

Lesson Plan

ONLINE MODULE ON  
ECOLOGICAL SANITATION

---

**Module coordinator: Mariska Ronteltap**



*November 2012*

## 1. INTRODUCTION

This online course deals with options for sustainable sanitation in low-income countries, which will contribute to achieving the Millennium Development Goals (MDGs) for sanitation and related fields such as reducing poverty and hunger, reducing child mortality, improving lives of slum dwellers and ensuring environmental sustainability.

The concept of ecological sanitation (ecosan) is presented. Ecosan is not a specific technology but a new approach to sanitation which regards sanitised human excreta and greywater as a resource, e.g. for application as a fertiliser and soil conditioner in (urban) agriculture. Ecosan strives to maximise the sustainability of sanitation systems, taking into account all aspects of sustainability.

The course is designed for mid-career professionals who work in low-income countries or countries in transition, and deal with planning, promoting, designing, operating or managing sanitation systems for residents in urban, peri-urban, slum or rural areas.

Participants are typically employed by government departments, private companies, local or international NGOs, universities, research institutions, aid agencies or international bodies such as WHO or UNICEF.

## 2. LEARNING OBJECTIVES (LO)

The course on ecological sanitation covers a number of topics, divided into 5 courses. Each course has its own units, and its own learning objectives.

The Module has the following general learning objectives:

Upon successful completion of the course, the student will:

- Know the limitations of conventional sewer-based ("flush-and-forget") or pit-based ("drop-and-store") sanitation systems, in the context of developing countries, with a focus on urban or peri-urban areas;
- Understand the need for a paradigm shift in urban sanitation and the relevance for the MDGs;
- Have a good overview of the available technology and reuse options within the ecosan approach (collection, transfer and treatment of excreta and greywater; safe reuse; non-technical aspects; ecosan in emergency areas, slums, and modern integrated urban water settings).

Per Course, the learning objectives are listed as follows.

#### Course 1 – The ecosan approach

---

*After completing this Course, the student will:*

- Be able to describe the concept of ecological sanitation
- Have an appreciation of the “sanitation crisis” in developing countries
- Be able to describe the limitations of conventional sanitation (sewer-based or pit based)
- Know the main characteristics of urine, faeces and greywater
- Know the main sanitisation methods for urine and faeces
- Be able to indicate why separation may be a good option
- Have an overview on the different hardware applications that can be part of an ecosan scheme

#### Course 2 – Transfer and treatment of human excreta and greywater

---

*After completing this Course, the student will:*

- Have an overview of the technologies that can be applied to the treatment of urine, faeces and greywater
- Know how and where these technologies are applied
- Know the benefits and limitations of the technologies discussed
- Be able to generally assess any technology on its applicability within an ecosan concept

#### Course 3 – Reuse of ecosan products in agriculture

---

*After completing this Course, the student will:*

- Know what the link is exactly between the products of ecological sanitation systems, fertiliser capacity and food production
- Know the difference between a fertiliser and a soil conditioner
- Have an overview of trials carried out globally in the field of using ecosan products in the agricultural field

#### Course 4 – Non-technical aspects of ecosan

---

*After completing this Course, the student will:*

- know how to perform a cost estimate for an ecosan system and how to compare costs of different options (importance of using either NPV or annualised capital costs)
- know the basic aspects of social marketing
- understand why people do or do not buy toilets and how this can be influenced (e.g. social marketing, awareness raising, demand for sanitation)
- know about aims and methods for hygiene education and for participatory methods to facilitate change (e.g. PHAST)
- recognise what gender awareness means in the context of ecosan and why it is important to consider separately the needs, barriers and desires for women and men and vulnerable groups with respect to access to safe water and sanitation.

### Course 5 – Ecosan applied under special circumstances

---

*After completing this Course, the student will:*

- Understand the challenges of sanitation provision in slums
- Be able to list the currently most applied form of sanitation in slums
- Know how ecosan approaches can be applied in slums and what their benefits and limitations are
- Be able to list the currently most applied form of sanitation in flood prone areas and emergency situations
- Know how ecosan approaches can be applied in flood prone areas and emergency situations and what their benefits are.
- Have an understanding of how (parts of) ecosan systems can be integrated into existing urban wastewater management systems
- Be able to describe several examples
- Have created an example of how ecosan could be integrated into the wastewater management in own environment.

### **3. MODULE SET-UP**

The online module is divided in 5 courses (see Table 1): 1) The ecosan Approach, 2) Transfer and treatment of human excreta and greywater, 3) Reuse of ecosan products in agriculture, 4) Non-technical aspects of sanitation, and 5) Ecosan in specific circumstances. Each course is divided up in one or more units, in which each unit covers one week of study load. In Course 1 the concept is introduced. Also attention is paid to the various toilet versions that can be used in an ecosan approach, as well the characteristics of urine, faecal matter and greywater. The second Course covers the technical aspects of ecosan and is therefore also the biggest course, covering 7 units (which corresponds to 7 weeks). Course 3 deals with the reuse part, the use of ecosan products in

agriculture. Course 4 introduces non-technical aspects of ecological sanitation: here sanitation as a business is discussed, as well as approaches for demand creation for sanitation and gender issues. Course 5 is a relatively new course, highlighting the application of ecosan in 3 specific conditions: in slums, in emergency settings as well as flood prone areas, and as a part of an integrated urban water management scheme. Here we discuss examples like direct greywater treatment and reuse through double plumbing in Australia, or the block treatment with the use of vacuum toilets from the Netherlands.

**Table 1.** Contents of the online module in courses and units. Each unit has a study load of 8 hours and is to be finished within one week.

	Week																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<b>Course 1: The Ecosan Approach</b>																	
Unit 1.1: Rationale for Ecosan																	
Unit 1.2: Characteristics of urine, faeces and greywater																	
Unit 1.3: Overview of technologies for ecosan (toilets and treatment)																	
<b>Course 2: Transfer and Treatment of Human Excreta and Greywater</b>																	
Unit 2.1: Treatment aspects of urine, faeces and greywater																	
Unit 2.2: Conventional on-site sanitation																	
Unit 2.3: Storage and transport logistics																	
Unit 2.4: Introduction to anaerobic treatment technologies																	
Unit 2.5: Introduction into constructed wetlands																	
Unit 2.6: Introduction to composting																	
Unit 2.7: Faecal sludge management																	
<b>Course 3: Reuse of ecosan products in agriculture</b>																	
Unit 3.1: Introduction into reuse																	
Unit 3.2: Urban agriculture and reuse research																	
<b>Course 4: Non-technical aspects of sanitation</b>																	
Unit 4.1: Sanitation as a business																	
Unit 4.2: Social issues; sanitation and gender																	
<b>Course 5: ECOSAN in specific circumstances</b>																	
Unit 5.1: ECOSAN in specific circumstances																	
<i>Part 1: Slum sanitation</i>																	
<i>Part 2: Emergency sanitation / sanitation in flood prone areas</i>																	
<i>Part 3: Integration of ecosan elements into existing Urban WM</i>																	
<b>Exam</b>																	

## 4. TEACHING APPROACH

The online module is laid out for a 4 months, 8 hrs per week study period with a total study load of approx. 140 hours resulting in 5 (European) credit point (ECTS). Each unit consists of a unit plan, in which the unit is introduced, the learning objectives are listed, useful websites are mentioned, and the links to the teaching materials can be found.

For each unit there are powerpoint slides designed for teaching without a lecturer present, meaning that they contain more text than would be appropriate in a face-to-face setting; they can contain questions, links to other units are mentioned, and sometimes further explanatory text is taken up in the Notes section of the powerpoint. For each unit, there is assigned reading material, material that is necessary to read in order to fully comprehend the unit, as well as extra material, which students can download and read in their own time when they have a deeper interest in a specific topic.

Each unit, as well as each course, has an accompanying audio file, recorded by the module coordinator, explaining the main message of the unit, the important aspects, any potential conflicts, and how the unit is built up. There is no recorded video material of lecturers presenting. Instead, a variety of materials are presented: next to the powerpoints composed by the lecturer and the audiofiles there are scientific papers, case studies, project reports, videos available on the internet and other weblinks.

Particularly in the beginning of the Module specific attention is paid to the creation of a virtual classroom: students are asked to introduce themselves, their work environment, their motivations for taking part in the class as well as their expectations. They are also invited to ask each other questions. The idea of knowing who your classmates are classmates motivates the students to return to the platform and contribute to the discussions, ask and answer questions, which in turn enhances the learning of all students in the class.

For study load calculation the following factors are applied:

Type of material	Study Load	Study Load per average unit
Unit introduction	20 min	0.3 hrs
Studying powerpoint material	30 slides per hour	2-3 hrs
Reading text	8-10 pages per hour	3-4 hrs
Preparing group assignment	3 hours per assignment	3 hrs
Participation on the platform	30 min per unit	0.5 hrs

Most units contain 60 – 90 powerpoint slides and 2-4 papers or documents for assigned reading (total ca 40 pages). Assessment takes place in the form of written (group) assignments and a final oral. The oral exam at the end of the course discusses mainly the content of the assignments; also some separate questions regarding the unit content or regarding the discussions on the platform can be asked.

## 5. ASSIGNMENTS

Each course is assessed separately; the type of assignments vary per course. The overview is listed in Table 2.

## 6. ONLINE MODULE ASSESSMENT

The assessment of the online module is based on three assessment aspects:

- 1) contribution to the online discussions (responding to questions, interaction with fellow participants); 5% of grade.
- 2) evaluation of the assignments; together 35% of grade. The assignments need to have been fulfilled appropriately in order for the participation to take part in the oral exam.
- 3) Oral examination; 60% of grade – it is obligatory to obtain at least a 6.0 for the exam in order to be eligible for the credit points.

The exam will be oral, and will be executed via Skype meeting. In case Skype (or comparable audio/video online program) can not function reliably due to very limited internet access, a reliable alternative will have to be sought.

Participants who acquire a minimum score of 60% AND have passed the exam obtain a certificate indicating that they have acquired 5 ECTS. If they do not pass the exam but manage to obtain 60% through the assignments, the participants obtain a certificate of participation.

The content of the online module discussed here is partly covered in the off-line modules Resource Oriented Wastewater Treatment and Sanitation (Course 2 and part 3 of Course 5, in UWS Module 6), and Decentralised Water Supply and Sanitation (Course 2 and 3, 20% of Course 4, and part 1 and 2 of Course 5 in UWS Module 11), both part of the UWS Master program. Course 4 is the only course that is not covered in a substantial amount in the face-to-face programme of UWS.



Table 2:

	Type of Assignment	Part of total (%)
<b>Course 1: The Ecosan Approach</b>	Descriptive assignment	10
Unit 1.1: Rationale for Ecosan		
Unit 1.2: Characteristics of urine, faeces and greywater		
Unit 1.3: Overview of technologies for ecosan (toilets and treatment)		
<b>Course 2: Transfer and Treatment of Human Excreta and Greywater</b>	Descriptive assignment	10
Unit 2.1: Treatment aspects of urine, faeces and greywater		
Unit 2.2: Conventional on-site sanitation		
Unit 2.3: Storage and transport logistics		
Unit 2.4: Introduction to anaerobic treatment technologies		
Unit 2.5: Introduction into constructed wetlands		
Unit 2.6: Introduction to composting		
Unit 2.7: Faecal sludge management		
<b>Course 3: Reuse of ecosan products in agriculture</b>	Group assignment: ppt in groups of 2-3	10
Unit 3.1: Introduction into reuse		
Unit 3.2: Urban agriculture and reuse research		
<b>Course 4: Non-technical aspects of sanitation</b>		
Unit 4.1: Sanitation as a business		
Unit 4.2: Social issues; sanitation and gender		
<b>Course 5: ECOSAN in specific circumstances</b>	Descriptive assignment	5
Unit 5.1: ECOSAN in specific circumstances		
<i>Part 1: Slum sanitation</i>		
<i>Part 2: Emergency sanitation / sanitation in flood prone areas</i>		
<i>Part 3: Integration of ecosan elements into existing Urban WM</i>		
<b>Exam (for the exam, at least 60% must be passed in order to be eligible for the credit points)</b>	Exam questions over all material, including (mainly) the assignments	60
<b>Participation in the discussions</b>		5
<b>Total</b>		<b>100</b>

