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D7.4 – Training and Education Programme

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Abbreviations and Acronyms

AquaEnviro	AquaEnviro/SUEZ - Project Partner
BORDA	Bremen Overseas Research and Development Association - Project Partner
BUV	Berson Milieutechniek BV - Project Partner
DoA	Description of Activities
DE5	DE5 Services SRL - Project Partner
EUT	Fundacio EURECAT - Project Partner
GYA	Yepez Madrunero Grace - Project Partner
HPT	Helio Pur Technologies - Project Partner
LBT	Lombritek Association - Project Partner
NBK	Nobatek - Project Partner
NUI Galway	National University of Ireland Galway - Project Partner
EKO	Ekodenge - Project Partner
ECOIND	Institutul National De Cercetare Dezvoltare Pentru Ecologie Industriala - Project Partner
RMC	RITMIC Com SRL - Project Partner
INB	Inbroom Industries SL - Project Partner
SW	Scottish Water - Project Partner
TPWG	Technology Prototyping Working Group
UCU	Universidad De Cuenca - Project Partner
UCSM	Universidad Catolica De Santa Maria - Project Partner
UDG	University of Girona - Project Partner
WRF	Water Research Facility
WWT	Wastewater Treatment

Executive Summary

Contaminated water from inadequate waste water management poses one of the greatest health challenges as it restricts social and economic development, increases poverty through costs to health care and endangers the environment (UNEP, 2010).

The aim of the INNOQUA Project is to progress, towards commercialisation, the development of a fully ecological modular sanitation system that integrates individual low cost, sustainable and biologically based technologies. The system will offer flexible waste water treatment solutions to suit a variety of target markets in developed and developing countries.

This report, Deliverable 7.4 (D7.4), presents details of the Project's Training and Education Programme. The programme target group composition are assessed, the Training and Education needs and the Training and Development delivery mechanisms are described here.

The INNOQUA Training and Education Programme comprises five distinct but complementary modules as follows:

- **Module 1** - Wastewater Management Concepts and Systems Overview
- **Module 2** - The Necessity for Wastewater Treatment Systems
- **Module 3** - The Fundamentals of Water, Sanitation and Hygiene
- **Module 4** - Overview of the INNOQUA Solution
- **Module 5** - The INNOQUA Solution Technical Instruction

1 Introduction

The aim of the INNOQUA Project is to progress, towards commercialisation, the development of a fully ecological sanitation solution that integrates individual low cost, sustainable and biologically based technologies. The INNOQUA Project commenced in June 2016 (M01) and this report, Deliverable 7.4 (D7.4), presents the Training and Education Programme developed for the Project.

1.1 Work Package 7 Objectives

The principle objectives of WP7 as listed in the Grant Agreement are as follows:

- To develop a comprehensive communication strategy
- To conduct creative communication activities
- To grow a general INNOQUA stakeholder community
- To grow and manage a special targeted INNOQUA Special Interest Group
- To conduct effective and purpose related dissemination activities
- To assess both communication and dissemination activities

1.2 The Role of Deliverable D7.4

The role of D7.4 Training & Education Program is to provide comprehensive framework and programme for the delivery of training and education as part of the INNOQUA project. This includes identifying programme participant groups, determining training and education needs and the appropriate delivery mechanisms.

1.3 Relationship with other Activities in the Project

T7.6 and its output, D7.4, have a critical role in the project development facilitating the transfer of knowledge about the developing technology to future end-users, stakeholders and the wider scientific community. Figure 1-1 following shows the interdependencies and relationships between project work packages as they relate to WP7 and Deliverable D7.4.

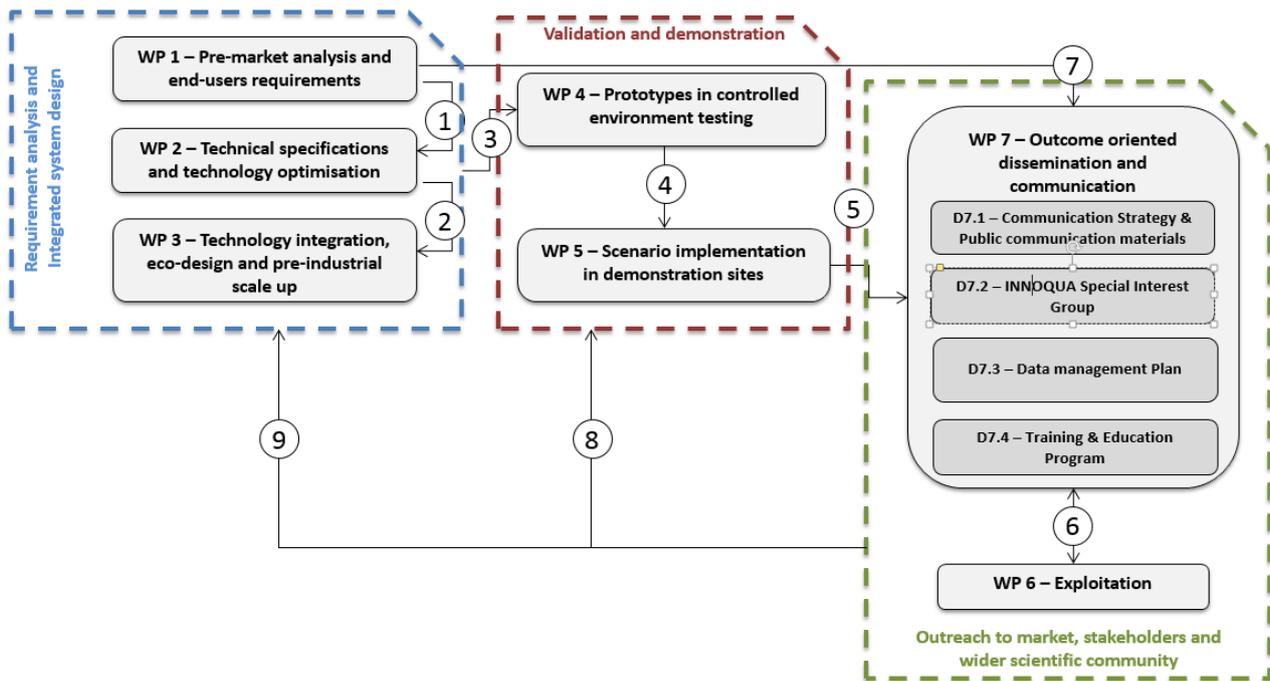


Figure 1-1 Relationship of Deliverable D7.4 to Project Activities

1.4 Document Outline

In particular, this document provides key information to inform the integrated INNOQUA Technology in the following Chapters;

Chapter 2 – Describes the likely Training and Education Programme Target Participant groups

Chapter 3 - Describes the Training and Education Needs of the Target Participant groups

Chapter 4 - Outlines the Training and Education Programme Coverage presented in distinct modules each with an anticipated learning outcome

Chapter 5 - Describes the Training and Education Programme Delivery Mechanisms that will be employed and reviews the most suitable Mechanism for each Target Participant Group and Module

Chapter 6 - Training and Education Programme Delivery and Evaluation outlines monitoring and Evaluation to determine the effectiveness of training endeavours carried out in accordance with this Programme

1.5 Training and Education Programme Development Approach

The high-level approach to the development of the INNOQUA Training and Education Programme is indicated in the graphic following:

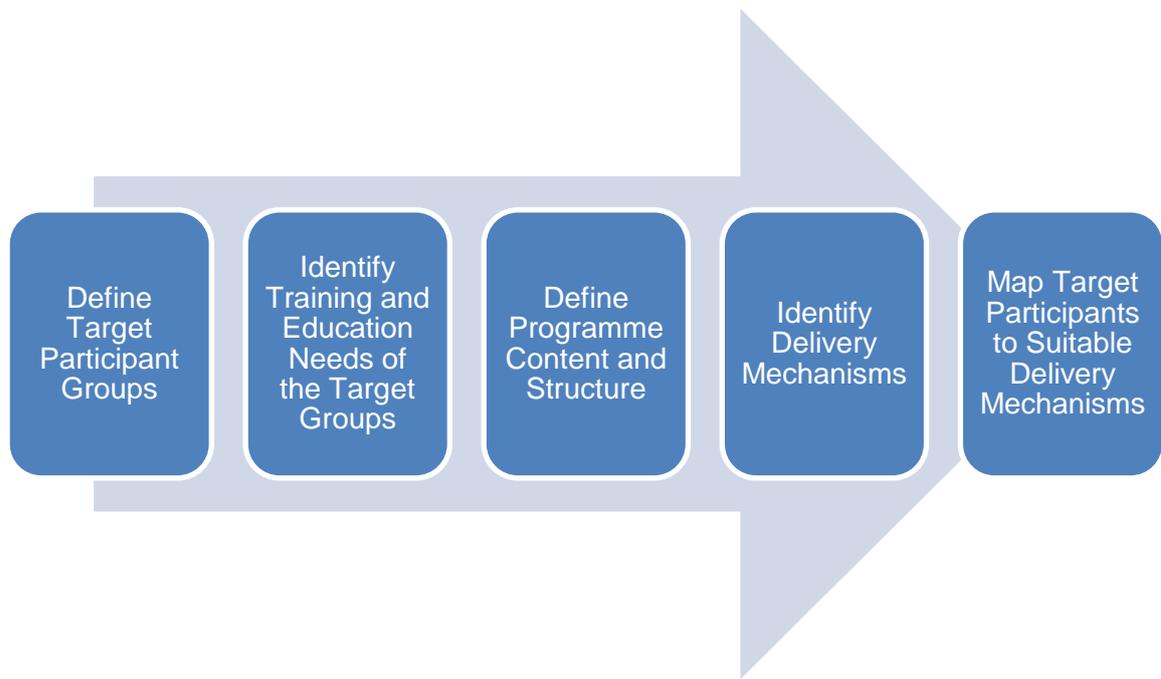


Figure 1-2 High-level approach to INNOQUA Programme Development

2 Training and Education Programme Target Participants

Identifying the Training and Education Programme Target Participants was informed, in the first instance, by the stakeholder segmentation for INNOQUA deployment. This information is included in the WP1 Project Deliverable, D1.2 Pre-market study, including partial market surveys, social and acceptance behaviour parameters. Section 1.2.3 of this report outlines the main stakeholder groups (end-users, early adopters, partnerships, etc.) being targeted for demonstrator replication and further exploitation activities as follows:

- Houses and multi-houses
- Parks management entities
- Transportation vehicles with sanitation needs
- Industries
- Tourism sector
- Government agencies

Project Deliverable D6.3 Identification and Assessment of Exploitable Results further refines the WP1 stakeholder groups and identifies Target Customers for each anticipated project exploitable result (ER) (Ref. D6.3 Chapter 2, Table 2 Expanded view of ER table for INNOQUA project at M18). This Target Customer Group (listed below) is well aligned with the Training and Education Programme Target Participants:

- Planners
- National and International authorities (regulatory bodies)
- Technology providers
- Small local communities
- Promoters of collective sanitation systems
- Landowners
- Hotel Groups
- Agro-industries
- De-centralised communities
- Water Utilities
- Sustainable Design Professionals
- Water Utilities
- Owners or managers of wastewater treatment facilities for isolated small communities (e.g. residential sites, rural-based communities, tourist facilities, farms...)
- Communities in the developing world
- NGOs involved in implementation of health solutions in rural areas.
- Farms, landowners local communities in close proximity to the demonstration sites
- Green parks
- Municipalities (to implement road washing)

2.1 Identifying the Training and Education Programme Participant Groups

To further understand and begin to identify the appropriate Training and Education requirements of the Training and Education Programme Target Participants, the identified customer groups are broadly categorized to Training and Education Programme Participant Groups according to their likely involvement with the INNOQUA Technology as follows:

2.1.1 End-users

Domestic, commercial or public entities or similar who may consider adopting the INNOQUA Technology in their communities, homes, businesses, or such premises;

2.1.2 Technical Professionals, Installers/Operators

Technical personnel e.g. installation, operation, maintenance, utilities technicians, building contractors or similar who may be involved in the installation, maintenance and operation of the INNOQUA Technology;

2.1.3 Promoters, Agents and Interest Groups

Commercial and non-commercial third party bodies that may promote and advocate for improved sanitation, the adoption of sustainable treatment technologies systems or specify sanitation solutions.

2.1.4 Technical Decision Makers

Regulatory authorities concerned with water quality and environmental protection. Planners and local and national authorities with responsibility for infrastructure and development. Some of these agencies may also have departments that are represented by the Technical Professionals, Installers/Operators Groups described in Section 2.1.2

Table 2-1 Maps the Target Customer Groups from D6.3 to the Training and Education Programme Target Participant Groups.

Table 2-1 Mapping the Target Customer Groups to Training and Education Programme Target Participant Groups

END-USERS	TECHNICAL PROFESSIONALS, INSTALLERS & OPERATORS	PROMOTERS, AGENTS & OTHER INTEREST GROUPS	TECHNICAL DECISION MAKERS
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Small communities and housing collectives	Technology providers	Promoters of collective sanitation systems	Planners
Landowners	Water Utilities /Managers of wastewater treatment facilities for isolated small communities	Sustainable Design Professionals	Regulatory authorities/bodies
Hotel Groups (Tourist facilities e.g. guest houses, hotels, camping parks etc)		NGOs involved in implementation of health solutions in rural areas.	Green parks
Agro-industries		Farms, landowners local communities in close proximity to the demonstration sites	Municipalities interested in water reuse
De-centralised communities (decentralised business and commercial operations)			

The table above represents a useful categorization of target groups and provides a framework to develop the INNOQUA Training and Education Programme it is not an exhaustive listing of all future training and education participants.

2.2 Identifying the Training and Education Programme Participant Sub-Groups

Project Deliverable D1.2 describes three distinct areas that comprise the initial INNOQUA Market Landscape. The locations are also INNOQUA Demonstration Site Locations (ref. INNOQUA WP5 – Scenario Implementation in Demonstration Sites) that are likely to be operational in first quarter 2019. The three identified areas (Geo Locations as shown in Figure 2-1) provide a rational grouping for the 13 project demonstration sites represented by areas that have certain commonalities. Such commonalities i.e. existing infrastructural development, social and cultural norms and socioeconomic construct that are relevant to market study are also relevant to the definition of the Training and Education Programme Participant Sub-Groups.

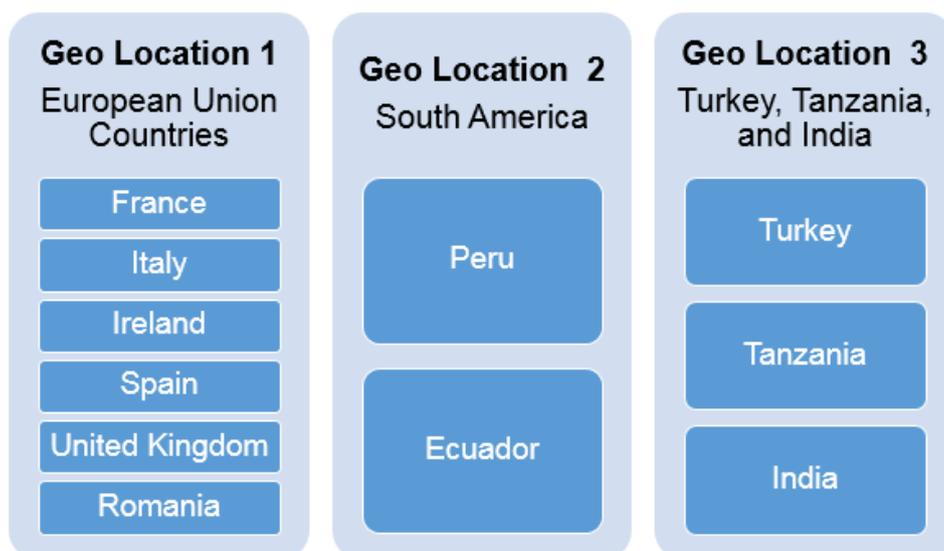


Figure 2-1 Geographic Grouping INNOQUA Market Landscape c.f. D1.2

Table 2-2 indicates the Training and Education Programme target participant groups sub divided by geographical location. Leveraging the conclusions of WP1 and the market studies, the development of the INNOQUA Training and Education Programme will focus on the four identified groups further refined by geographical location to give 12 sub-groups.

Table 2-2 Training and Education Programme Target Participant Sub-Groups

GEOGRAPHICAL LOCATION	TRAINING AND EDUCATION GROUPS			
	END-USERS	TECHNICAL PROFESSIONALS, INSTALLERS & OPERATORS	PROMOTERS, AGENTS & INTEREST GROUPS	TECHNICAL DECISION MAKERS
France	✓	✓	✓	✓
Italy				
Ireland				
Spain				
United Kingdom				
Romania				
Peru	✓	✓	✓	✓
Ecuador				
Turkey	✓	✓	✓	✓
Tanzania				
India				

3 Training and Education Needs

Defining the Training and Education Programme Target Participant Groups by their likely involvement with the INNOQUA Technologies enables identification of what knowledge and information is required by these groups to realise a successful engagement.

Feedback from likely participants on their knowledge of wastewater treatment systems and their awareness of the problem of the effective treatment of wastewater is also used to define the Training and Education Needs of identified participant groups. This feedback is provided by analysis of the response to the limited circulation of the Social Acceptance Questionnaire, presented in D1.2, in M22.

The INNOQUA Project benefits from local project partners based at or in close proximity to each of the proposed project demonstration sites. Each demonstration site has an INNOQUA demonstration Site Manager who has a unique knowledge of the cultural, social, infrastructural issues that may be pertinent to Education and Training programme development.

3.1 Target Participant Groups

For each Training and Education Programme Target Participant Group, the following question is considered;

What information and knowledge is required to enable the successful engagement of this Training and Education Target Participant Group with the INNOQUA Technologies?

3.1.1 End-users

As described in Section 2.2.1, End-users can be commercial, domestic or public and are likely to be part of the decision to install or adopt an INNOQUA Technology. Typically end-users require the /answers (or information in relation) to following questions:

- What does the system do?
- A high level overview of the function of the system
- Why do I need it?
- How does it work?
- A high level overview of the operation of the system
- What maintenance/operation is required?
- A high level maintenance guide and troubleshooting manual
- What advantage does the system offer over other systems?
- What will it look like when it is installed?
- Who will install it?
- How much does it cost?
- What are the running costs?
- Who will fix it if it breaks?
- Is the system a sustainable solution?
- Does the system meet environmental regulation (and other necessary certification)?

- Is the system compatible with local social norms
- What is its potential role in promoting better health and environmental outcomes?
- What is its potential role in role in facilitating gender equality?

3.1.2 Technical Professionals, Installers & Operators

As described in Section 2.1.2 this group is defined by Technical personnel involved in installation, operation, maintenance of the INNOQUA Technology.

Technical Professionals, Installers & Operators require the following information/answers to following questions:

- What does the system do?
- A detailed technical specification
- How does it work?
- A detailed operation manual
- What site preparatory work is required prior to installation, i.e. excavations, foundations?
- What power supply is required?
- What pipework is required?
- What ICT infrastructure is required?
- A detailed technical installation and implementation guide
- What maintenance/operation is required?
- A detailed maintenance guide and troubleshooting manual
- What advantage does the system offer over other systems?
- What are the running costs?
- Is there technical support for the system?
- Where can replacement parts be sourced?

3.1.3 Promoters, Agents & Other Interest Groups

As described in Section 2.1.3 this group is defined by Commercial and non-commercial third party bodies that may promote and advocate for improved sanitation, the adoption of sustainable treatment technologies systems or specify sanitation solutions.

Promoters, Agents & Other Interest Groups require the following information/answers to following questions:

- What does the system do?
- A high level overview of the function of the system
- How does it work?
- A high level overview of the operation of the system
- What maintenance/operation is required?
- What advantage does the system offer over other systems?
- What will it look like when it is installed?
- Who will install it?
- How much does it cost?
- What are the running costs?
- Who will fix it if it breaks?

- Is the system a sustainable solution?
- Does the system meet environmental regulation (and other necessary certification)?
- Is the system compatible with local social norms
- What is its potential role in promoting better health and environmental outcomes?
- What is its potential role in role in facilitating gender equality?

3.1.4 Technical Decision Makers

As described in Section 2.1.3 this group is defined by regulatory authorities concerned with water quality and environmental protection. Planners and local and national authorities with responsibility for infrastructure and development.

Promoters, Agents & Other Interest Groups require the following information/answers to following questions:

- What does the system do?
- A high level overview of the function of the system
- How does it work?
- A high level overview of the operation of the system
- What maintenance/operation is required?
- What advantage does the system offer over other systems?
- What will it look like when it is installed?
- Is the system a sustainable solution?
- Does the system meet environmental regulation (and other necessary certification)?
- Is the system compatible with local social norms
- What is its potential role in promoting better health and environmental outcomes?
- What is its potential role in role in facilitating gender equality?

3.2 Social Acceptance Questionnaire Feedback

A social acceptance questionnaire was initially developed by NUI Galway, Suez and R2M as part of D1.2. The purpose of the questionnaire was to identify specific barriers or issues that may effect the acceptance of a biologically based wastewater treatment system such as that proposed by the INNOQUA Project. In constructing the survey, included in Appendix A, questions were included to gauge respondent's knowledge and awareness of the treatment of wastewater arising from their residences and also their awareness of the problem that is the safe disposal of wastewater. The social acceptance questionnaire was revised by NUI Galway in M23 from that included in D1.2 following a review by the Sociology Department at Project Partner UCU.

The questionnaire survey was circulated to demonstration site managers in the 11 uncontrolled demonstration site locations. The results of the questionnaire with respect to questions of particular relevance to training and education are given in the following sections.

Table 3-1 shows the completed Social Acceptance Questionnaires received from each region.

Table 3-1 Initial Social Acceptance Questionnaire Participants

LOCATION	NUMBER OF PARTICIPANTS
India	5
Tanzania	7
Ecuador	30
Italy	10
France	6

3.2.1 India - Initial Results

Of the 5 respondents from India, 60% were female and 40% male; 4 were aged 19-29 and 1% aged 30 – 49; 2 are unemployed, 1 is involved in the construction industry, 1 healthcare and 1 administrative work. 40% indicated that wastewater arising from their main residence is currently untreated.

The response to selected questions and statements posed by the survey questionnaire that were considered to relate best to Training and Education are given in Table 3-4.

Table 3-2 Social Acceptance Questionnaire Training and Education Response: India

STATEMENT	RESPONSE				
	COMPLETELY DISAGREE	DISAGREE	NEUTRAL	AGREE	COMPLETELY AGREE
<i>I am aware of what wastewater is and the various sources of wastewater occurring at the property where I live</i>	0.00%	0.00%	0.00%	0.00%	100.00%
<i>I have a strong personal obligation to ensure that wastewater generated by me or my household is connected to an effective treatment system</i>	0.00%	0.00%	0.00%	0.00%	100.00%
<i>The ineffective treatment of wastewater is a problem for society</i>	0.00%	0.00%	0.00%	0.00%	100.00%
STATEMENT	DEFINITELY NOT	PROBABLY NOT	POSSIBLY	PROBABLY	DEFINITELY YES
<i>Would you be willing to adopt a nature-based solution incorporating earthworms or other micro-organisms for the treatment of wastewater at your residence?</i>	0.00%	20.00%	0.00%	60.00%	20.00%
<i>Would you be willing to adopt a nature-based solution incorporating crustaceans or</i>	0.00%	20.00%	20.00%	60.00%	0.00%

<i>other micro-organisms for the treatment of wastewater at your residence?</i>					
<i>Would you be willing to use treated wastewater from an onsite treatment system for non-consumable use? (E.g. Irrigation or domestic applications such as toilet flushing)</i>	0.00%	20.00%	0.00%	0.00%	80.00%

3.2.2 Tanzania - Initial Results

Of the 7 respondents from Tanzania, 3 were female and 4 male; 1 was aged 19-29 and 1 aged 30 – 49; 4 aged 50 – 65 and 1 over 65 years. 2 are unemployed, 2 are involved Professional, scientific and technical activities, 1 healthcare and 1 in Public administration and defence. One respondent indicated that wastewater arising from their main residence is currently untreated and another indicated that wastewater is connected to a municipal sewer with the remaining 5 indicating some form of on-site treatment (Table 3-4).

Table 3-3 Social Acceptance Questionnaire Training and Education Response: Tanzania

STATEMENT	RESPONSE				
	COMPLETELY DISAGREE	DISAGREE	NEUTRAL	AGREE	COMPLETELY AGREE
<i>I am aware of what wastewater is and the various sources of wastewater occurring at the property where I live</i>	0.00%	0.00%	0.00%	14.29%	85.71%
<i>I have a strong personal obligation to ensure that wastewater generated by me or my household is connected to an effective treatment system</i>	0.00%	0.00%	0.00%	14.29%	85.71%
<i>The ineffective treatment of wastewater is a problem for society</i>	0.00%	0.00%	14.29%	28.57%	57.14%
STATEMENT	DEFINITELY NOT	PROBABLY NOT	POSSIBLY	PROBABLY	DEFINITELY YES
<i>Would you be willing to adopt a nature-based solution incorporating earthworms or other micro-organisms for the treatment of wastewater at your residence?</i>	0.00%	14.29%	14.29%	28.57%	42.86%
<i>Would you be willing to adopt a nature-based solution incorporating crustaceans or other micro-organisms for the treatment of wastewater at your residence?</i>	0.00%	0.00%	14.29%	28.57%	57.14%

<i>Would you be willing to use treated wastewater from an onsite treatment system for non-consumable use? (E.g. Irrigation or domestic applications such as toilet flushing)</i>	0.00%	0.00%	0.00%	0.00%	100.00%
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3.2.3 Ecuador - Initial Results

Of the 30 respondents from Ecuador, 57% are female and 43% male; 77% are aged 19-29 and 17% aged 30 – 49; 67% are students, 20% are involved in the construction industry and a further 10% in Education. 33% indicated that wastewater arising from their main residence is currently untreated. (Table 3-4).

Table 3-4 Social Acceptance Questionnaire Training and Education Response: Ecuador

STATEMENT	RESPONSE				
	COMPLETELY DISAGREE	DISAGREE	NEUTRAL	AGREE	COMPLETELY AGREE
<i>I am aware of what wastewater is and the various sources of wastewater occurring at the property where I live</i>	0.00%	16.67%	40.00%	20.00%	23.33%
<i>I have a strong personal obligation to ensure that wastewater generated by me or my household is connected to an effective treatment system</i>	3.33%	16.67%	20.00%	16.67%	43.33%
<i>The ineffective treatment of wastewater is a problem for society</i>	3.33%	3.33%	3.33%	16.67%	73.33%
STATEMENT	DEFINITELY NOT	PROBABLY NOT	POSSIBLY	PROBABLY	DEFINITELY YES
<i>Would you be willing to adopt a nature-based solution incorporating earthworms or other micro-organisms for the treatment of wastewater at your residence?</i>	0.00%	6.67%	23.33%	33.33%	36.67%
<i>Would you be willing to adopt a nature-based solution incorporating crustaceans or other micro-organisms for the treatment of wastewater at your residence?</i>	0.00%	10.00%	26.67%	33.33%	30.00%
<i>Would you be willing to use treated wastewater from an onsite treatment system for non-consumable use? (E.g. Irrigation or domestic</i>	0.00%	3.33%	26.67%	33.33%	36.67%

<i>applications such as toilet flushing)</i>					
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3.2.4 Italy - Initial Results

Of the 10 respondents from Italy, 50% were female and 50% male; 1 aged 19-29 and 4 aged 30 – 49 and the remainder 50-64. 3 are involved in the construction industry and the remainder various in Industry, Wholesale & Retail trade, accommodation and food service activities, financial, insurance and real estate activities and Professional, scientific and technical activities. 100% indicated that wastewater arising from their main residence is connected to a Municipal/Centralized Treatment (Table 3-5).

Table 3-5 Social Acceptance Questionnaire Training and Education Response: Italy

STATEMENT	RESPONSE				
	COMPLETELY DISAGREE	DISAGREE	NEUTRAL	AGREE	COMPLETELY AGREE
<i>I am aware of what wastewater is and the various sources of wastewater occurring at the property where I live</i>	0.00%	0.00%	40.00%	20.00%	40.00%
<i>I have a strong personal obligation to ensure that wastewater generated by me or my household is connected to an effective treatment system</i>	0.00%	0.00%	40.00%	20.00%	40.00%
<i>The ineffective treatment of wastewater is a problem for society</i>	0.00%	0.00%	0.00%	0.00%	100.00%
STATEMENT	DEFINITELY NOT	PROBABLY NOT	POSSIBLY	PROBABLY	DEFINITELY YES
<i>Would you be willing to adopt a nature-based solution incorporating earthworms or other micro-organisms for the treatment of wastewater at your residence?</i>	0.00%	20.00%	70.00%	0.00%	10.00%
<i>Would you be willing to adopt a nature-based solution incorporating crustaceans or other micro-organisms for the treatment of wastewater at your residence?</i>	0.00%	20.00%	70.00%	0.00%	10.00%
<i>Would you be willing to use treated wastewater from an onsite treatment system for non-consumable use? (E.g. Irrigation or domestic applications such as toilet flushing)</i>	0.00%	0.00%	0.00%	0.00%	100.00%

3.2.5 France - Initial Results

Of the 6 respondents from France, 50% were female and 50% male; 4 aged 19-29 and 2 aged 65+. 2 are involved in the construction industry, 1 in wholesale & Retail trade, 1 in Professional, scientific and technical activities and 2 Public administration and defence. 100% indicated that wastewater arising from their main residence is connected to a Municipal/Centralized Treatment (Table 3-6).

Table 3-6 Social Acceptance Questionnaire Training and Education Response: France

STATEMENT	RESPONSE				
	COMPLETELY DISAGREE	DISAGREE	NEUTRAL	AGREE	COMPLETELY AGREE
<i>I am aware of what wastewater is and the various sources of wastewater occurring at the property where I live</i>	0.00%	0.00%	40.00%	20.00%	40.00%
<i>I have a strong personal obligation to ensure that wastewater generated by me or my household is connected to an effective treatment system</i>	0.00%	0.00%	40.00%	20.00%	40.00%
<i>The ineffective treatment of wastewater is a problem for society</i>	0.00%	0.00%	0.00%	0.00%	100.00%
STATEMENT	DEFINITELY NOT	PROBABLY NOT	POSSIBLY	PROBABLY	DEFINITELY YES
<i>Would you be willing to adopt a nature-based solution incorporating earthworms or other micro-organisms for the treatment of wastewater at your residence?</i>	0.00%	16.67%	50.00%	16.67%	16.67%
<i>Would you be willing to adopt a nature-based solution incorporating crustaceans or other micro-organisms for the treatment of wastewater at your residence?</i>	16.67%	0.00%	66.67%	16.67%	0.00%
<i>Would you be willing to use treated wastewater from an onsite treatment system for non-consumable use? (E.g. Irrigation or domestic applications such as toilet flushing)</i>	33.33%	0.00%	16.67%	16.67%	33.33%

3.3 Demonstration Site Manager Feedback

Details of successful training and education programmes currently being provided in India focusing on the area of sanitation health are included in Appendix B of this report. Examples of two sanitation training programmes in Tanzania are included in Appendix C.

The requirement for Education and Training in wastewater management concepts in India, Tanzania and South America was highlighted by demonstration site managers in these countries. The need, which was identified through on-site experience of the absence of wastewater management, particularly in developing regions, focuses on the variety of wastewater management solutions beyond traditional centralised schemes to address unpredictable development and infrastructural deficiencies that are a feature in the regions.

3.4 Training and Education Needs Summary

Table 3-7 summarizes the training needs of the participant sub-groups.

Table 3-7 Training Needs Summary by Participant Sub-group

TRAINING AND EDUCATION TOPIC	GEO-LOCATION 1, GEO-LOCATION 2, GEO-LOCATION 3			
	END-USERS	TECHNICAL PROFESSIONALS, INSTALLERS & OPERATORS	PROMOTERS, AGENTS & INTEREST GROUPS	TECHNICAL DECISION MAKERS
<i>What does the system do?</i>	✓	✓	✓	✓
<i>A high level overview of the function of the system</i>	✓		✓	✓
<i>A detailed technical specification</i>		✓		
<i>Why do I need it?</i>	✓			
<i>How does it work?</i>	✓	✓	✓	✓
<i>A high level overview of the operation of the system</i>	✓		✓	✓
<i>A detailed operation manual</i>	✓	✓		

<i>What site preparatory work is required prior to installation, i.e. excavations, foundations?</i>		✓		
<i>What power supply is required?</i>		✓		
<i>What pipework is required?</i>		✓		
<i>What ICT infrastructure is required?</i>		✓		
<i>A detailed technical installation and implementation guide</i>		✓		
<i>What maintenance/operation is required?</i>	✓	✓	✓	✓
<i>A high level maintenance guide and troubleshooting manual</i>	✓	✓		
<i>A detailed maintenance guide</i>		✓		
<i>What advantage does the system offer over other systems?</i>	✓		✓	✓
<i>What will it look like when it is installed?</i>	✓			✓
<i>Who will install it?</i>	✓			
<i>How much does it cost?</i>	✓		✓	
<i>What are the running costs?</i>	✓		✓	
<i>Who will fix it if it breaks?</i>	✓			
<i>Is there technical support for the system?</i>		✓		
<i>Where can replacement parts be sourced?</i>		✓		
<i>Is the system a sustainable solution?</i>	✓		✓	✓

<i>Does the system meet environmental regulation (and other necessary certification)?</i>	✓		✓	✓
<i>Is the system compatible with local social norms?</i>	✓		✓	✓
<i>Role in promoting better health/environmental outcomes</i>	✓		✓	✓
	GEO-LOCATION 3			
<i>Wastewater management concepts</i>			✓	✓
<i>Fundamentals of sanitation health</i>	✓		✓	
<i>The necessity for wastewater treatment</i>	✓	✓		✓
<i>Role in facilitating gender equality</i>	✓		✓	✓

4 Training and Education Programme Coverage

The Training and Education Programme is considered as five distinct modules designed to satisfy, in a logical manner, particular training need as described in Chapter 3.

Each module can be delivered and attended as a distinct training and education endeavour or may form part of a longer undertaking incorporating multiple modules. Each module is described in detail below with a brief summary of learning outcomes that link back to the defined Training and Education Needs provided.

- Wastewater Management Concepts and Systems Overview
- The Necessity for Wastewater Treatment Systems
- The Fundamentals of Water, Sanitation and Hygiene
- Overview of the INNOQUA Solution
- The INNOQUA Solution Technical Instruction

The full course material for each of the defined modules is under currently under development and will be available in line with the proposed schedule described in Chapter 6 of this report.

4.1 Wastewater Management Concepts and Systems Overview

This module will consider the Wastewater Management strategies to service planned and unplanned developments of varying scales. The content will present the variability and suitability of wastewater management approaches that may be adopted. The module content development will leverage existing Training and Education Material developed by NUI Galway, in particular that developed for the NUI Galway Master of Engineering Science Course Water Resources Engineering, (Appendix D) and existing Training Courses provided by AquaEnviro (Appendix E). The relevant benefits and disadvantages of centralised and decentralised solutions, small-scale and large-scale systems and on- and off-site treatment will be reviewed. The target groups for this module are **Technical Decision Makers** and **Promoters, Agents & Other Interest Groups**.

The impact of region specific issues and geographic variations will be highlighted in this module. The particular problem posed by unplanned settlements in India and Tanzania and wastewater management infrastructural deficits in developing countries will be addressed.

In countries such as India and Tanzania that lack a well-established infrastructure for wastewater management the issue of operating costs and requirements for any proposed treatment technology is significant. Adoption of a sustainable wastewater management approach is a good proposition for such countries and the suitable technologies that include resource recycling such as the INNOQUA system present very viable long-term solutions to decision makers.

In brief the **Wastewater Management Concepts and Systems Overview** module will include the following sections. Each section will be maximum 1 hour in duration.

- What is wastewater?
- What is wastewater management?
- What wastewater management concepts may be suitable for my area?

- What are wastewater treatment systems and how do they work?
- What is a sustainable wastewater treatment system?
- What common types of wastewater treatment systems are available and what are the relative advantages of each?
- Overview of what supporting infrastructure is needed for general types of systems

4.2 The Necessity for Wastewater Treatment Systems

This module will consider Wastewater Treatment Systems, it will give a brief overview of the typical systems commonly available in the geographical location that the Training and Education Programme is being presented. The target groups for this module are **End-Users**, **Technical Decision Makers** and **Promoters, Agents & Other Interest Groups**.

The benefits of wastewater treatment and the potential impacts of inadequate wastewater treatment will be described with particular focus on regional specific information. This module content development will leverage existing Training and Education Material developed by NUI Galway, in particular that developed for the NUI Galway Master of Engineering Science Course Water Resources Engineering, (Appendix D) and existing Training Courses provided by AquaEnviro (Appendix E). Attendees will be made aware that low levels and inadequate wastewater treatment present an enormous threat to the quality and availability of freshwater resources. The linkage between inadequate wastewater treatment and water and food security problems will be made. Existing treatment system options will be reviewed and the relative benefits of these and sustainable systems with resource reuse, such as that offered by the INNOQUA Technologies will be addressed. The opportunity and advantages of water reuse to assist agricultural and food production will be described.

In brief the **The Necessity for Wastewater Treatment Systems** module will include the following sections. Each section will be maximum 30 minutes in duration.

- What is wastewater?
- What benefits does a wastewater treatment system bring?
- What are the impacts of not having a wastewater system?
- What are the impacts of having an inadequate wastewater treatment system?
- What common types of wastewater treatment systems are available locally and what are the relative advantages of each?
- What is a sustainable wastewater treatment system?
- What is the benefit of a sustainable wastewater treatment system?

4.3 The Fundamentals of Water, Sanitation and Hygiene

This module will focus on the domestic, community and commercial **End-users** target group. It will reinforce the message of other existing programmes such as WASH in promoting good sanitation health. In addition, it will focus on the role of citizens in maintaining and implementing good sanitation health practices.

This module will answer three very fundamental questions and issues posed in the social acceptance questionnaire;

‘What is wastewater and what are the various sources of wastewater occurring at the property where I live’,

‘The ineffective treatment of wastewater is a problem for society’

‘The effect of making improvements to the treatment of wastewater from my home/property on the overall quality of treated wastewater or the resources required to treat it.’

In brief the ***The Fundamentals of Water, Sanitation and Hygiene*** module will include the following sections. Each section will be 30 minutes in duration.

- What is wastewater?
- What are the various sources of wastewater occurring at the property where I live?
- How is the wastewater occurring at your property currently treated?
- The importance of sanitation health at home
- The importance of sanitation health at school
- The role of everybody in sanitation health
- What common types of wastewater treatment systems are available locally and what are the relative advantages of each?
- What is a sustainable wastewater treatment system?

4.4 Overview of the INNOQUA Solution

This module will focus on the ***End-users, Promoters, Agents & Other Interest Groups and Technical Decision Makers*** target groups and the sustainable wastewater treatment solution that is proposed by the INNOQUA. This module will present the overall concept and unique selling point of the INNOQUA solution. It will describe also the fundamentals of the individual INNOQUA technologies: the Lumbrifilter, the Daphniafilter, the Bio-solar Purification System and the Ultraviolet System. The modular nature of the solution will be presented in this module and the various options and likely applications for the arrangements will be addressed.

In brief the ***Overview of the INNOQUA Solution*** module will include the following sections. Each section will be 30 minutes in duration.

- The overall concept of the INNOQUA Sustainable Wastewater treatment solution
- The individual INNOQUA technologies
- Basic operation and maintenance of the modular INNOQUA Sustainable Wastewater treatment solution
- The relative benefits of the INNOQUA system compared to other systems including water reuse, installation, operation, maintenance and associated costs

4.5 The INNOQUA Solution Technical Instruction

This module is a practical training module and will focus primarily on the ***Technical Professionals, Installers and Operators*** target group and also some domestic and commercial ***End-users***. The installation, operation and maintenance of the INNOQUA Sustainable Wastewater Treatment Solution will be addressed in detail in this module which will leverage Project Deliverables D3.2

Implementation Guidelines and D6.2 Best Practices Guidelines for Design, Installation and Operation. Each section will be 45 minutes in duration.

- Installation
- Operation
- Maintenance

5 Training and Education Programme Delivery Mechanisms

In this section, various programme delivery methods are considered with respect to the education and training modules proposed and the target participant groups identified:

- Webinars Synchronized Instruction Delivered online - E-Learning
- Self-Administered Instruction Delivered online – E-Learning
- Instructor-led Classroom or Group Learning (Medium-Size <35)
- Instructor-led Classroom or Group Learning (Small-Size <15)
- Showcases and Demonstrations
- Self-Administered Structured Reading
- Instructor-Supported, Self-Administered Training
- Post-training Support

5.1 Webinars - Synchronized Instruction Delivered online

Webinars are seminars, presentations or informative events conducted online at an allocated time. They allow attendees in dispersed locations to participate at a defined time and interact with an instructor and other participants. Webinars can be very useful for distance learning particularly for technical professionals and technical decision makers. To successfully receive training and education via **Webinar**, access to a hardware such as tablet, laptop, computer system is required as is stable internet and power connectivity.

5.2 Self-Administered Instruction Delivered online – E-Learning

Similar to above, but distinguished in this report as asynchronous, this type of E-Learning makes online seminars, presentations or informative events available to view by participants at a time convenient to them. This type of E-learning allows attendees in dispersed locations to experience an instructor led training event but does not provide real-time interaction with the instructor or other participants. To successfully receive training and education via **Self-Administered Instruction - Delivered online**, access to a hardware such as tablet, laptop, computer system is required as is stable internet and power connectivity.

5.3 Instructor-led Classroom or Group Learning (Medium-Size <35)

Instructor led classroom or group learning to medium sized groups fosters interaction and engagement and allows the instructor to tailor delivery to suit participants. There is a great variety of teaching tools that can be employed in this type of delivery depending on local availability and instructor preferences e.g. interactive whiteboards, chalkboards, discussion groups. To successfully

receive training and education via ***Instructor-led Classroom or Group Learning***, access to a suitable classroom or training centre is the basic requirement. This type of training, once prepared, can be delivered at a number of locations to different groups over a programme period.

5.4 Instructor-led Classroom or Group Learning (Small-Size <15)

Instructor led classroom or group learning events to small sized groups fosters greater interaction and engagement than for above and allows the instructor to respond to individual participants. Similar to above there is a great variety of teaching tools that can be employed in this type of delivery depending on local availability and instructor preferences e.g. interactive whiteboards, chalkboards, discussion groups. This type of small group size is suited to train the trainer events. To successfully receive training and education via ***Instructor-led Classroom or Group Learning***, access to a suitable classroom or training centre is the basic requirement. This type of training, once prepared, can be prepared and delivered at a number of locations to different groups over a programme period.

5.5 Showcases and Demonstrations

Training and Education activities centred on ***Showcases and Demonstration Sites*** are particularly suited to target participant groups understanding and visualising new technologies such as the INNOQUA solution. ***Showcases and Demonstrations*** may form the centrepiece of Instructor-led Classroom or Group Learning or more likely open days and technical demonstrations facilitated by INNOQUA Project Demonstration Site and Showcase Site Managers. To successfully receive training and education via ***Showcases and Demonstrations*** target participants must travel to one of the 13 project showcase and demonstration sites. All target participants will benefit from attendance at showcase and demonstration site training and education events.

5.6 Self-Administered Structured Reading

This type of Training and Education is where the target participants are provided with an instructional manual/digital media to review and read at their own pace. Development of comprehensive instructional material is required. To successfully receive training and education via ***Self-Administered Structured Training*** target participants must have a good reading comprehension skills and be provided with instructional material.

5.7 Self-Administered Structured Training

This type of Training and Education is where the target participants are provided with an instructional manual/digital media to review and read at their own pace and are provided with support from an instructor or trainer. This could be online via email or other platform or in person. Development of comprehensive instructional material is required. To successfully receive training and education via ***Self-Administered Structured Training – Instructor Supported*** target participants must have a good reading comprehension skills and be provided with instructional material.

5.8 Post-training Support

Post-training support is included as part of the delivery mechanism proposals as this facility serves to reinforce primary learning and clarify issues that may arise during implementation. Post-training support can be provided in a variety of ways and tailored to suit the availability of personnel, resources and infrastructure. It can comprise follow-up instructor/representative meetings, helpdesk type question and answer support etc.

5.9 Suitable Delivery Mechanisms for INNOQUA Training Modules

Table 5-1 below details suitable delivery mechanism for each of the five proposed INNOQUA Training Modules.

- **Module 1** - Wastewater Management Concepts and Systems Overview
- **Module 2** - The Necessity for Wastewater Treatment Systems
- **Module 3** - The Fundamentals of Water, Sanitation and Hygiene
- **Module 4** - Overview of the INNOQUA Solution
- **Module 5** - The INNOQUA Solution Technical Instruction

Table 5-1 Suitable Delivery Mechanisms for INNOQUA Training Modules

	MODULE 1	MODULE 2	MODULE 3	MODULE 4	MODULE 5
<i>Webinars</i>	✓	✓	✓	✓	✓
<i>Self-Administered Digital Instruction – E-Learning</i>	✓	✓		✓	
<i>Instructor-led Classroom or Group Learning (Medium-Size <35)</i>	✓	✓	✓	✓	
<i>Instructor-led Classroom or Group Learning (Small-Size <15)</i>	✓	✓	✓	✓	✓
<i>Showcases and Demonstrations</i>				✓	✓
<i>Self-Administered Structured Training</i>			✓	✓	✓
<i>Trainer Supported, Self-Administered Training</i>			✓	✓	✓
<i>Post-training Support</i>	✓	✓	✓	✓	✓

6 Training and Education Programme Delivery and Evaluation Schedule

The full course content is currently (i.e. M24) under production and it is anticipated that the initial modules i.e. modules 1, 2, 3 will be available in M34. With draft Modules 4, 5 available after this time. The delivery of the INNOQUA Training and Education Programme will coincide principally with the installation and operation commencement of the demonstration and showcase sites which is likely to be in M34.

6.1 Content Development

Table 6-1 below details for each module in each distinct location, the key INNOQUA Project Partner that will contribute to the development of core course material.

- **Module 1** - Wastewater Management Concepts and Systems Overview
- **Module 2** - The Necessity for Wastewater Treatment Systems
- **Module 3** - The Fundamentals of Water, Sanitation and Hygiene
- **Module 4** - Overview of the INNOQUA Solution
- **Module 5** - The INNOQUA Solution Technical Instruction

Table 6-1 Course Content Development Key Partners

GEO-LOCATION 1				
European Union Countries				
Module 1	Module 2	Module 3	Module 4	Module 5
<ul style="list-style-type: none"> ➤ NUI Galway ➤ AquaEnviro ➤ BORDA 	<ul style="list-style-type: none"> ➤ AquaEnviro ➤ BORDA 	<ul style="list-style-type: none"> ➤ BORDA ➤ ECOIND 	<ul style="list-style-type: none"> ➤ Industrial Partner ➤ Technology Providers ➤ NUI Galway ➤ Demo Site Managers 	<ul style="list-style-type: none"> ➤ Industrial Partner ➤ Technology Providers ➤ NUI Galway
GEO-LOCATION 2				
South America				
Module 1	Module 2	Module 3	Module 4	Module 5
<ul style="list-style-type: none"> ➤ NUI Galway ➤ AquaEnviro ➤ BORDA ➤ UCU ➤ CUSM 	<ul style="list-style-type: none"> ➤ BORDA ➤ UCU ➤ CUSM 	<ul style="list-style-type: none"> ➤ BORDA ➤ UCU ➤ CUSM 	<ul style="list-style-type: none"> ➤ Industrial Partner ➤ Technology Providers ➤ NUI Galway ➤ Demo Site Managers 	<ul style="list-style-type: none"> ➤ Industrial Partner ➤ Technology Providers ➤ NUI Galway
GEO-LOCATION 3				
Turkey, Tanzania and India				
Module 1	Module 2	Module 3	Module 4	Module 5
<ul style="list-style-type: none"> ➤ NUI Galway ➤ AquaEnviro ➤ BORDA 	<ul style="list-style-type: none"> ➤ BORDA ➤ Ekodenge 	<ul style="list-style-type: none"> ➤ BORDA ➤ Ekodenge 	<ul style="list-style-type: none"> ➤ Industrial Partner ➤ Technology Providers 	<ul style="list-style-type: none"> ➤ Industrial Partner ➤ Technology Providers

			<ul style="list-style-type: none"> ➤ NUI Galway ➤ Demo Site Managers 	<ul style="list-style-type: none"> ➤ NUI Galway
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6.2 Training and Education Programme Delivery and Evaluation Schedule

Table 6-2 below indicates an initial schedule for delivery of the INNOQUA training and education programme at the demonstration site locations.

Table 6-2 Initial Training and Education Programme

Demonstration Site	Ireland	Spain	Ireland - Agriculture	France - Commercial	Italy	France - Industrial	UK - Scotland	Turkey	Romania Site	Ecuador	Peru	Tanzania	India
Partner	NUI Galway	UDG	NUI Galway	NBK	R2M	LBT	SW	EKO	ECO	GYA-UCU	CUSM	BORDA	BORDA
Webinars	M39	M39	M39	M39	M39	M39	M39	M39	M39	M39	M39	M39	M39
Instructor-led Classroom (Medium <35)										M35 M41	M35 M41	M35 M41	M35 M41
Instructor-led Classroom (Small <15)			M40	M40	M40	M40	M40	M40	M40	M35 M41	M35 M41	M35 M41	M35 M41
Showcases and Demos	M27 M29	M27 M29	M37 M40	M37 M40	M37 M40	M37 M40	M37 M40	M37 M40	M37 M40	M37 M40	M37 M40	M37 M40	M37 M40
Other (ongoing from)	M34	M34	M34	M34	M34	M34	M34	M34	M34	M34	M34	M34	M34

Monitoring and Evaluation to determine the effectiveness of training endeavours carried out in accordance with this Programme is proposed by course evaluations to be circulated at the end of each training module delivery and follow up contact with programme participants 1 month post training.

Appendix A Social Acceptance Questionnaire

INNOQUA SOCIAL ACCEPTANCE QUESTIONNAIRE M23

Thank you for agreeing to take part in this important survey measuring social acceptance of various wastewater treatment solutions. INNOQUA, an EU-funded project through the Horizon 2020 research and innovation programme launched in June 2016, aims to meet the challenges posed by a lack of sanitation by promoting sustainable water sanitation technologies capable of performing a whole water treatment cycle. These technologies resemble natural cleaning processes and are based on the purification capacity of earthworms, zooplankton, and alternatively microalgae and sunlight exposure. The Questionnaire will take 5-10 minutes to complete. Please be assured that all answers you provide will be kept in the strictest of confidentiality.

For more information on the INNOQUA project and technologies, you can visit our website at www.innoqua-project.eu

Part 1 – General information about you

1. Are you male or female?

Male	Female

2. What is your age range?

18 - 29	30 - 49	50 - 64	65 years and over

3. In which of the following regions do you currently reside?

Europe	South America	North America	Africa	Asia	Other

4. Which (if any) religion do you associate yourself with?

Christian (all denominations)	Muslim	Buddhist	Hindu	Jewish	Sikh	Not Religious	Other	Don't want to say

5. What is the highest education that you finished?

No formal education	Primary School	Lower Secondary	Upper Secondary	Third Level - College or University	Third Level - Post Graduate	Don't want to say

6. What best describes the industry in which you are usually employed?

Agriculture, Forestry & Fishing	Industry	Construction	Wholesale & Retail Trade	Accommodation and food service activities	Information and communication	Financial, insurance and real estate activities	Professional, scientific and technical activities	Administrative and support service activities
Public administration and defence	Education	Human health and social work activities	Student	Other	Not in Employment			

7. What best describes your job?

Management Staff	Professional	Operational Staff	Technical Staff	Administrative Staff	Other

8. What is your average monthly income?

€500 or Less	€500-1,000	€1,000-2000	€2,000-3,000	€3000 or Above	Would prefer not to specify

9. What best describes your living situation?

I am a homeowner	I rent my home	I live with my Parents	I am in a house/apartment share	Other

10. What best describes your main residence?

Detached House	Semi-Detached House	Flat	Other

11. How many persons are in your household?

I live alone	Number of Adults	Number of Children

12. Is wastewater arising from your main residence currently connected to a sewerage network?

yes	no	I don't know

13. How is wastewater arising from your main residence currently treated?

Untreated	On-site settlement tank system	On-site septic tank & percolation system	Proprietary Biological/Mechanical on-site treatment system	Connected to a Municipal/Centralised Treatment

Part 2 – General Questions about pro-environmental activities

In this part of the survey we are interested in your current involvement in pro-environmental activities. Please read each question and indicate how often you do this by ticking the box that best represents your current behaviour.

1. Do you incorporate pro-environmental activities in your daily routine?

Never	Rarely	Sometimes	Often	Always	N/A

2. Do you take measures to minimise the volume of waste that you generate?

Never	Rarely	Sometimes	Often	Always	N/A

3. Do you favour nature based solutions when selecting new products or technologies where possible?

Never	Rarely	Sometimes	Often	Always	N/A
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4. Do you choose low energy technologies where possible?

Never	Rarely	Sometimes	Often	Always	N/A

5. Do you choose water saving technologies where possible?

Never	Rarely	Sometimes	Often	Always	N/A

Part 3 – Your Opinion on the Treatment of Wastewater

In this part of the survey we are interested in your opinion and feelings regarding the treatment of wastewater. Please read each statement and consider whether you agree or disagree with it. Indicate the strength of your response, from completely disagreeing at point 1 to completely agreeing at point 5, by ticking the appropriate box.

1. I am aware of what wastewater is and the various sources of wastewater occurring at the property where I live

Completely Disagree	1	2	3	4	5	Completely Agree

2. I have a strong personal obligation to ensure that wastewater generated by me or my household is connected to an effective treatment system

Completely Disagree	1	2	3	4	5	Completely Agree

3. I worry about the negative impact of untreated or poorly treated wastewater on the environment

Completely Disagree	1	2	3	4	5	Completely Agree

4. I consider that biological treatment systems using earthworms that can treat wastewater to acceptable quality before reuse or discharge are positive solutions

Completely Disagree	1	2	3	4	5	Completely Agree

5. I consider that biological treatment systems using crustaceans that can treat wastewater to acceptable quality before reuse or discharge are positive solutions

Completely Disagree	1	2	3	4	5	Completely Agree

6. I consider that biological treatment systems using Sunlight that can treat wastewater to acceptable quality before reuse or discharge are positive solutions

Completely Disagree	1	2	3	4	5	Completely Agree

7. In selecting a new wastewater treatment system or other technology, I'd feel guilty if I chose a less sustainable solution over a more sustainable solution of similar cost

Completely Disagree	1	2	3	4	5	Completely Agree

8. The ineffective treatment of wastewater is a problem for society

Completely Disagree	1	2	3	4	5	Completely Agree

9. The lack of sustainable and effective wastewater treatment systems has a significant negative environmental impact

Completely Disagree	1	2	3	4	5	Completely Agree

10. Making improvements to the treatment of wastewater from my home/property will not have an effect on the overall quality of treated wastewater or the resources required to treat it

Completely Disagree	1	2	3	4	5	Completely Agree

11. Promoting sustainable and pro-environmental wastewater technologies at work /school /college will have a positive effect on peoples adoption of such technologies

Completely Disagree	1	2	3	4	5	Completely Agree

12. The provision of incentives (such as grants) for installing/adopting sustainable and pro-environmental wastewater technologies would have a positive effect in people adoption of such technologies

Completely Disagree	1	2	3	4	5	Completely Agree

Part 4 – Your Views on Criteria for Selecting Innovative Wastewater Treatment Systems

In this part of the survey we are interested in recording your views on the importance of certain criteria in adopting wastewater treatment systems. Please consider each criteria and rate it as to whether you consider it to be irrelevant or extremely important. Indicate the strength of your response, from irrelevant at point 1 to extremely important at point 5 by ticking the appropriate box.

1. Ease of Installation (E.g. factors such as size, weight, number of ancillary parts, whether this is installed over or underground)

Not Important	1	2	3	4	5	Extremely Important

2. Efficiency and Performance (E.g. Ability to produce a very high quality final effluent)

Not Important	1	2	3	4	5	Extremely Important

3. Sustainability and Energy Requirements (E.g. Energy consumption during Operation)

Not Important	1	2	3	4	5	Extremely Important

4. Aesthetics and Visual Impacts (E.g. Factors such as size of unit, whether this can be installed over or underground)

Not Important	1	2	3	4	5	Extremely Important

5. Initial Purchase Cost

Not Important	1	2	3	4	5	Extremely Important

6. Ease of use and maintenance requirements

Not Important	1	2	3	4	5	Extremely Important

7. Noise and Odours

Not Important	1	2	3	4	5	Extremely Important

Part 5 – Your Views on Adopting Innovative Wastewater Treatment Systems

In this part of the survey we are interested in recording your views on adopting wastewater treatment systems. Please read each statement and consider whether you agree or disagree with it. Indicate the strength of your response, from completely disagreeing at point 1 to completely agreeing at point 5, by ticking the appropriate box

1. Would you be willing to adopt a nature-based solution incorporating earthworms or other micro-organisms for the treatment of wastewater at your residence?

Definitely Not	Probably Not	Possibly	Probably	Definitively Yes

2. Would you be willing to adopt a nature-based solution incorporating crustaceans or other micro-organisms for the treatment of wastewater at your residence?

Definitely Not	Probably Not	Possibly	Probably	Definitively Yes

3. Would you be willing to use treated wastewater from an onsite treatment system for non-consumable use? (E.g. Irrigation or domestic applications such as toilet flushing)

Definitely Not	Probably Not	Possibly	Probably	Definitively Yes

Appendix B Successful Training and Education Programmes - India

The following best practice examples for successful training and education programs carried out by CDD Society and BORDA SA are presented to introduce and serve as an overview for the INNOQUA project.

1. Training on Construction of Twin Pit Latrine and Septic Tank

Target group: Masons / Toilet Builders

Overview: To provide masons with technical knowledge and skills on the design and principles of Onsite Sanitation Systems (OSS) as specified under Swachh Bharat Mission. (Twin pit, Septic tank, UDDT, toilet)

2. Training on Onsite Sanitation System (OSS)

Target group: Plumbers

Overview: To equip the plumbers with understanding about basic design and installation procedures of household sewerage to the septic tanks or sewerage system.

3. Training on “Safe Reuse of Human Waste and Wastewater in Agriculture

Target Group: Farmers using untreated faecal sludge or wastewater on their crops and/or those in communities where FSM or other sanitation management systems are being implemented.

Overview: Farmers are made aware of the value of organic fertilizers, especially co-compost, compared to chemical ones and the nutrient requirements of different crops. Farmers are motivated to practice safe faecal sludge reuse—including but not limited to co-compost.

4. IEC on Personal Hygiene and Community Hygiene

Target group: women, and school children

Overview: Women and school children are motivated to maintain good personal and household hygiene, including proper toilet usage, and for women, menstrual hygiene management. Proper toilet usage and menstrual hygiene management are especially important, as they affect not only people’s health but also the inputs into the FSTP plant.

5. IEC on Desludging of Septic Tanks and Pits

Target group: Toilet users in community

Overview: Community residents are motivated to empty their toilet-connected leach pits/septic tanks every 2-3 years. This will ensure the longevity of the pits/septic tanks, as well as regular inputs to the FSTP.

6. IEC on Solid Waste Management

Target group: Community residents

Overview: Community residents are motivated to segregate solid waste at home and not dispose of it in the toilet or outside in open drains, fields, etc. Again, this affects the local environment (and consequently health) and the inputs into the FSTP and co-composting unit.

7. IEC on Sanitation Value Chain

Target group: Community residents (women and men)

Overview: Community residents are made aware of faecal sludge management and the value of the FSTP by-products, such as treated wastewater and co-compost, and are willing to buy these products. Co-compost in particular will have high nutrient value compared to chemical fertilizers and can improve the soil and crop quality.

8. IEC on Personal Hygiene and School Sanitation

Target group: School children

Overview: School children are motivated to maintain good personal and school sanitation including proper toilet usage, and menstrual hygiene management for girls. Hand washing practices, handling of drinking water, water saving and garbage management are covered. Proper toilet usage and menstrual hygiene management are especially important, as they affect not only people's health but also the inputs into the FSTP plant.

Appendix C Successful Training and Education Programmes - Tanzania



DESWAM- Decentralized Solid Waste Management

Overall Objectives of Module 1: To educate service providers, LGAs about DESWAM so they will be able to sustainably operate and maintain all components of a DESWAM system.



MODULE 1: DESWAM Overview

Objectives of MODULE 1	1) To understand different terms used in waste management 2) To understand current laws for waste disposal 3) To understand DESWAM in relation to unplanned areas 4) To understand different standards in DESWAM services	
Methodology	Class room training with IEC materials On-site training with IEC materials	
Training Materials & Tools	Ex. 1.1 – Solid & Liquid Waste cards and categories Ex. 1.2 – Category Boards where waste cards can be pinned Ex. 1.3 – Satellite map of Dar es Salaam Ex. 2.1.2 – Do's and Don't's Poster Ex. 2.1.2 – Copy of Bylaws Ex. 2.3.1 – 'Results of no payment' cards Ex. 3.1.1 – Poster of Dar es Salaam facts Ex. 3.2.1 – B4.1 Gaps and Challenges in SWM document Ex. 3.4.1 – B4.1 Sample causal chain and template Ex. 3.4.2 – Poster case of residents using poor SWM practices Ex. 4.1.1 – B4.1 DESWAM approach Ex. 4.2.1 – Question cards for groups Ex. 4.3.1 – B4.1 DESWAM Components and Project Cycle Ex. 4.3.2 – B4.1 DESWAM Approach Section 5 – Tunza Taka/Waste Management Quality Standards Blank Cards for SP responsibilities;	
Participants	Operators & Management	
Participants Should Bring	Pen and Paper	
Location(s)	Classroom/office (Management) DESWAM Site (Operator)	
Time (465Min.)	460 Minutes Total Section 1: 65 Minutes Section 2: 70 Minutes	Section 3: 155 Minutes Section 4: 95 Minutes Section 5: 80 Minutes

Module N°	Module name	Duration (h)	Target groups				Process & Methodology	Training rationale & expected outcome
			Operators	LGA	Community	Managers		
1	DESWAM Module	7.8	X	X		X	<p>Rationale This is the core module for DESWAM system that need to be understood by DESWAM implementers. All other modules refers this module</p> <p>Outcome Trainees to sustainability operate and maintain DESWAM system</p>	
2	DESWAM Management	10				X	<p>Rationale This training will expose DESWAM managers to necessary steps to professionally establish and manage specific DESWAM system using the selected business model</p> <p>Outcome Management has all basic knowledge to establish and maintain sustainable DESWAM system solutions</p>	
3.1	DESWAM operators	7.0	X			X	<p>Rationale This module gives basic information to operators on their tasks and responsibilities and the processes</p> <p>Outcome Operators properly perform their specified DESWAM systems tasks & responsibilities</p>	
3.2	DESWAM OS&H	7.9	X			X	<p>Rationale Operators will be equipped with knowledge and skills to professionally use specific PPEs and work safely in DESWAM systems; managers will be able to maintain and insure professional work environment</p> <p>Outcome DESWAM operators safely accomplish their tasks and responsibilities</p>	
4	DESWAM user	1.9	X			X	<p>Rationale The rationale for training operators/SP on this module is for them to be able to explain the roles and responsibilities of the community (users) in the SWM</p> <p>Outcome DESWAM users effectively perform tasks and undertake their responsibilities in SWM</p>	
Duration		34.6						

Figure 0-1 DESWAM Manual Coverage

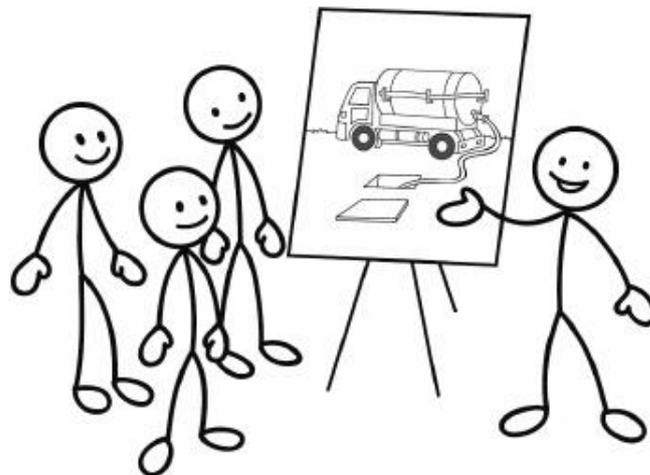
July 2016

Trainer Manual



Sandec
Sanitation, Water and
Solid Waste for Development

Introduction to Faecal Sludge Management





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CAWST (the Centre for Affordable Water and Sanitation Technology) is a nonprofit organization that provides training and consulting to organizations working directly with populations in developing countries who lack access to clean water and basic sanitation. One of CAWST's core strategies is to make water knowledge common knowledge. This is achieved, in part, by developing and freely distributing education materials with the intent of increasing the availability of information to those who need it most.

Sandec is the Department of Sanitation, Water and Solid Waste for Development, at Eawag, the Swiss Federal Institute of Aquatic Science and Technology. Sandec's mandate is to develop and test methods and technologies that help the world's poorest access sustainable water and sanitation services. The Sandec team is composed of scientists who work together with partner organizations worldwide, make use of Eawag's multidisciplinary scientific and technological knowledge, and publish and disseminate our research and training materials for free.

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Appendix D NUI Galway Training and Education Relevant Material

MSc (Water Resources Engineering)
College of Engineering & Informatics, NUI Galway

The College of Engineering and Informatics at NUI Galway offers a 1 year full-time Master of Engineering Science (MSc) Programme. The course allows students to consider the problem of water security as one of the main threats facing humanity. As engineers will be the primary professionals tackling this problem, this programme will provide the technical competences to provide solutions to deliver safe/clean water. http://www.nuigalway.ie/courses/taught-postgraduate-courses/msc-water-resources-engineering.html#course_outline

The following course modules are offered:

- Design of Sustainable Environmental System I
- Design of Sustainable Environmental Systems II
- Environmental Economics
- Estimates and Costing
- Computational Methods in Civil Engineering
- Coastal and Offshore Engineering I
- Hydrological Modelling
- Water Quality
- Hydrology & Water Resources Engineering
- Water Resources in Arid Regions
- Natural Resource Governance
- Applied Field Hydrogeology
- Global Change
- Project Management

The coverage material provided in the Design of Sustainable Environmental System I & II, Water Quality, Water Resources in Arid Regions, Natural Resource Governance and Global Change MSc modules will be leveraged to prepare the INNOQUA Module 1 and 2 course content.

Appendix E AquaEnviro Training Courses



Training Solutions for the
wastewater & waste
industries

Consultancy and events in
environmental science and
engineering

www.aquaenviro.co.uk

Courses we offer

Phosphorus Removal and Tertiary Treatment Processes

Date TBC

A specialised day of training for those working with anaerobic digestion treating water and wastewater.

Course content:

- Understanding the digestion process
- Digester operation
- Digester foaming
- Feeding, mixing and heating
- Digester biogas
- Dewatering the digestate and handling the dewatering liquor treatment
- Advanced digestion



"Just a note regarding the digestion training yesterday, which I thought was excellent – really good presenters and I'll recommend this to other members in my process team and operators on digestion sites in future."

Severn Trent Water, 2016

aquaenviro.co.uk/events/training

Courses we offer

Microscopic Examination for the Operation & Control of Wastewater Treatment Plants

9th March 2017

Course content:

- **The Protozoa** - introduction to floc morphology and protozoa
- **Lab session** - using the microscope; floc structure; protozoa identification; filament numbers
- **Interpreting the results of microscopic examination** - health of the plant; changes that may have occurred in the influent; process conditions (F/M, sludge age); problems with the process (low O₂, under/overloading; nutrient deficiency; toxicity)
- **The Filaments** - filament characteristics on wet mounts; cell size; shape; filament width; length; branching etc.; staining; gram; neisser; sulphur
- **Lab session** - methods for identifying species; filament characteristics on wet mounts; identification charts; stained filament characteristics; gram and neisser staining
- **Control strategies for filamentous bacteria** - chemical and physical strategies
- **Design considerations to eliminate filaments** - selectors; loc loading; plug



Kinetic Process Modelling for Optimising Aerobic & Anaerobic Treatment Plants

Date TBC

Course content:

- Introduction to kinetic process modelling - what is kinetic process modelling? The use of process modelling and its potential in process design and optimization
- Introduction to fundamental equations of kinetic modelling - basic concepts; biological models (ASMT, ADM1)
- **Setting up process models** - requirements for process simulation; data collections and assessment; engineering checks; calibration and validation
- **Popular kinetic process modelling tools** - BioWin; GPS-X; Simba
- **Modelling aerobic treatment plants** - modelling activated sludge process with BioWin
- **Modelling anaerobic digesters with BioWin**
- **Industrial Case Studies**

aquaenviro.co.uk/events/training

Courses we offer

Digester operation and making the most of the digestate

17 - 18th May 2017

This new 2 day course is an essential investment for anyone interested in making the most of their plant, for those considering a new build facility or plant upgrades to increase the value of the digestate

Course content:

Day 1 - Operating Anaerobic Digesters and Opportunities for Nutrient Recovery:

- The different phases of AD and the key terms (Hydrolysis to methanogenesis; and the importance of volatile fatty acids, alkalinity, pH, temperature)
- Key metrics for digester operation – Organic Loading Rate, Hydraulic Retention Time, Methane Yield and Volatile Solids Destruction
- Options for further processing and recovery of nutrients (including digestate recirculation and nitrogen and phosphorus removal)
- Common operational problems and solutions



Day 2 - Digestate and Digester Optimisation:

- Optimising digester performance for maximum biogas production, and understanding how this affects digestate dewaterability
- Potential markets for digestate
- Agricultural use of digestate: waste vs. product, logistics (such as transport and spreading), complying with legislation, marketing to farmers. This will cover waste, non-waste (crop) and sludge digestates
- Importance of quality – including physical, chemical and microbiological aspects
- Valorising digestate (technologies and markets)
- Using digestate in non-agricultural markets



aquaenviro.co.uk/events/training

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