

Issues	Responding Organization Key in Wastewater Management and Use in Agriculture																			
	EMA		UZ BioSci		UZ Civil Eng.		UZ Ag. Eng/Soil Sci.		AGRITEX		HARARE City Health Dept.		MoWRDM		Department of Irrigation		ZINWA		AVG - Cur	AVG - Imp.
	Cur.	Imp.	Cur.	Imp.	Cur.	Imp.	Cur.	Imp.	Cur.	Imp.	Cur.	Imp.	Cur.	Imp.	Cur.	Imp.	Cur.	Imp.		
Assessment of Health Risk																				
Microbial and chemical laboratory analysis	3	4	3	4	4	3	4	2	1	1	4	4	2	4	2	4	3	4	2.89	3.33
Epidemiological studies	3	3	2	4	2	3	3	1	1	3	4	4	2	4	2	3	2	3	2.33	3.11
Quantitative microbial risk assessment (QMRA)	3	3	1	4	3	3	3	1	1	3	3	4	2	4	2	4	3	3	2.33	3.22
Setting health based targets	2	3	1	4	3	3	1	1	1	3	4	4	2	4	2	3	1	3	1.89	3.11
Health Protection Measures																				
Wastewater treatment	4	4	3	4	4	4	3	1	1	3	3	4	3	4	3	3	3	4	3.00	3.44
Non-treatment options	3	3	1	4	3	4	3	1	1	3	4	4	2	3	3	4	2	2	2.44	3.11
Monitoring and System Assessment																				
Monitoring of health protection measures	2	3	3	4	3	3	4	1	1	3	3	4	2	3	3	3	3	3	2.67	3.00
Wastewater use system assessment	3	3	2	4	4	4	3	1	1	4	2	4	3	4	3	4	2	3	2.56	3.44
Crop Protection aspects																				
Components of wastewater harmful to crop production	3	3	3	4	3	3	4	2	2	3	2	2	2	4	3	4	3	3	2.78	3.11
Agricultural tradeoffs of wastewater irrigation	3	3	2	4	3	3	4	3	1	3	2	2	2	4	3	4	2	3	2.44	3.22
Management strategies for maximizing crop production	2	2	2	4	3	3	4	2	2	4	2	2	2	4	3	4	1	2	2.33	3.00
Environmental Aspects																				
Components of wastewater harmful to the environment	4	4	4	4	4	3	4	3	2	4	4	4	3	4	3	3	4	4	3.56	3.67

Environmental effects through the agriculture chain	3	3	3	4	2	3	3	2	1	4	3	3	3	4	3	3	3	3	2.67	3.22
Management strategies for reducing environmental impacts	4	4	2	4	3	3	3	2	1	4	4	4	3	4	2	3	3	3	2.78	3.44
Sociocultural Aspects																				
Cultural and religious beliefs	3	3	2	4	2	2	4	1	2	3	3	3	2	4	2	3	3	3	2.56	2.89
Public acceptance	4	3	2	4	2	2	3	1	1	3	2	2	2	4	3	3	2	3	2.33	2.78
Economic and financials considerations																				
Economic feasibility	3	3	1	2	3	3	2	1	2	4	3	3	2	4	3	4	1	1	2.22	2.78
Financial feasibility	2	2	1	2	2	3	3	3	1	3	3	3	2	4	3	3	1	1	2.00	2.67
Market Feasibility	2	2	1	2	2	3	3	3	1	3	3	3	2	4	3	3	1	1	2.00	2.67
Policy Aspects																				
Institutional roles and responsibilities	4	4	3	4	3	3	2	2	2	3	4	4	3	4	3	4	3	3	3.00	3.44
Laws and regulations	4	4	2	4	2	3	3	3	2	3	4	4	2	4	3	4	1	1	2.56	3.33
Plans and programs	4	4	2	2	2	3	3	3	1	3	3	3	2	4	3	4	1	1	2.33	3.00
Economic instruments	4	4	1	2	2	3	3	2	1	3	3	3	2	4	3	3	1	1	2.22	2.78
Education and social awareness	4	4	1	3	2	3	4	3	1	4	3	3	2	4	3	4	1	1	2.33	3.22
Others																				
Environmental compliance																	3	4	3.00	4.00
AVERAGE	3.17	3.25	2.00	3.54	2.75	3.04	3.17	1.88	1.29	3.21	3.13	3.33	2.25	3.92	2.75	3.50	2.12	2.52	2.53	3.16

formula verification

3.167 3.25

List of respondent organizations

Scores

Poor/Very low = 1

Basic/Low = 2

Good/High = 3

1. The Environmental Management Agency (EMA)

2. The Zimbabwe National Water Authority (ZINWA)

3. The Departments of Civil Engineering, Agricultural Engineering, and

Biological Sciences at the University of Zimbabwe (UZ) being UZ Civil Eng., UZ Ag. Eng, and UZ BioSci respectively

Excellent/Very high = 4

*Cur. = current knowledge
and skills*

*Imp. = Importance of the
subject to the organization*

4. The City Health Department in Harare
5. The Department of Irrigation
6. The Ministry of Water Resources Development and Management (MoWRDM)
7. Department of Agricultural Technical and Extension Services (AGRITEX)

We did not obtain responses from the Ministry of Health in Harare and the City of Harare, Water Engineering branch.

Questionnaire survey results for Organizations in Bulawayo, Zimbabwe

Issues	EMA		ZINWA		AGRITEX		Ministry of Health		Bulawayo Eng. Services Dept		Dept. of Irrigation		AVG - Cur	AVG - Imp.
	Cur.	Imp.	Cur.	Imp.	Cur.	Imp.	Cur.	Imp.	Cur.	Imp.	Cur.	Imp.		
Assessment of Health Risk														
Microbial and chemical laboratory analysis	4	4	3	4	1	3	2	3	3	4	3	4	2.67	3.67
Epidemiological studies	2	4	2	3	1	3	3	4	2	4	2	4	2.00	3.67
Quantitative microbial risk assessment (QMRA)	2	3	3	4	1	3	2	3	3	3	2	4	2.17	3.33
Setting health based targets	2	3	4	4	1	3	3	3	4	4	3	4	2.83	3.50
Health Protection Measures														
Wastewater treatment	3	3	4	4	1	3	3	3	3	3	2	4	2.67	3.33
Non-treatment options	2	2	3	4	1	4	3	3	2	3	3	4	2.33	3.33
Monitoring and System Assessment														
Monitoring of health protection measures	3	2	3	3	1	4	4	4	2	2	3	4	2.67	3.17

Wastewater use system assessment	2	2	4	4	1	4	3	3	2	2	3	4	2.50	3.17
Crop Protection aspects														
Components of wastewater harmful to crop production	1	3	4	4	1	4	2	3	3	2	3	4	2.33	3.33
Agricultural tradeoffs of wastewater irrigation	2	3	4	4	1	4	1	3	3	3	3	4	2.33	3.50
Management strategies for maximizing crop production	1	2	3	4	1	4	1	3	3	3	3	4	2.00	3.33
Environmental Aspects														
Components of wastewater harmful to the environment	3	4	4	4	1	4	1	3	3	3	3	4	2.50	3.67
Environmental effects through the agriculture chain	2	3	4	4	1	4	2	3	2	2	3	4	2.33	3.33
Management strategies for reducing environmental impacts	1	4	3	4	1	4	1	3	2	2	3	4	1.83	3.50
Sociocultural Aspects														
Cultural and religious beliefs	2	3	2	3	1	4	4	3	3	2	3	4	2.50	3.17

Public acceptance	3	3	3	4	1	4	4	4	3	3	2	4	2.67	3.67
Economic and financials considerations														
Economic feasibility	2	4	4	4	2	4	3	3	3	3	2	4	2.67	3.67
Financial feasibility	2	4	4	4	1	4	3	3	3	3	3	4	2.67	3.67
Market Feasibility	2	4	4	4	2	4	3	4	2	3	2	4	2.50	3.83
Policy Aspects														
Institutional roles and responsibilities	4	4	4	4	2	3	3	3	3	3	3	4	3.17	3.50
Laws and regulations	3	4	4	4	1	4	3	3	4	3	3	4	3.00	3.67
Plans and programs	3	4	4	4	1	3	3	4	3	3	3	4	2.83	3.67
Economic instruments	2	4	3	4	1	4	2	3	3	2	3	3	2.33	3.33
Education and social awareness	2	4	3	4	1	4	4	3	3	2	3	4	2.67	3.50
Others														
EIA					1	4								
AVERAGE	2.29	3.33	3.46	3.88	1.13	3.71	2.63	3.21	2.79	2.79	2.75	3.96	2.51	3.48

List of respondent organizations

Scores

Poor/Very low = 1

Basic/Low = 2

Good/High = 3

Excellent/Very high = 4

1. The Environmental Management Agency (EMA)
2. The Zimbabwe National Water Authority (ZINWA)
3. The Department of Irrigation
4. Ministry of health and Childwelfare
5. Department of Agricultural Technical and Extension Services (AGRITEX)
6. Engineering Services Department of the City of Bulawayo

*Cur. = current knowledge
and skills*

*Imp. = Importance of the
subject to the organization*

We did not obtain responses from the City Health Department the City of Bulawayo. We assumed that the local university (National University of Science and Technology) had the same capacity as the University of Zimbabwe.

Summary

Responding institution	EMA	UZ-Bio Sciences	UZ Civil Eng.	UZ Ag. Eng. & Soil Science	AGRITEX	Harare City Health Dept	MoWRD M	Department of Irrigation	ZINWA	National Average
Average score on current knowledge and skills	3.17	2.00	2.75	3.17	1.29	3.13	2.25	2.75	2.12	2.53
Average score on Importance	3.25	3.54	3.04	1.88	3.21	3.33	3.92	3.5	2.52	3.16

National survey

Issues		
Assessment of Health Risk	AVG - Cur	AVG - Imp.
Microbial and chemical laboratory analysis	2.89	3.33
Epidemiological studies	2.33	3.11
Quantitative microbial risk assessment (QMRA)	2.33	3.22
Setting health based targets	1.89	3.11
Health Protection Measures		
Wastewater treatment	3	3.44
Non-treatment options	2.44	3.11
Monitoring and System Assessment		
Monitoring of health protection measures	2.67	3
Wastewater use system assessment	2.56	3.44

Bulawayo Results

AVG - Cur	AVG - Imp.
2.67	3.67
2.00	3.67
2.17	3.33
2.83	3.50
2.67	3.33
2.33	3.33
2.67	3.17
2.50	3.17

Overall rating is out of a score of 4

Crop Protection aspects		
Components of wastewater harmful to crop production	2.78	3.11
Agricultural tradeoffs of wastewater irrigation	2.44	3.22
Management strategies for maximizing crop production	2.33	3
Environmental Aspects		
Components of wastewater harmful to the environment	3.56	3.67
Environmental effects through the agriculture chain	2.67	3.22
Management strategies for reducing environmental impacts	2.78	3.44
Sociocultural Aspects		
Cultural and religious beliefs	2.56	2.89
Public acceptance	2.33	2.78
Economic and financials considerations		
Economic feasibility	2.22	2.78
Financial feasibility	2	2.67
Market Feasibility	2	2.67
Policy Aspects		
Institutional roles and responsibilities	3	3.44
Laws and regulations	2.56	3.33
Plans and programs	2.33	3
Economic instruments	2.22	2.78

2.33	3.33
2.33	3.50
2.00	3.33
2.50	3.67
2.33	3.33
1.83	3.50
2.50	3.17
2.67	3.67
2.67	3.67
2.67	3.67
2.50	3.83
3.17	3.50
3.00	3.67
2.83	3.67
2.33	3.33

Education and social awareness	2.33	3.22
Others		
Environmental compliance	3	4
Environmental Impact Assessment		
AVERAGE	2.53	3.16

	2.67	3.50
	1	4
	2.51	3.48

List of respondents at National/Head Office Level

Institution	Type of Organization	Name of Respondent	Position	Contacts
EMA	National Governmental	Christopher Mushava	Principal Officer	emazimbabwe@yahoo.com
ZINWA	National Governmental	Theodore Nherera	Quality assurance Scientist	tnherera@zinwa.co.zw
Harare, City Health Dept.	Local Governmental	Innocent Mukeredzi	A/Epidemiology and Disease Control Manager	imukeredzi@gmail.com
Department of Irrigation	National Governmental	Thubelihle A. Thebe	Principal Irrigation Engineer	tathebe@gmail.com
UZ Dept of Civil Engineering	University	H. Makurira	Head of Department	civil@eng.uz.ac.zw
UZ Dept of Biological Sciences	University	Tamuka Nhiwatiwa	Senior Lecturer	tnhiwatiwa@science.uz.ac.zw
UZ Dept of Ag. Eng.	University	T. Tendayi	Senior Chief Technician	tendayi@agric.uz.ac.zw
AGRITEX	National Governmental	Joseph Gondo	Principal Director	gondojoseph@yahoo.com
Ministry of Water RDM	National Governmental	Tatenda Mawokomatanda	A/Chief Eng. Water Resources	tanamawoko@yahoo.co.uk

BULAWAYO

EMA	National Governmental - Province	Tapiwa Munezvenyu	Environmental Quality Officer	Tel: +263964705
ZINWA	National Governmental - Province	W. Mandiziba	Operations Manager	pr@zinwa.co.zw
Bulawayo, Engineering Services Department	Local Governmental	Sitha Ncube	Town Planner	sithancube@gmail.com
Department of Irrigation	National Governmental - Province	Thubelihle A. Thebe	Principal Irrigation Engineer	tathebe@gmail.com
AGRITEX	National Governmental - Province	Dumisani Nyoni	Provincial Agric. Extension Officer	dumiennyoni@yahoo.com

Ministry of Health & Child Welfare	National Governmental - Province	Dumisani Ncube	A/Provincial Environmental Health Officer	dummiencube@gmail.com
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