and local authorities and for common people.

A strategy for supporting the enforcement of a newly developed or revised policy can in many cases be an important tool when starting to implement/enforce the policy or new legislation. Such a strategy could for example include a description of the roles for all involved actors when implementing the policy, description of incentives on different levels, a platform for discussion between key actors and the strategic communication of key messages and facts to target groups. Stimulating knowledge sharing between actors and ongoing projects could also be part of such a strategy.

There is need for a communication structure that can prioritize and spread messages about the positive effects of a reuse-oriented policy among relevant actors. Actively seeking champions and spokespersons for the messages are important. It is very important to convince politicians and stakeholders to promote sustainable sanitation and reuse “within” the existing water and sanitation sectors and hierarchies. It is strategic to work within established institutional and organizational structures.

Other key strategies to promote action for closed-loop sanitation:

- Need to advocate for the importance of recycling – create incentives for it.
- Solve logistical puzzles of urban reuse systems.
- Semantics are important – label the recycled products and technologies in a way that creates a positive image.

- Make sure that it is not just about having the possibility to recycle, it should actually be done!

VI. Summary

There is general agreement that bringing agricultural aspects into sanitation planning and promoting closed-loop processes requires the participation of a wider group of stakeholders then is currently the norm in sanitation planning. Including more stakeholders in a planning process can be difficult if careful attention is not paid to how the process itself is run. Some recommendations for a closer analysis and understanding of the urban sanitation planning process, and how to work with it are given here[2].

- The objectives for using participatory processes should be clearly defined at the beginning of the planning process and participation levels of all stakeholders adapted so as to be consistent with achieving these objectives.
- The variety of perspectives regarding what is sustainable in the local context needs to be included in the planning process in order to achieve a system that offers an appropriate technology at the right service level.
- Once local sustainability criteria are established they need to be included in the project document, terms of reference and indicators for monitoring and evaluation, at both program and donor levels. Specifically, project objectives and performance indicators should match the sustainability criteria of the stakeholders. Note that if actions to meet sustainability criteria are not spelled out in the terms of reference they will not be achieved.

VII. Recommendations for future work

The second objective of this report was to develop a number of ideas for future activities within this working group. The following is a summary of ideas that were identified during this survey. They have been further developed into a concept note and budget for future activities (Appended).

1. **Documentation** of good case studies showing urban closed-loop sanitation planning processes and implementation of systems
2. **Further research** to support implementation efforts (e.g. differentiated user fee system promoting reuse)
3. **Advocacy** for closed-loop systems at local, regional, and national levels (workshops, seminars, etc)
4. **Pilot cases** in which we initiate planning processes for large-scale implementation (new development areas, low-lying fruit – municipalities ready to try)

[2] McConville, J. (2011) Towards Better Design of the Process of Planning for Sanitation. Sustainable Sanitation Practice, Issue 7/2011.

Appendix – Concept note for future activities

Activity II: Validation workshop on stakeholder criteria for closed-loop planning processes

This workshop will act as a validation of the criteria and planning vision gathered from the stakeholders individually in Activity I. It will bring together municipal authorities, construction companies and farmers from both Stockholm and Örebro in an equitable discussion around the results of the stakeholder survey and the challenges of implementing a closed-loop planning process.

Outputs II:

- Report outlining consensus on criteria and recommended planning process
- Concept note for how to implement a pilot project of closed-loop planning (Activity III)

Activity III: Pilot planning process

The final activity in this working group will be to test the recommendations developed in the previous activities. Details for this pilot phase will come from the validation activities in phase II and potentially involve the stakeholders from Stockholm and/or Örebro in implementing their own ideas. Another possibility is the piloting of a closed-loop sanitation planning process in a developing country (e.g. Burkina Faso, Ghana), linking this working group with other working groups within the SIANI expert group on sanitation and agriculture.