ECOSAN

The End of All-mains Sewerage

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The following presentation aims to sketch out the basic elements of a new ecological sanitation concept, EAUTARCIE's version of what is generically called ECOSAN. **EAUTARCIE's ECOSAN** applies new principles that go against the thinking of present-day Sanitary Engineering.

Today, selective urban waste collection is no longer disputed as a means towards the recycling of our waste. And yet, we don't realize that our «all to the sewer» sanitation system follows the same «all-trash-to-the-garbage» logic that has dominated urban waste management. Its consequences however are more grievous because the current system threatens global food production for future generations.

Urban wastewater is a mixture of two differerent types of wastewater : **grey water** – containing soaps and detergents, and **black water** – containing human dejecta, organic matter and bacteria. Combining grey water with black water has a disproportionate environmental impact that no wastewater treatment, however efficient, can alleviate. The key to a truly sustainable solution lies in the selective treatment of grey water, separate from black water.

When you analyse the differences between these two types of wastewater, two important facts are revealed :

1. First, black water contains harmful domestic waste, in the following proportions : 99% of our bacteria, 90% of our phosphorus and 98% of our nitrogen. These elements, mixed in with medicinal residues, constitute a serious threat to the receiving milieu ;

2. Second, human dejecta represent only 1% of the total combined urban wastewater volume.

What a paradox ! Almost all ot the harmful pollutants are found in only 1% of our urban wastewater. And yet, **this 1% becomes truly harmful** because it is diluted and then treated in a conventional sanitation plant.

When you remove human dejecta from wastewater, a new situation presents itself : grey water, which would only pose a threat to the environment if it were discharged in a river, lake or sea ; can be more usefully reclaimed for agricultural food production or to replenish our underground water tables. Meanwhile, human waste conveyed by ultra-low-flush toilets will be treated as a raw material.

If we hope to attain sustainable water management and sustainable food production, we must abandon all-mains sewerage.

For Sanitary Engineering science, efficient wastewater treatment is said to better protect the environment. In fact, quite the opposite can be shown: the more wastewater is purified and destroyed, the more we pollute the environment. Instead of being treated, municipal wastewater must be fully recycled.

And again, agricultural technicians and Sanitary Engineers have not yet discovered the intimate links between agriculture and wastewater management.

On the one hand, agricultural specialization has led to a separation in animal and plant production. Meanwhile, wastewater treatment has evolved quite independently. **Yet these two activities have a common link : biomass.** Its mass destruction, both through agriculture and conventional sanitation removes this precious resource from the cycle of humus formation for soil. One must understand that biomass is the cornerstone of sustainable food production and the key to the resorption of our water problems. There is no other way.

Agriculture, our staple food supply chain, has gradually abandoned organic fertilization and adopted the use of chemical fertilizers and liquid manures, both of which are environmentally harmful.

Human dejecta are destroyed in wastewater treatment plants, from which so-called « treated wastewater » is discharged into rivers. The solids found in sewage sludge - a degraded organic

matter – are then partly incinerated, partly recycled in agriculture, where, similarly to chemical fertilization, part ot their nitrate content reaches our groundwaters. Meanwhile, for purposes of «energy recovery», we are also destroying plant biomass.

Direct and indirect consequences are multiple :

1. The use of chemical fertilizers, liquid livestock manures and sewage sludge pollutes groundwaters with nitrates.

2. Wastewater discharged from sewage treatment plants contributes to the eutrophication and asphyxiation of our waterways.

3. The incineration of sewage sludge and the burning of plant waste also produce carbon dioxide, the effects of which need no further explanation.

But the greatest harm to the environment comes from not returning all our organic waste, both animal- and plant-based, back towards the formation of humus in soil. This leads to a serious degradation of our arable lands.

Present-day destruction of biomass and human wastewater has led to a rift in Earth's nitrogen, carbon and water cycles, undermining the biosphere. In the process, a growing proportion of our agricultural land is degrading, disappearing or simply being destroyed, while what's left is increasingly dependent on synthetic fertilizers.

Eliminating all-mains sewerage will help restore these natural cycles. Our food comes from the earth. And naturally, our excreta, including those of animals, must go back to the earth. But this must be done correctly.

For sustainable food production and the preservation of farmland, it is necessary to **fully** reclaim plant-based biomass as well as all human and animal excreta (although not in the form of liquid pig manure). Seven billion people's worth of dejecta represents a substantial quantity, comparable to that of livestock. We cannot afford to destroy such a resource for sanitation purposes.

Concerning household grey water, domestic cleaning products only become harmful when they are discharged into a watercourse by way of sewers and sanitation plants, as revealed in recent studies.When grey water is infiltrated directly in the ground, the situation is quite different because soil microorganisms have the time to break down the pollutant load, unlike a river.

The transition to this new ecological sanitation system involves new techniques. Sustainable sanitation features are already largely available : for example the TRAISELECT grey water purification system, the biolitter dry toilet, domestic composting, and biomass treatment and composting centres.

Other aspects still need to be adapted to EAUTARCIE's basic ECOSAN principles.

Sanitary engineers now need to simplify the design of existing sanitation plants, to adapt them for the selective treatment of grey water. Such plants would produce very little sludge that could be composted along with human waste.

Another line of research would be to adapt the selection of household cleaning products to further simplify treatment and reduce environmental impacts.

Two options are available to replace all-mains sewerage:

- **In peri-urban and rural areas**, people will have the option of using dry toilets combined with domestic composting, or using ultra-low-flush toilets combined with septic holding tanks;

- **In urban areas,** the collection and treatment of greywater and black water separately, by means of separate sewerage networks.

Implementing this new system will have little impact on users' lifestyle behaviours. Those who so wish will continue to use flush toilets, of ultra-low-flush type. The main purpose isn't to save water, but to produce a black water concentrate, a prerequisite for subsequent treatment.

In this new system, **in peri-urban and rural areas,** grey water produced by the household will be discharged into a leachfield-type dispersal system, or used to irrigate plants. Although the use of a good dry toilet is the least expensive solution, it need not be compulsory. Ultra-low-flush toilets could be still used, discharging human waste into a septic holding tank from which the organic matter

would be transported to a biomass treatment centre for impregnation and subsequent composting. There is however an added cost to this, which dry toilet users would obviously not have to pay.

In urban areas, existing sewers would be reserved for the transport of domestic grey water and roadway stormwater runoff, to be conveyed to simpler-type sanitation plants (excluding the treatment of sewage and industrial waste). In the absence of black water, soapy grey water would be treated in a way conducive to its further reuse. The grey water that is not reused for agriculture will therefore be conveyed through a slow-flowing natural or artificial wetland before discharge into a watercourse.

In dry areas, and during dry seasons, all the wastewater generated by cities would be conveyed to farmland as a means of irrigation (after first being screened, deoiled and decanted). In fact, without the presence of human dejecta, this wastewater no longer poses a health hazard or a pollution risk to our groundwaters.

Concentrated black water coming from urban centres would be conveyed to a biomass treatment centre for impregnation. In urban areas, this would be by way of a separate sewerage network. In peri-urban and rural areas, the effluent would have to be trucked to the treatment centre. After which the impregnated cellulose litter would be composted prior to being spread on farmland.

Such impregnation and composting centers already exist as a waste management technique for the treatment of domestic septic tank sludge. Black water is screened and decanted prior to being spread on straw to produce valuable composted manure.

In future biomass treatment centres, the materials to be impregnated will include such cellulosic waste as cardboard boxes, soiled paper, shredded wood and leaves from city park maintenance, agricultural and agro-industry waste, and so on.

An important point: it has been observed that medicinal and drug residues contained in human waste are almost entirely eliminated during composting. The rest will slowly degrade in the soil. Although further research is still needed on this matter, many observations have shown that plants to not absorb weak concentrations of medicinal residues from the soil. On the other hand, those contained in mains treated wastewater are harmful to aquatic life and compromise the quality of mains water supply. Nowadays, conventional sanitation is incapable of filtering out these harmful byproducts.

In addition, consider that composting can eventually produce a considerable amount of usable energy, say for the heating of greenhouses or homes, especially in periurban and rural areas.

The considerations developed herein fundamentally question mainstream views and other preconceived notions on matters of sanitation in our modern world.

The gradual transition to the new system would save considerable costs for people and the community, not to mention improving our environment. Yet, the current legal framework in most European member states makes it impossible, even though European legislation does not prohibit better performing systems such as EAUTARCIE's ECOSAN.

To better understand this uncommon vision, you can visit our website www.eautarcie.org, where you will find all pertinent information to help you make your own opinion on the matter.

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Online since 22/07/12

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