



STRENGTHENING RESEARCH AND INNOVATION (R&I) IN NATURAL RESOURCES
MANAGEMENT (NRM) AND WASTE MANAGEMENT (WM) IN MALAWI,
MOZAMBIQUE, TANZANIA AND ZAMBIA (RINaWa) PROJECT

Work Package I: Capacity Strengthening of Research and Tertiary Education Institutions in
Delivering Up-to-date Research and Training in Waste Management and Natural Resources
Management

TRAINING NEEDS ASSESSMENT (TNA)

FINAL REPORT

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EXECUTIVE SUMMARY

This Training Needs Assessment (TNA) was carried out in February 2024 by the College of African Wildlife Management (CAWM) in the four Target countries of Malawi, Mozambique, Tanzania and Zambia as part of the implementation of the SADC project 'Strengthening Research and Innovation in Community Based Natural Resources Management' (RiNaWa) and Waste Management'. The results of this TNA were set to be incorporated into the Curriculum development component of this project. The Assessment involved the use of two separate sets of online questionnaires (each with 97 questions), targeting employers and trainers in the Community-Based Natural Resources Management (CBNRM) and Waste management (WM) sectors, respectively. These questionnaires were carefully formulated and structured as well as field pre-tested and validated by stakeholders prior to being administered. For the Trainers, inquiry focused on the current ground circumstances surrounding their delivery of WM and CBNRM academic programs while for the employers (which included Training Institutions, Government Entities, Local and National Groupings and Value Chain Actors-The Private Sector), attention was on their employee job qualifications and competency. These two in-depth surveys were further complemented by interviewing 14 employer Key Informants. The specific functions, duties and tasks of employees in CBNRM and WM were gathered through 3-day consultative discussion held in March 2024 that involved 41 employees from all the four target countries through 'Developing a Curriculum (DACUM)' process. This workshop facilitated them to share their thoughts and experiences on their job needs as CBNRM and WM employees. The results from all these inquiries combined were triangulated and collated so as to feed into the ongoing Curriculum Development process.

A total of 308 questionnaires were administered online of which slightly more than half (117 or 58.5% of the total) focused on the WM component. Of the total administered questionnaires, 175 or 59% were responded to. It became apparent that there was an overall shortage of well-trained employees in CBNRM and WM sectors amounting to 46.6% and 66%, respectively. Most critical, was the prevalent scarcity of non-degree staff in both WM (-266%) and NRM (-192%) compared to the market demands. This is further reflected in the fact that almost all the 65 training institutions that were interviewed were found to train a disproportionally higher number of degree compared to no-degree graduates. Regarding the specific duties of employees, employers indicated that these were gradual but clear-cut, with the non-degree employees engaged more on hands-on duties. In contrast, their degree counterparts were undertaking more of the managerial, research and supervisory duties.

A similar trend emerged regarding the expected competencies as reported by employers. The non-degree employees were expected to be better equipped in hands-on-related competencies as opposed to managerial, research and supervisory or consultancy competencies for those with degree level qualifications. However, creativity and innovation in seizing technological opportunities for addressing CBNRM and WM challenges were cross cutting issues considered as critical by the majority (19% of 40 employers). Information and Communication were also repeatedly mentioned as of importance. Another key finding regards availability, adequacy and quality of teaching and learning environment. This included issues such as teaching space, facilities and equipment as well as specialized needs such as laboratories. For each of these, the capacity for CBNRM and WM training institutions were roughly rated at about 50% - signaling a clear need for improvement. There was also an emphasis on the need to balance theoretical and practical training components at a ratio of at least 3:2, respectively.

This TNA Assessment clearly illuminates on the key issues on the ground from the point of view of both employers and employees with a focus at strengthening R&I components in WM and CBNRM training programs within the SADC region. It is therefore paramount that the WM and CBNRM Curricular being developed take into consideration these findings so as to reflect on the actual needs on ground. This will ensure that these curricular are demand-driven in view of the existing and potential socio-economic, environmental, political and technological needs of the current time.

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CHAPTER I: INTRODUCTION

1.1 BACKGROUND

The majority of rural areas within the Southern African Development Cooperation (SADC) region are not only rich in wildlife populations but serve also as valuable sources of critical ecosystem services. As such, they bear immensely on local and national economies. Nonetheless, these areas are ever confronted by unprecedented human-mediated natural resource extraction-related threats, notably poaching and deforestation that have already pushed some species to the brink of extinction (Uhm & Moreto 2018). Likewise, desertification, water scarcity, and contamination, as well as air pollution are intensifying at the expense of biodiversity conservation and human welfare (Crist et al., 2017; Kumar 2022a; Mkonda 2022). This rather gloomy situation also continues to impair ecosystem processes and functioning (Crist et al., 2017; Edelblutte et al., 2023) leading to, for example, widespread Human-Wildlife Conflict incidences (Suich 2013; Manral et al., 2016; Njera et al., 2016; Nyhus 2016; Umar & Kapembwa 2020; Kuiper et al., 2022; Brackowski et al., 2023; Edelblutte et al., 2023). It places the future sustainability of wildlife resources hence their inherent potential to support community livelihood at a crossroads.

Poor waste management is yet another contesting environmental issue, especially in the developing world (Abdel-Shafy & Mansour 2018). The ongoing rapid socio-economic transformation taking place in Africa today has led to a sharp rise in human living standards - especially in urban areas. Consequently, the metropolitan population is fast burgeoning in parallel with both indiscriminate harvest of natural resources and a colossal generation of waste. As this trend continues to deepen, poor waste management has increasingly become a topic of environmental and public health concern in Africa but also globally (Adeel & Jun-Li 2023). According to RINaWa (2023), the annual rate of solid waste collection from the four SADC countries of Malawi, Mozambique, Tanzania, and Zambia amounted to only about 25-32% of the volume generated by any one country. This dire situation partly reflects the prevalent waste management challenges facing these countries – including acute budgetary constraints (Liyala 2011; Hoornweg & Bhada-Tata 2012).

RINaWa (2023) also notes that the academia in these countries is generally ill-prepared in terms of having the academic curricula in place, specifically designed for effective training in both sustainable Waste Management (WM) and Community-Based Natural Resources Management (CBNRM). Nevertheless, to sustainably manage both natural resources and waste partly demands well-trained personnel. Against this backdrop, as part of the ongoing implementation of the SADC RINaWa project, The College of African Wildlife Management (CAWM), Mweka, embarked on the preparation of a set of competency-based curricula for addressing the prevalent shortage of qualified staff in the areas of CBNRM and WM. The ultimate aim is to have (well-trained) competent staff with the level of knowledge and skills that respond to the current CBNRM and WM ground realities within the SADC region. In this context, the CAWM carried out a comprehensive Training Needs Assessment (TNA) in the four Target countries of Malawi, Mozambique, Tanzania, and Zambia, to gather stakeholder information essential for assimilation into the curriculum development process. This report presents details of the process and the results of the TNA exercise.

1.2 RATIONALE FOR CARRYING OUT TRAINING NEEDS ASSESSMENT

This TNA exercise was in response to the growing trend of poor natural resources and waste management. Exacerbated by rapid human population growth, this tendency has resulted in widespread environmental degradation, thus impacting negatively almost all economic sectors including Tourism, which is one of the major economic pillars within the SADC region. Consequently, economic progress

for the region also remains relatively impaired. Strenuous efforts continue to be undertaken by various actors within the SADC region to manage natural resources and waste. Regrettably, however, these initiatives are frustrated by a multiplicity of factors including lack or poor application research and innovation.

As these dual natural resources and waste management challenges continue to grow, the need for well-qualified staff to address them is increasingly indispensable - a scenario that calls for strengthening competency-based training. The point in this case is that staff working in the Natural Resources and Waste Management sectors, need to be equipped with adequate knowledge and skills such that they are able to handle these challenges under the current ground realities. This TNA was thus undertaken to seek relevant information from WM and NRM trainer and employer stakeholder segments so as to feed their ideas into the curricula development process. The TNA was supplemented by a thorough occupational analysis exercise employing the 'Development of Curriculum'¹ (DACUM), which is a methodology of choice in Curriculum development process. This TNA/DACUM combination allowed for a thorough analysis of the content required for preparation of the planned curricula.

1.3 OBJECTIVES OF TRAINING NEEDS ASSESSMENT

1.3.1 Overall Objective

The overall objective of this TNA was to gather critical comments and suggestions from the key stakeholder segments (trainers and employers) in the CBNRM and WM sectors from the four Target countries (Malawi, Mozambique, Tanzania, and Zambia) of the SADC region that could be incorporated into the preparation of CBNRM and WM training curricular.

1.3.2 Specific objectives

The specific objectives of the TNA exercise were as follows:

- i. Survey the training gaps on CBNRM and WM
- ii. Address the employment requirements of the CBNRM and WM sectors
- iii. Explore the needs of various CBNRM and WM societal segments
- iv. Inquire on CBNRM and WM labor market demands and dynamics
- v. Examine various CBNRM and WM learning constraints

¹ Developing a Curriculum (DACUM) is a process that incorporates the use of a focus group in a facilitated storyboarding process to capture the major duties and related tasks included in an occupation, as well as the necessary knowledge, skills, and traits. This cost-effective method provides a quick and thorough analysis of any job.
<https://www.eku.edu/facilitation/developing-curriculum-dacum/>

CHAPTER II: METHODOLOGY FOR TRAINING NEEDS ASSESSMENT

2.1 TRAINING NEEDS ASSESSMENT

TNA data were collected from four (4) SADC target countries: Malawi, Mozambique, Tanzania and Zambia. These countries were separately visited by the survey teams at around the end of January 2024, which served to primarily raise awareness and sensitize targeted stakeholders on their need to participate fully in the TNA exercise (**Plate I**). TNA questionnaire respondents were sampled purposively, with a focus on those working on WM and CBNRM sectors - the views of whom were considered crucial within the context of curriculum development. Respondents were categorised into three groups: (i) employers and (2) trainers from the academia (Research and Tertiary Training Institutions), as well as (3) employers from Government entities, local and national groupings and Value Chain Actors (private companies).

2.1.1 Data Collection

2.1.1.1 Questionnaire survey

Both physical and online versions of a structured questionnaire survey were employed during the TNA exercise. Two (2) detailed online questionnaires were separately designed through a web-based free Google application online form builder² to elicit responses related to employer and trainer job tasks. Such a tool was considered convenient given the wider geographical spread of the targeted respondents. Employer and academic staff questionnaires comprised of 97 questions each



Plate I: Stakeholder sensitization on the need to participate in the survey for Value Chain Actors, Tanzania



Plate II: Populating the Zambia online questionnaire mailing list consultatively with the Director of Zambia Climate Change Network (ZCCN)

(**Appendix I & II**), validated online by 20 key stakeholders through a consultative meeting in December 2023 prior to detailed field data collection in January 2024 (See **Appendix III for a list of validation participants**). Mailing lists were also compiled purposely but in consultations with the Local Multipliers or Consortium Members of the Project to target the most relevant respondents in each target country.

² <https://docs.google.com/forms/u/0/>

2.1.1.2 Key Informant Interviews (KII)

The TNA exercise was supplemented by Key Informant Interviews (KIIs). These were qualitative, loosely structured but in-depth interviews of people selected for their first-hand knowledge on the topic of interest³. KII leading questions (**Appendix IV**) were framed spontaneously, probing for a free flow of information and ideas from the respective respondents. A total of 14 respondents (**Appendix V – List of Key Informants interviewed**) were interviewed as Key Informants. [Photo]



Plate III: Key Informant Interview (KII) with the Director of Maputo National Park, Mozambique

2.1.1.3 Site visits

The TNA survey teams also undertook a number of site visits in the respective countries during field data collection to acquaint themselves with the WM



Plate IV: Site visit at Multi Cable Recycling Company during TNA exercise, Tanzania

and NRM training and employment issues existing on the ground. A total of 60 such visits were conducted involving various WM and NRM institutions and working premises (**Appendix VI**).

2.2 DACUM exercise

The DACUM Exercise was conducted in a workshop convened in February 2024 that gathered on-the-job WM and NRM employees from all the target countries (**Appendix VII- List of participants in the DACUM Exercise**). For convenience, participants were chosen purposely, given they were graduates and employees in Waste Management or Community-based Natural

Resource sectors. During the workshop, they shared their on-the-ground WM and NRM-related employment duties and specific tasks (**Appendix VIII-DACUM Charts**).

³ https://pdf.usaid.gov/pdf_docs/pnabs541.pdf

2.2.1 Data Collection

2.2.1.1 Focus Group Discussion (FGD)

The DACUM exercise employed a Focus Group Discussion (FGD) methodology, which engaged groups of participants in detailed conversation in a facilitated setting⁴. A total of 32 participants worked in four groups (NRM=2 groups; WM=2 groups) of roughly 8 people each in detailed but guided discussions on employment duties and tasks related to NRM and WM. Individual Groups were then invited to present in the plenary, allowing for a wider sharing of views and reaching consensus on the key issues thus presented. Discussions were mediated by a seasoned expert in Curriculum development from The National Council for Technical and Vocational Training (NACTVET) of Tanzania, who provided professional guidance on both the DACUM approach and content of discussions.



Plate V: Participants on WM discussion during the DACUM exercise, Arusha, Tanzania

2.3 DATA ANALYSIS

Descriptive statistics was adopted to summarize data from questionnaires followed by in-depth analysis and synthesis to depict key issues and trends from the results. Key ideas from KII and FGDs were summarized and categorized into major themes to complement results of the questionnaire survey. Quantitative data were analyzed using the Statistical Package for Social Sciences (SPSS®)⁵ version 25.

⁴ <https://www.participatorymethods.org/glossary/focus-group-discussion>

⁵ <https://www.ibm.com/spss>

CHAPTER III: FINDINGS

3.1 TRAINING NEEDS ASSESSMENT

3.1.1 Questionnaire Response rates

Table 3.1 is a summary of response rates for the 308 administered questionnaires by target groupings. It shows that 172 or 55.8% of all questionnaires addressed the NRM theme. Further, about 55.8% of the questionnaires were administered to the employers, exceeding that of Trainers (44.2%) by a slight margin. Given that some of the Trainers responded as employers, these ratios are within reasonable expectations. For a full list of questionnaire respondents, see **Appendix IX – List of questionnaire respondents**.

Table 3.1: TNA Questionnaire Response rate by theme and target group. Numbers in Parentheses are sample sizes

Theme/Target Group	No. Administered	Response	
		No. Response	%
WM (136)			
Trainers	44	26	59.0
Employers	92	65	70.7
NRM (172)			
Trainers	92	37	40.2
Employers	80	47	58.8
WM+NRM (308)			
Trainers	136	63	46.3
Employers	172	112	65.1
Total	308	175	56.8

Table 3.1 also shows that the WM/NRM questionnaire response rate for the trainers ranged 40.2-59.0% compared to 58.8-70.7% for the employers. The reasons for these relatively lower response rates for the academia are puzzling, given they were equally sensitized to engage in the exercise. A summary of questionnaire response rates by Institutional category is given in **Table 3.2**.

Table 3.2: Questionnaire Responses by Institutional category

Institutional Category	No. Response	%
Research and Training (Trainers)	63	36.0
Research and Training (Employers)	15	9.0
Government Entities (Employers)	40	22.9
Local and National Groupings (Employers)	35	20.0
Value Chain Actors (Employers)	22	12.6
Total	175	100

With the exception of Research and Training institutions (as Employers), which presented with fewer responses, it can be seen that the rates for the rest of the institutional groupings are reasonably comparable. However, the majority (36%) of the responses came from the Training institutions (as Trainers) followed by government entities, local and national groupings and Value Chain Actors in that order. Regardless of these differences, the overall volume of administered questionnaire of 308 and the response rate of about 57% (175/308) was considered reasonable to proceed with detailed analysis.

3.1.2 Waste Management (WM)

3.1.2.1 Adequacy of employees

The number of existing employees reported by respondents from all the 65 sampled institutions totaled 1766 against the actual requirement of 2935, representing a striking 66% deficit (**Table 3.3**). This shortfall in staff requirements is particularly acute for non-degree academic qualifications, with the maximum deficit at -227% for employees with Certificate level qualifications. By comparison, the higher degrees (Master and PhD levels) were slightly overstaffed by 24-57%. From these results, it becomes immediately apparent that there is a critical need for training of non-degree staff to meet the market demands of the WM sector.

Table 3.3: Existing against required WM staff requirements by academic qualification

	Qualification	Existing	Required	Difference (-)	% Difference (-)
1	Certificate	195	638	(443)	(277)
2	Diploma	349	987	(638)	(183)
3	Bachelor Degree	746	999	(253)	(34)
4	Master Degree	318	243	75	24
5	PhD	158	68	90	57
	Total	1766	2935	(1169)	(66)

3.1.2.2 Employee duties

A total of 94 specific WM duties were listed by 65 employers as currently implemented by their respective employees, regardless of their academic qualifications (**Appendix X - Duties of WM employees reported by their employers**). For ease of interpretation these duties were collapsed to 23 through content analysis (**Figure 3.1**). At the Certificate qualification level, employees tended to deal mostly with waste processing and community mobilization, which comprised > 54% of all their mentioned duties. For Diploma graduates, supervision and community outreach comprised the majority (53%) of their usual duties, while for the Bachelor degree level the main duties shifted to project management as well as research and resources mobilization (47%).

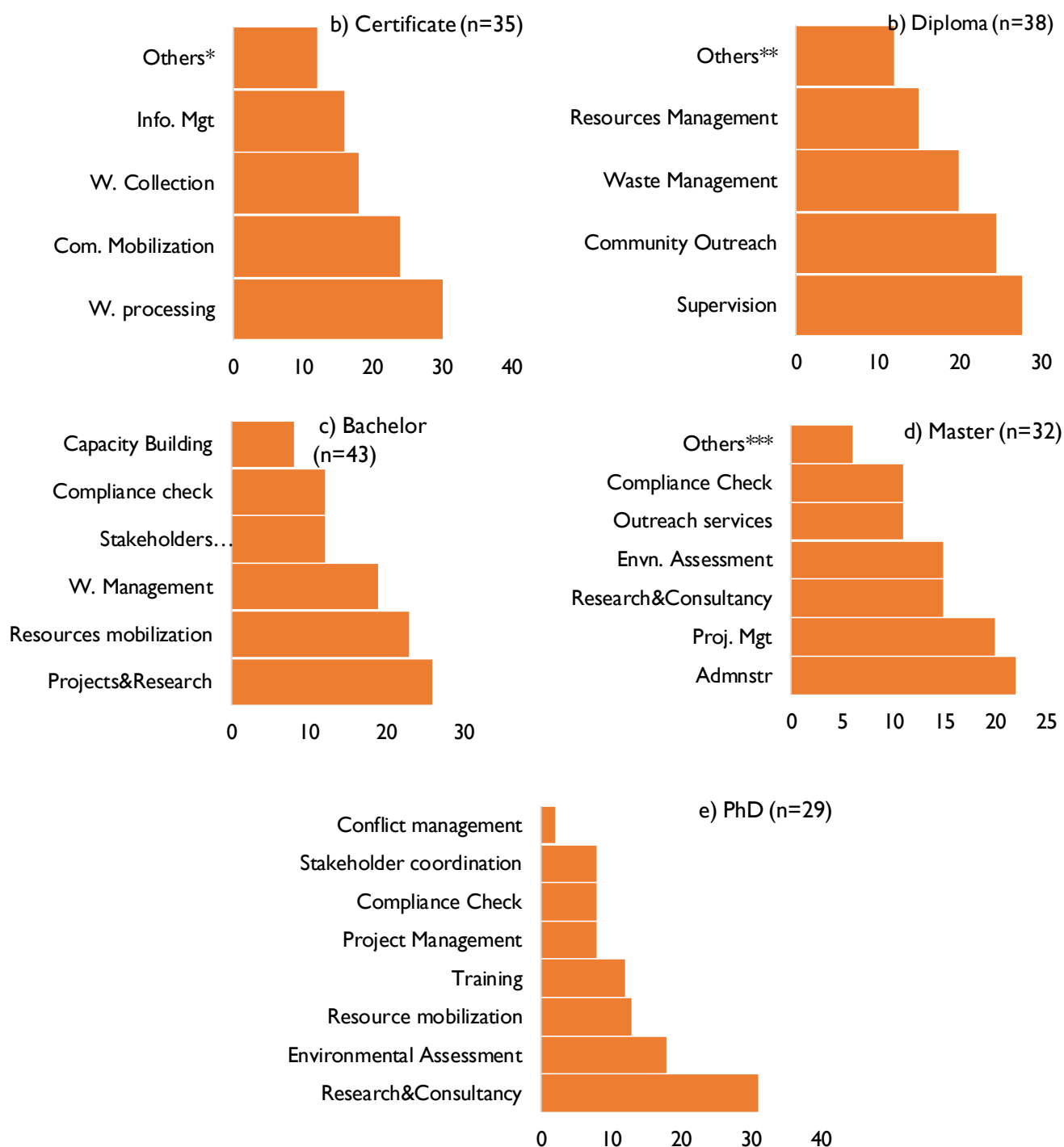


Figure 3.1: Duties expected of WM employees by academic qualification.
 Figures are in % (* Marketing, Resource mobilization and Waste payment collection; ** Planning, Waste regulation and enforcement and Marketing; *** Reporting, Financial resource mobilization and Develop waste management technologies)

For Masters level employees administrative and project management related duties were the highest rated, comprising about 42% of their overall duties while the PhD graduate employees were mainly (49%) pre-occupied by environmental assessments and research as well as consultancy related duties. This ground-scenario, points to a clear separation of the main duties by academic qualifications, with

more hands-on duties performed by non-degree employees compared to those related to managerial or supervisory and research duties for degree graduates

3.1.2.3 Competencies of the employees

Employers listed a long list of 72 competencies as expected of WM employees for them to perform their duties efficiently (**Appendix XI**). This raw list was distilled down to 25 through content analysis for ease of analysis and interpretation. **Figure 3.2** is the ranking for the importance these competencies, as opined by employers. Similar to the picture on expected duties (see **3.1.2.2**) a clear separation of expected competences by academic qualifications emerged. Non-degree employees were expected by employers to be better equipped in hands-on competencies (e.g. waste management for certificate level) as opposed to managerial, research and supervisory competencies for those with degree level qualifications.

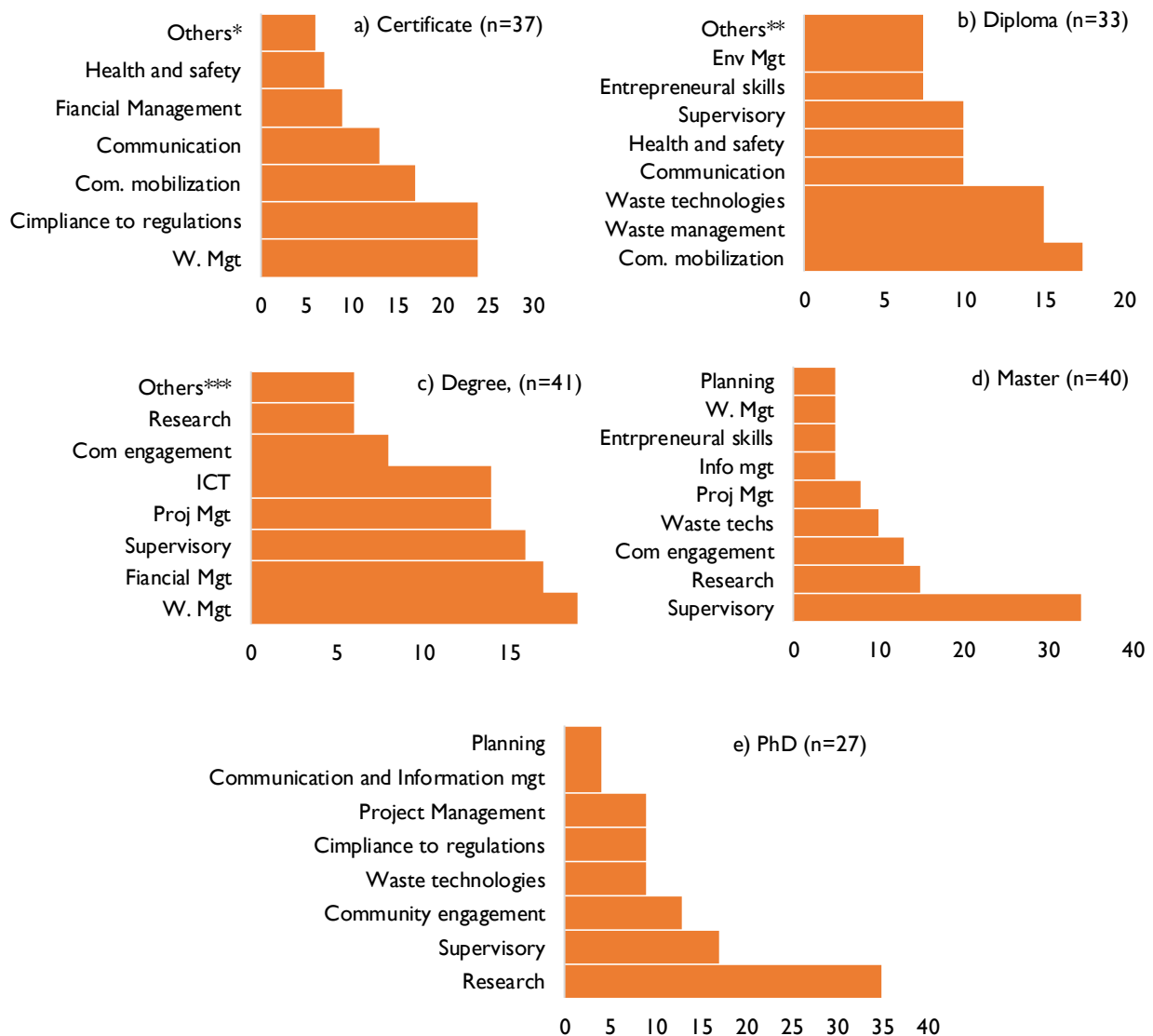


Figure 3.2: Competencies expected of WM employees by academic qualification.
Figures are in % (*Waste technologies and Artisanal/Craftmanship; **Research, Planning and Conflict resolution; ***Artisanal/Craftmanship and Planning)

3.1.2.4 Attributes for Recruitment

Employers were asked to rank in order of importance (High, Medium, Low) of each of the 10 key attributes considered useful for employment in the WM sector. The findings (**Fig. 3.3**) show that environmental and waste management (CWM), Innovation and technology (IPT), and Working experience (RWP) are the three most critical.

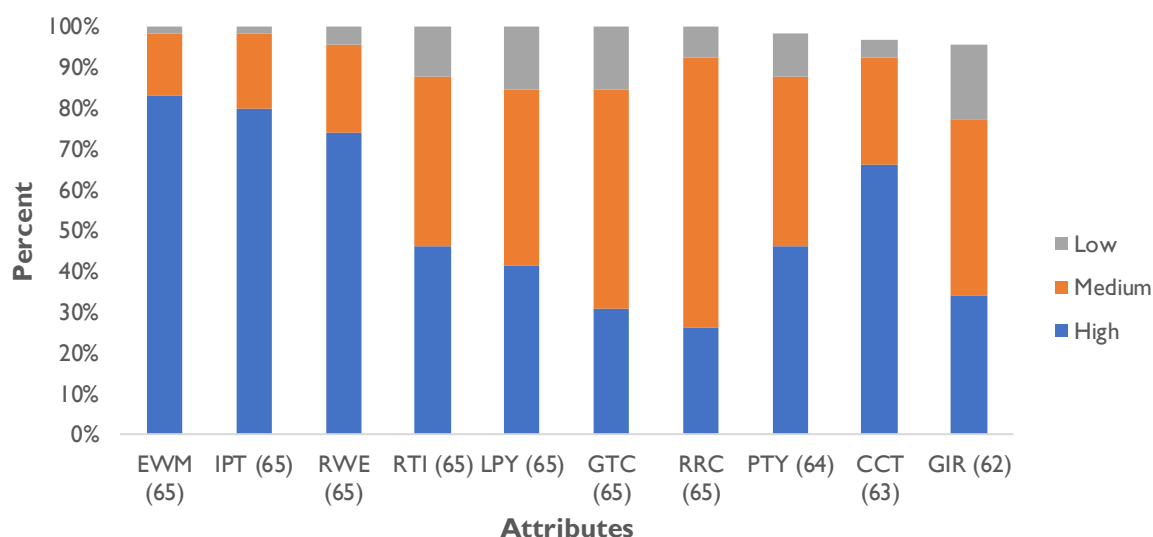


Figure 3.3: Importance of recruitment attributes⁶ for WM employees.
Numbers in parentheses are sample sizes

3.1.2.5 Employees soft skills

A total of ten (10) soft skills (**Figure 3.4**) were mentioned by employers as imperative for effective delivery of duties in WM. Amongst these, creative and innovative minds were prioritized by most participants (19% of 40 respondents), followed by Problem solving skills (16% of 35 respondents) and Communication and leadership skills (14% of 30 respondents). Overall, these results depict the importance for the WM employees to be both innovative and creative. Thus, it is key to prepare curricula that encapsulate these critical aspects.

⁶ EWM=Competence in Environment & Waste Management, PNY=Personality, IPT=Innovation and Proficiency in Technologies, LPY=Language Proficiency, CCT=Curriculum Content, RWE=Relevant Working Experience, GIR=General Interview Results, RTI=Reputation of Training Institute, GTC=Grades in the Transcript (GPA), RRC=Referees' Recommendations

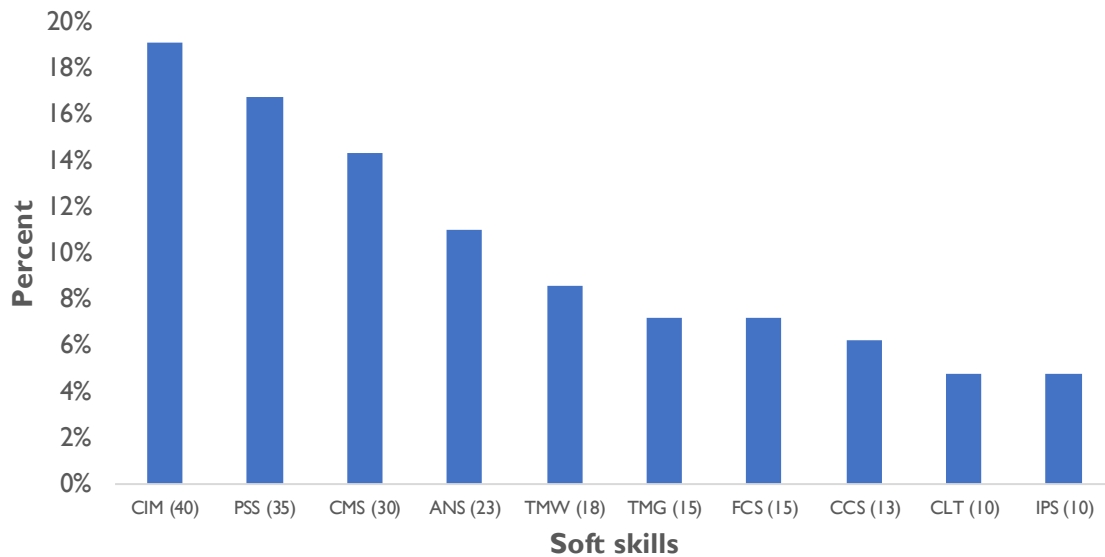


Figure 3.4: Soft skills⁷ needed for WM employees.
Numbers in parentheses are sample sizes

3.1.2.6 Labor market demand for Academic programs

WM Employers were also asked to prioritize the importance of the academic programs currently on offer in view of the job market situation. Master degree, Bachelor degree and Diploma level programs were considered the most needed (**Fig. 3.5**).

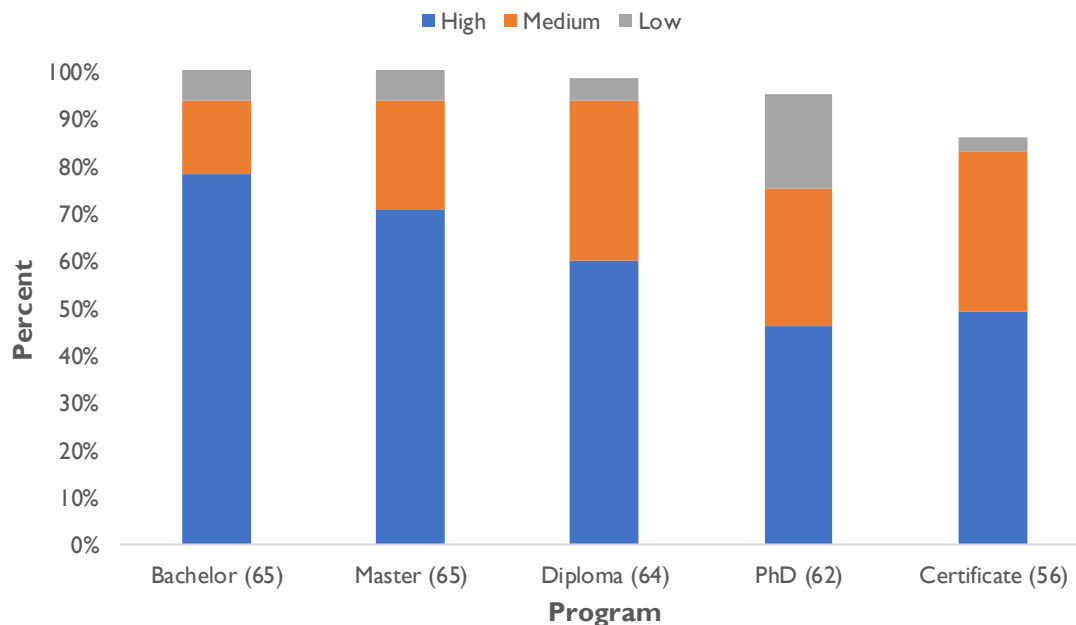


Figure 3.5: Labor market demand for WM academic programs.
Numbers in parentheses are sample sizes

⁷ CIM=Creative with innovative minds, PSS=Problem solving skills, CMS=Communication skills, leadership & decision-making skills, ANS=Analytical skills, TMW=Teamworking, TMG=Time management, FCS=Facilitation skills, CCS=Customer-care skills, CLT=Computer literacy, IPS=Interpersonal skills

3.1.2.7 Additional stakeholder comments for improving the Curricula contents for WM Programs

- i. Ensure sufficient innovation coupled with practical skills
- ii. Address the social and behavioral aspects of employees
- iii. Include community engagement strategies and communication skills, as well as Circular Economy concepts
- iv. Include Environmental Software skills
- v. Proper balancing of Theory and Practice

3.1.2.8 WM related courses currently on offer

Extensive literature search revealed a large volume of WM related courses on offer in the four Target countries. These are summarized in **Appendix XII (List of WM related courses offered in Training Institutions)**. These courses are diverse covering more than 40 modules but mostly cover undergraduate and post-graduate programs, and to a lesser extent Diploma levels. That WM training within the region is heavily inclined towards degree (as opposed to non-degree) courses is in close agreement with the prevalent scarcity of non-degree WM employees, as depicted by a questionnaire survey in this study (see section 3.1.2.1).

3.1.2.9 Theory to Practical Ratio and Time Sufficiency

Another question posed to trainers was whether or not the WM modules reflected the curricular in name and content, and the ideal theory to practical ratio in training. On the whole, surprisingly few respondents replied this category of questions, which complicates firm interpretations. However, most 40% of trainers (n=11) preferred a 3:2 ratio for Theory to Practical components (**Figure 3.6**), which is fairly reasonable, while the majority (59%) of respondents (n=13) indicated that time allocated to teaching of these WM modules was 'good'.

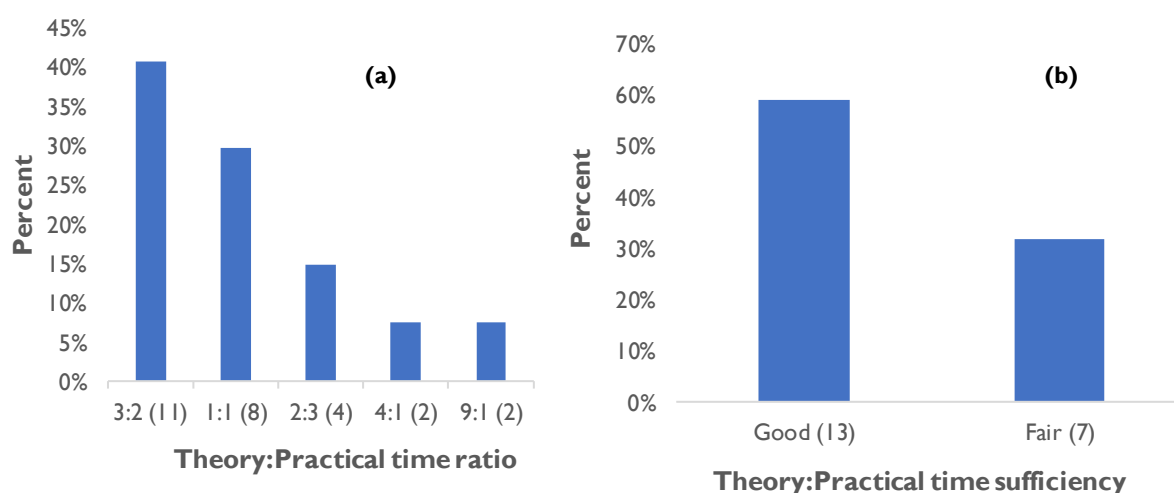


Figure 3.6 : (a) Theory: Practical ratio and (b) Sufficiency of time allocated.
Numbers in parentheses are sample sizes

3.1.2.10 Teaching aids and learning facilities

Training staff were also asked to indicate whether or not teaching aids and learning facilities were available and adequate, respectively. Only about half of respondents were in agreement that the adequacy of these facilities was 'good' (**Fig. 3.7**).

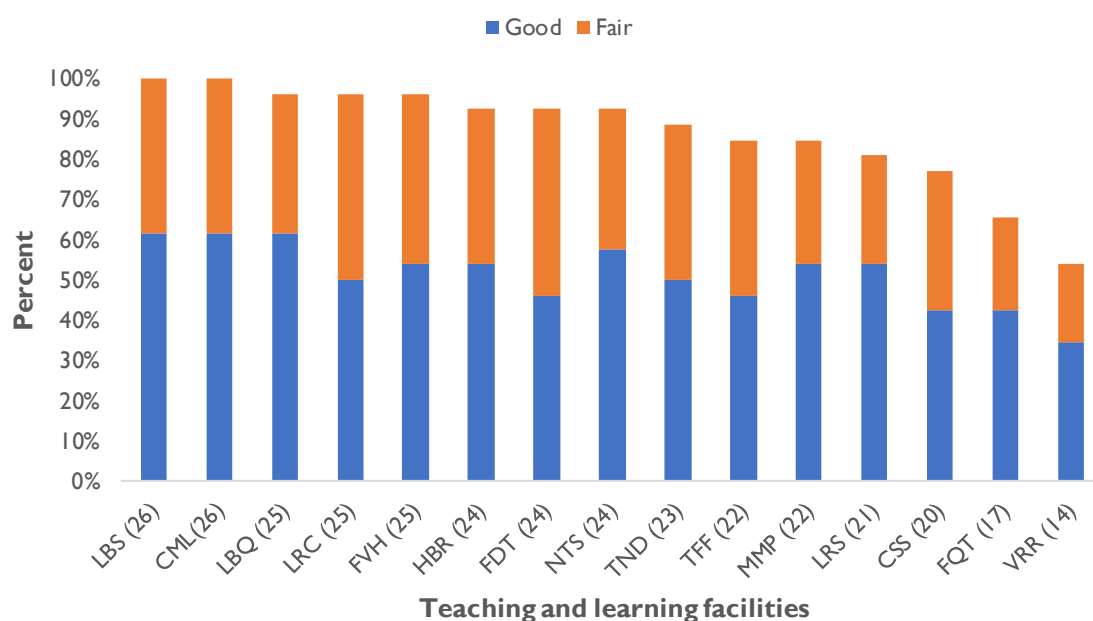


Figure 3.7: Adequacy of teaching facilities⁸ in WM Academic Institutions.
Numbers in parentheses are sample sizes

Similarly, the quality of the teaching aids and learning facilities was rated as 'good' by about half of respondents (**Fig 3.8**). These mixed results indicate that adequacy as well as quality of WM teaching facilities and aids are far from ideal hence need substantial improvements.

⁸ LBS= Laboratory Space, LBQ=Laboratory Equipment, CML=Computer Lab, NTS=Internet Services, FVH=Field vehicles, HBR=Herbarium, MMP=Multimedia Projector, LRS=Library space, LRC=Library Collection TND=Teaching Aids, FDT=Field Tents, TFF=Other field facilities, FQT=Field equipment, CSS=Classes, VRR=Overall rating

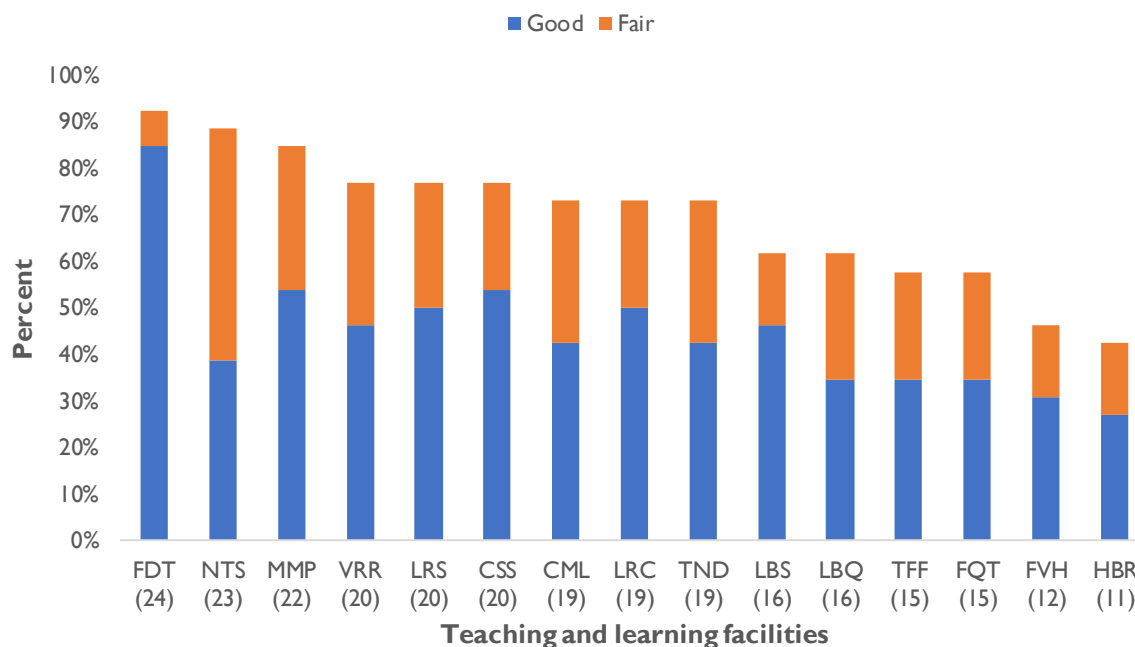


Figure 3.8: Quality of teaching facilities in WM Academic Institutions.
Numbers in parentheses are sample sizes

3.1.2.11 Source of teaching and learning materials

About 34% (n=20) of trainers highlighted textbooks, while 25% (n=13) mentioned Journal articles as teaching materials for competence-based training, respectively. Other options mentioned were hand-outs, brochures and research reports. Professional experience was also highlighted as a key enabler of the learning process. Existing teaching and learning materials were considered up-to-date (**Appendix XIII**) by the majority (92%) of respondents (n=23).

3.1.2.12 Teacher-Student interactions

The majority (69.2%, n=18) of the trainers acclaimed that classroom space was adequate for effective teacher-student interactions. Moreover, the teacher-student interaction for both laboratory, field practical, seminar presentation and lecture learning sessions combined were mainly rated as good or excellent (94%, n=97). About 65.4% (n=17) of the respondents affirmed that class- contact hours are reasonably adequate to facilitate effective learning.

3.1.2.13 Student Assessment

Most student assessments are in the form of a 'Combination of Periodical Examinations and Continuous Assessments', (47%; n=17), as opposed to 'Only Continuous Assessments', (36%; n=13) or 'Only Periodical Examinations' (17%; n=6) (**Fig. 3.9**).

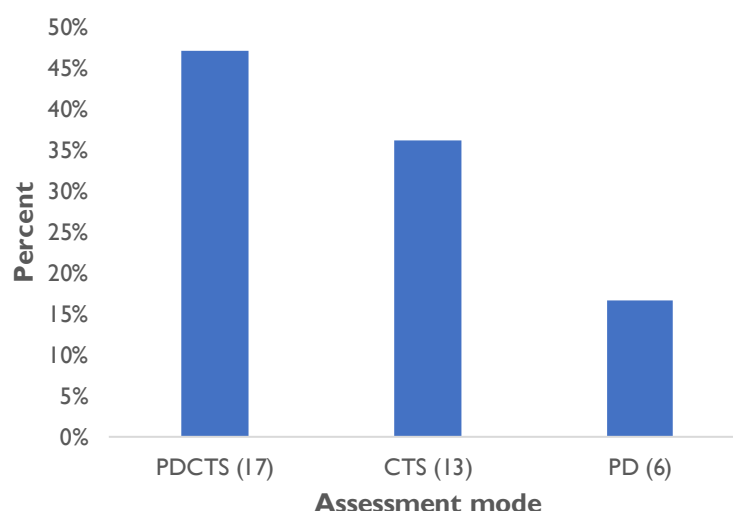


Figure 3.9: Preferred student assessment methods⁹ for WM-related modules.
Numbers in parentheses are sample sizes

Regarding allocation of marks, most respondents (58%; n=15) indicated preference for a 3:2 ratio for continuous assessment: final examinations. Essay type as well as problem solving questions are awarded 40% (n=18) each. Regarding both setting and marking of the exams, 'Vetted Individual-Panel Moderated' was indicated as the method of choice in examination moderation (42%; n=11 and 65%; n=17), respectively.

3.1.2.14 General comments by trainers affecting the implementation of WM training programs

- i. Teaching environment should be adequate to enable students and lecturers to attain their goals
- ii. Incorporate real challenges on the module to expose students to real WM practicalities
- iii. Integrate other modules
- iv. Capture trans-boundary issues related to waste management
- v. Adopt technology and innovation to address environmental issues
- vi. Emphasize on Student Centered Learning

3.1.3 Natural Resources Management (NRM)

3.1.3.1 Status of employees

Table 3.4 shows the total number of 1,280 existing employees from 60 sampled CBNRM related institutions against the requirements of 2,387, representing a deficit of about 46.4%. Interestingly, similar to the situation in the WM sector, the non-degree qualifications were the most hit compared

⁹ PDCTS= Periodical Examination and Continuous Assessment; CTS= Continuous Assessment; PD= Periodical Examination

to degree qualifications. Thus, there is also a need to train more of the non-degree employees in the NRM labor market.

Table 3.4: Number of existing employees in CBNRM compared to requirements by academic qualification

	Qualification	Existing	Required	Difference (-)	% Difference (-)
1	Certificate	557	1,628	(1,071)	(192)
2	Diploma	143	214	(71)	(50)
3	Bachelor Degree	347	352	(5)	(1)
4	Master Degree	158	143	15	9
5	PhD	75	50	25	33
	Total	1,280	2,387	(1,107)	(46.4)

3.1.3.2 Employee duties

A total of forty-seven (47) employers reported on 57 specific duties performed by employees of different academic qualifications (**Appendix XIV**). Content analysis simplified these into 18 duties as shown in **Figure 3.10**. Non-degree (Certificate and Diploma holders), employees tended to engage more or less in field and outreach duties, which comprised > 50% of all their duties. For those with Bachelor Degree qualifications, the spectrum of duties widened but dominated by Resource mobilization (28%). For employees with Master degree level qualifications, resource mobilization and project management combined comprised 42% of their duties, while PhD level holders engaged mostly in research and consultancy (36%). Overall, similar to the situation in WVM, these results show that on the ground, there is a clear separation of duties by academic qualifications levels.

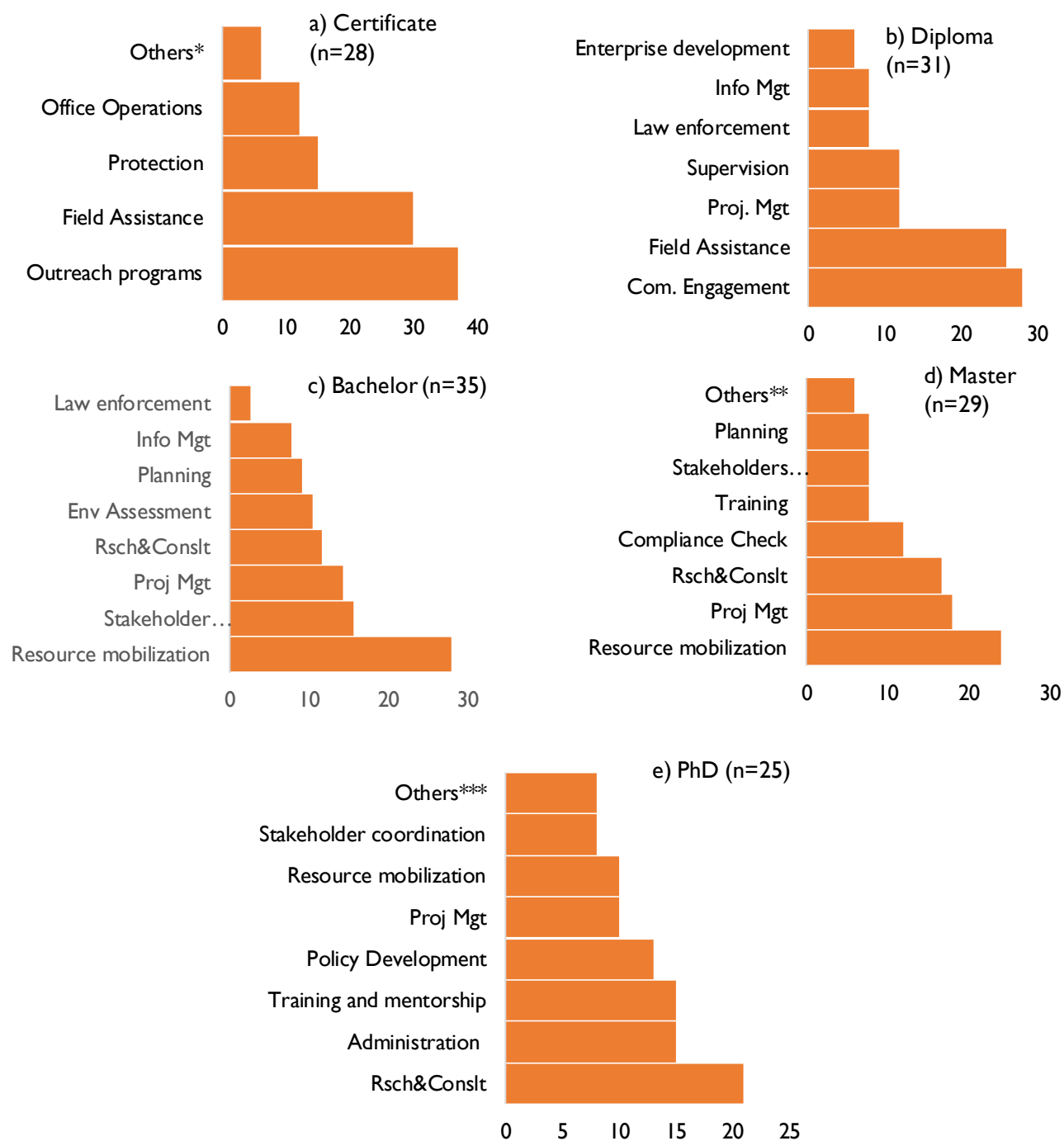


Figure 3.10: Duties expected of CBNRM employees by academic qualification.
 Figures are in % (* Reporting, Facilities management, Tourism operationsHabitat Management;
 **Information Management, Enterprise Management, Technology development, Conflict resolution and
 Management; ***Business Management, HWC Management, Technology Management, and Information
 Management)

3.1.3.3 Competencies of the employees

A total of 53 competencies were mentioned by Employers as important for CBNRM employees for them to perform their duties efficiently (**Appendix XV**). To simplify interpretation, these were

collapsed into 12competences (**Figure 3.11**). Unlike in the WM component (see 3.1.2.3), there appears to be no clear-cut trend in the order of preference of these key competencies by employers. However, information and communication were cross-cutting, regardless of the level of academic qualifications. These results appear perplexing and should be further scrutinized during the Curricula development process.

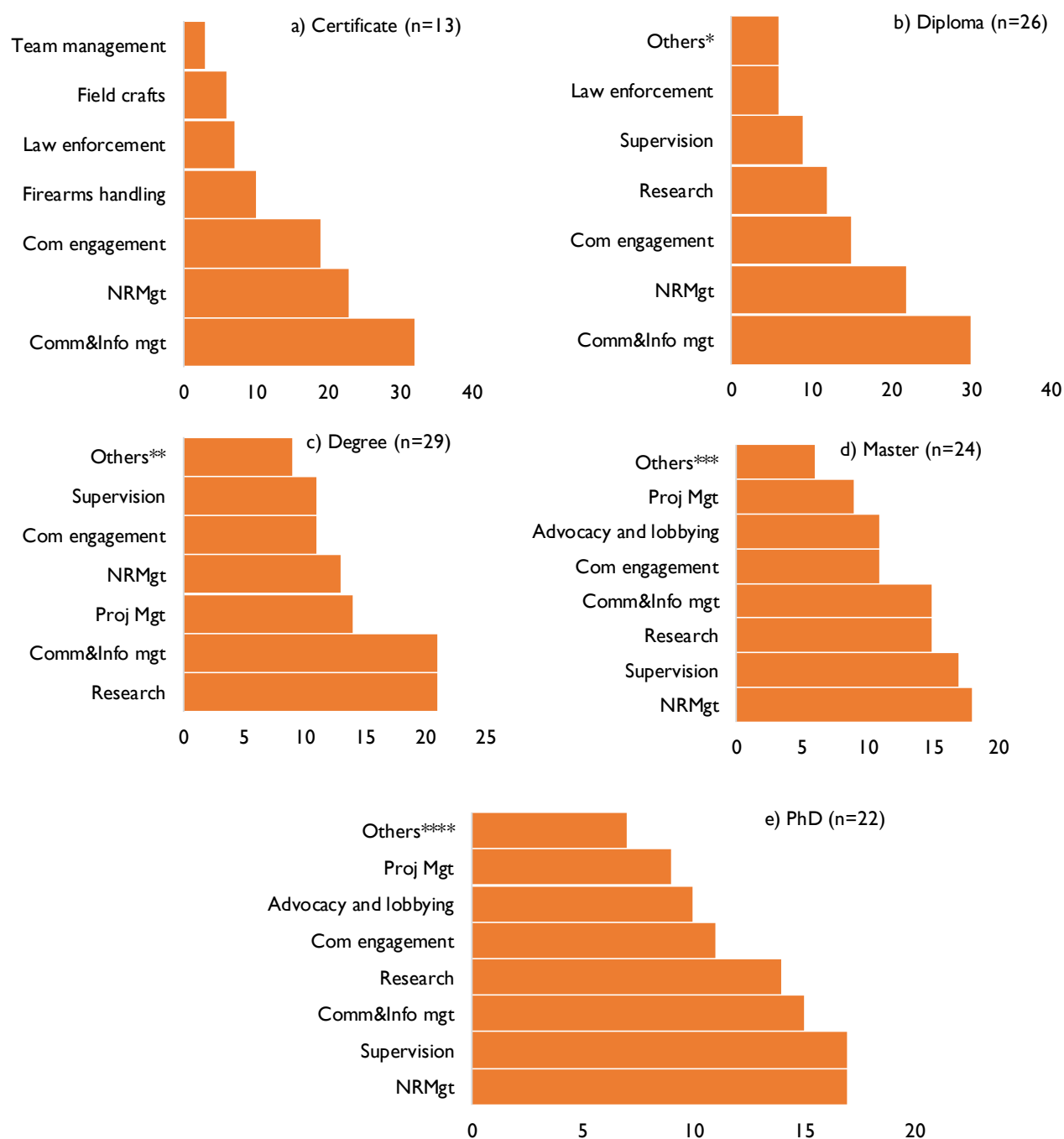


Figure 3.11: Competencies expected of CBNRM employees by academic qualification. Figures are in % (*Field crafts and Project Management; **Law enforcement, Field crafts and Entrepreneurship; *Law enforcement and Entrepreneurship; ****Regulatory compliance, Entrepreneurship and Resource mobilization)**

3.1.3.4 Attributes for recruitment

The importance of ten (10) employee recruitment attributes were subjected to ranking (i.e. high, medium and low) by employers. The results are summarized (**Fig 3.12**), which shows that Employers considered CCBNRM, NPT and RWP as most important of these attributes.

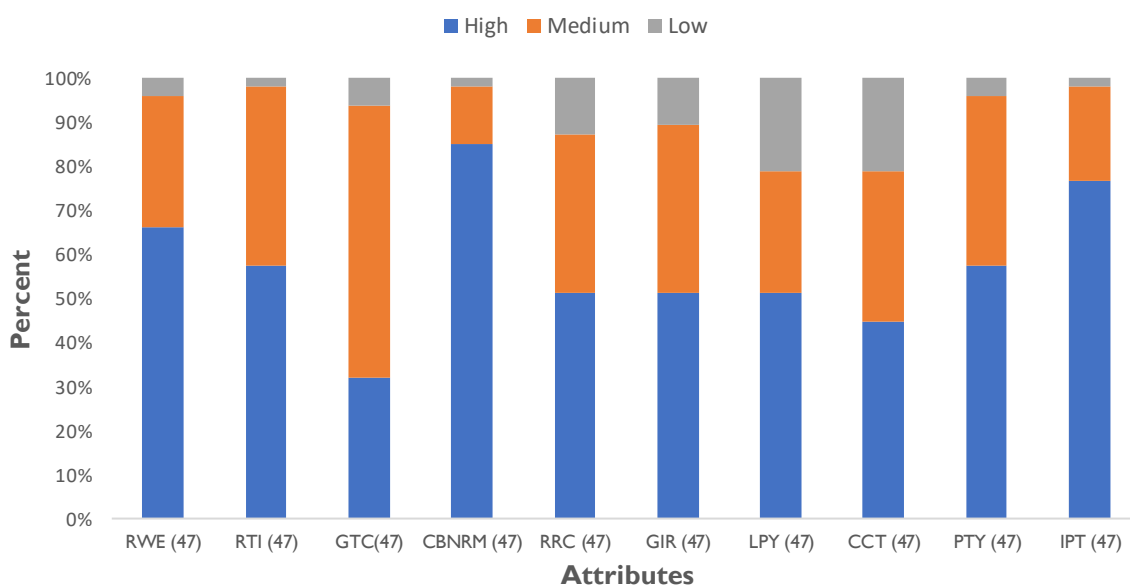


Figure 3.12: Importance of recruitment attributes¹⁰ for CBNRM employees.
Numbers in parentheses are sample sizes

3.1.3.5 Employees soft skills

Figure 3.13 entails the prioritization of employee soft skills by employers. It is striking that the great majority (85%; n=40) of them ranked creativity and innovation as critical. These twin aspects of creativity and innovation are thus crucial and should therefore be accorded due consideration in the process of CBNRM curricular development.

¹⁰ RWE=Relevant Working Experience, RTI=Reputation of Training Institute, GTC=Grades in the Transcript (GPA), CBNRM=Competence in Community Based Natural Resource Management, RRC=Referees' Recommendations, GIR=General Interview Results, LPY=Language Proficiency, CCT=Curriculum Content, PTY=Personality, IPT=Innovation and Proficiency in Technologies

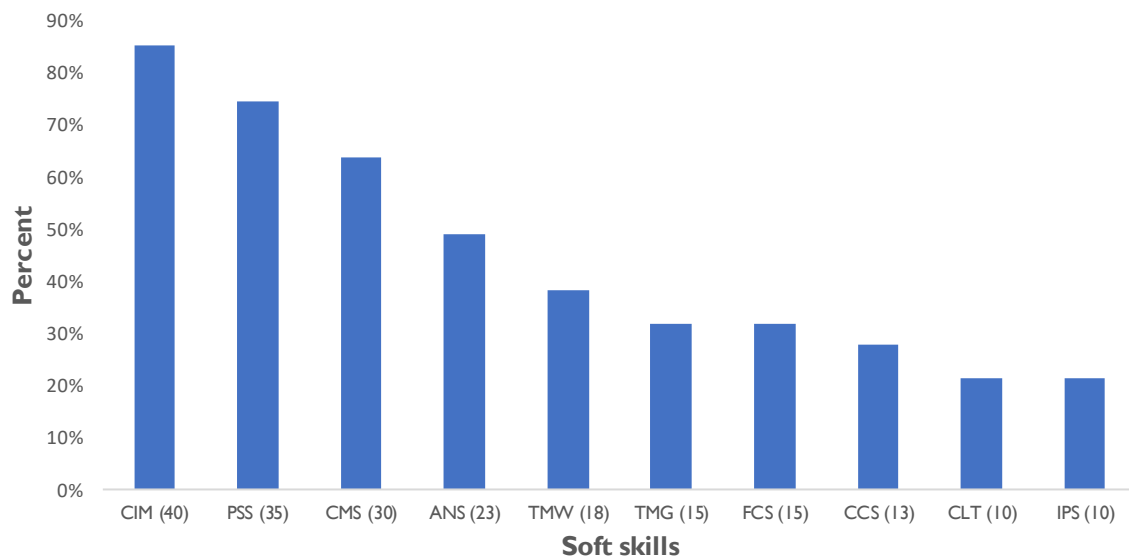


Figure 3.13: Soft skills¹¹ needed for CBNRM employees.
Numbers in parentheses are sample sizes

3.1.3.6 Importance of Academic programs in the labor market

On the importance of existing academic programs in the existing job market, 60-90% of CBNRM Trainers indicated Bachelor degree, Diploma and Certificate as the most important as opposed to higher degrees.

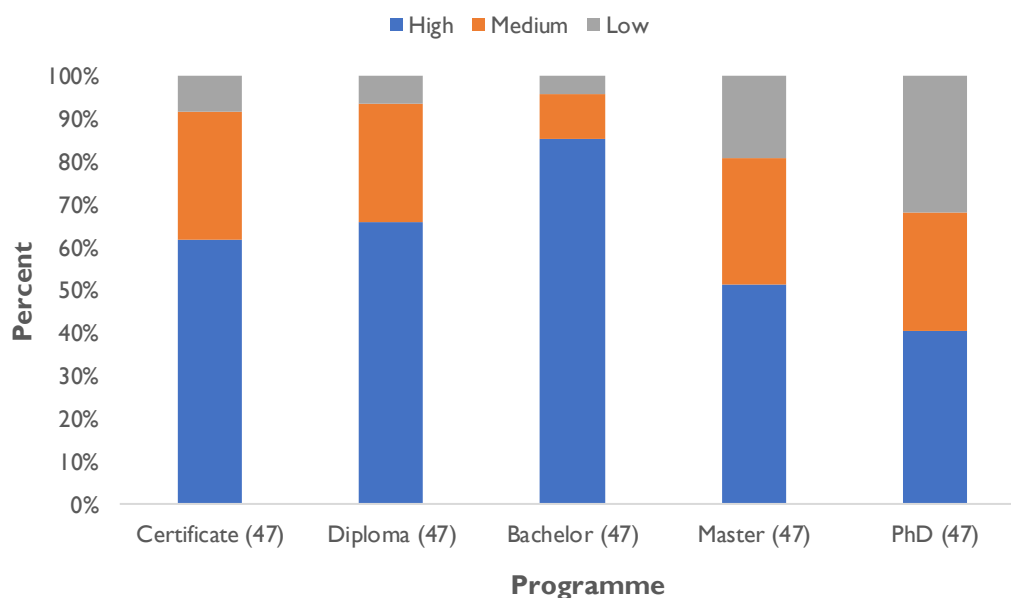


Figure 3.14: Labor market demand for CBNRM academic programs.
Numbers in parentheses are sample sizes

¹¹ CIM=Creative with innovative minds, PSS=Problem solving skills, CMS=Communication skills, leadership & decision-making skills, ANS=Analytical skills, TMW=Teamworking, TMG=Time management, FCS=Facilitation skills, CCS=Customer-care skills, CLT=Computer literacy, IPS=Interpersonal skills

3.1.3.7 Comments to improve content of curricula related to CBNRM Programs

- i. The programs need to practical oriented.
- ii. Include entrepreneurship (Enterprise development) and Geo-information science
- iii. Include CNRM co-management and benefit sharing aspects
- iv. Incorporate climate changes and technological issues

3.1.3.8 CBNRM-related courses

Appendix XVI is a list of CBNRM related literature-sourced programs. There are over 60 such programs, addressing a wide range of academic fields and levels but (similar to a situation in WM), they are somewhat skewed towards degree programs.

3.1.3.9 Theory to Practical Ratio and Time Sufficiency

The majority (94.5%) of trainers (n=35) indicated that the CBNRM module names reflected the respective contents and that the modules sufficiently addressed the curricula (78.3%; n=29). Practical components were considered essential by 67.6% (n=25) of respondents. Their suggestions on time allocation to practical/theoretical training are given in **Figure 3.15**. They mostly (42%; n=16) indicated preference for a Theory: Practical ratio of 3:2. The majority also (44%; n=16) also rated the ration of time allocation for theory and practical sessions was 'good'. The point of emphasis here is the need to maintain a fair balance of the theoretical and practical training components.

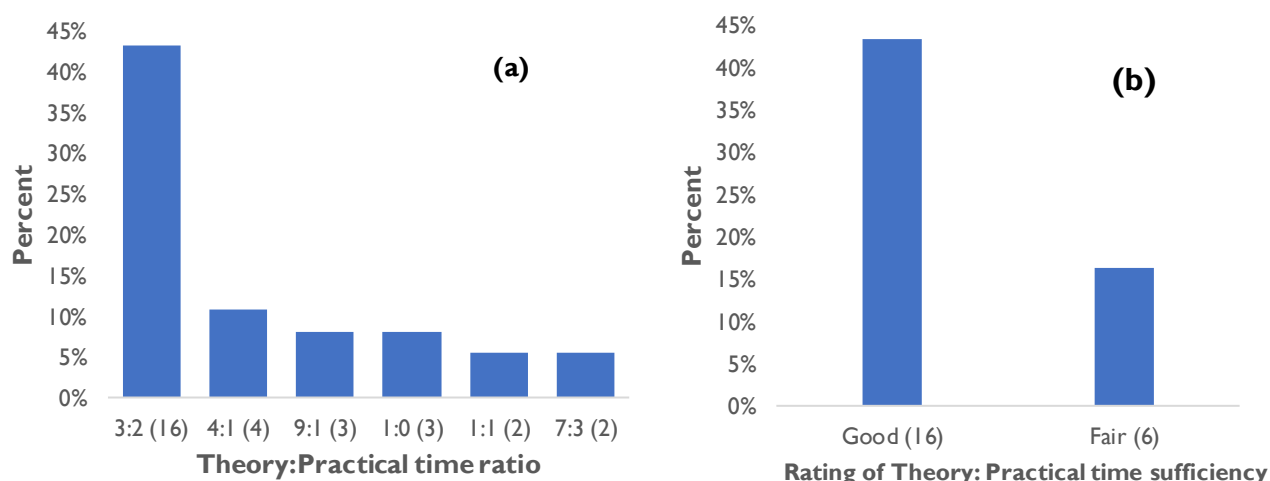


Figure 3.15: (a) Theory: Practical ratio (b) Sufficiency of time allocated.
Numbers in parentheses are sample sizes

3.1.3.10 Teaching aids and learning facilities

The trainers were also requested to comment on availability, adequacy and quality of teaching aids and learning facilities. Availability of teaching facilities and aids were considered fairly well by only about 50% of the respondents (**Fig. 3.16**). Facilities were mostly reported as 'good' enough to facilitate

competence-based learning (**Fig. 3.17**). The quality of teaching aids and learning facilities were also generally rated as ‘good’ (**Fig. 3.18**). Thus, scarcity of teaching facilities and aids appears to be an issue of concern here.

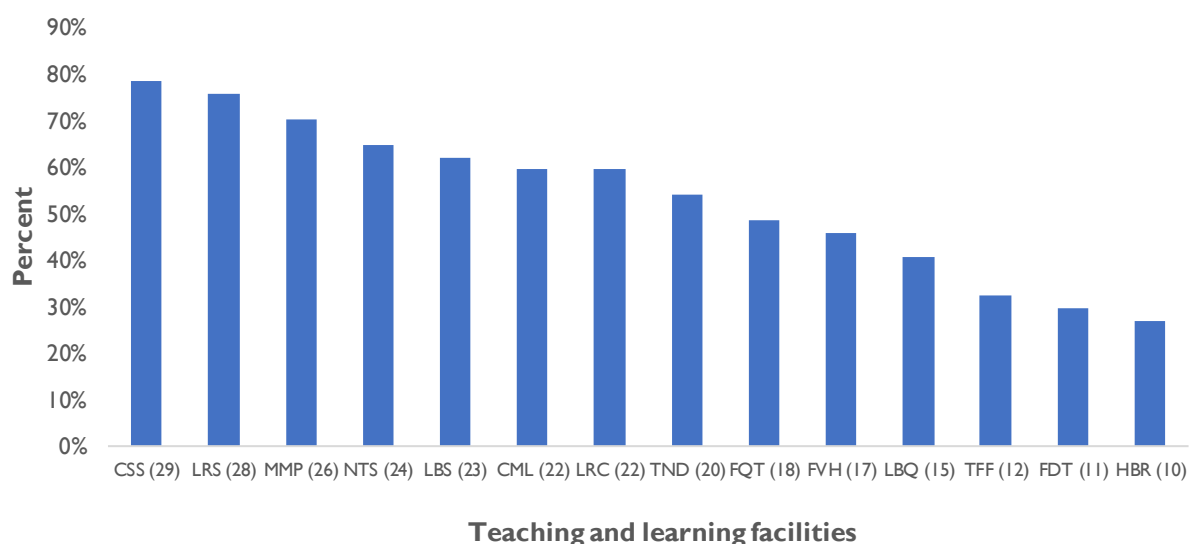


Figure 3.16: Percent of respondents replying ‘yes’ on availability of teaching facilities¹². Numbers in parentheses are sample sizes

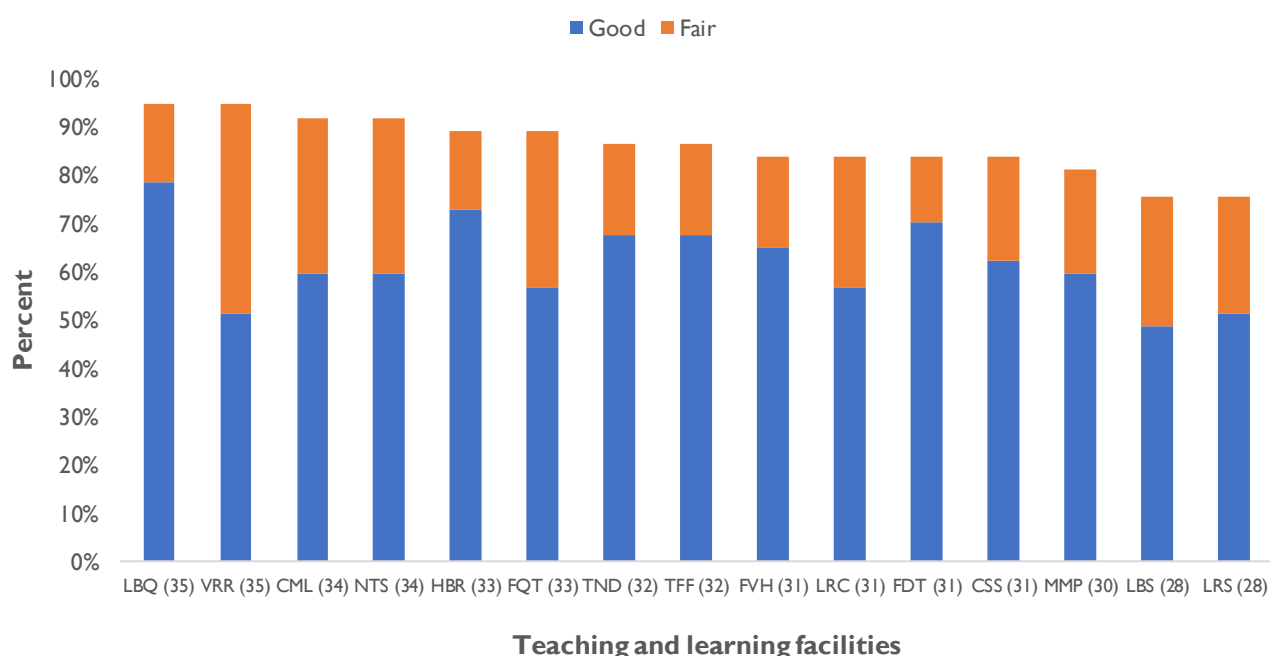


Figure 3.17: Adequacy of teaching facilities in CBNRM Academic Institutions. Numbers in parentheses are sample sizes

¹² LBS= Laboratory Space, LBQ=Laboratory Equipment, CML=Computer Lab, NTS=Internet Services, FVH=Field vehicles, HBR=Herbarium, MMP=Multimedia Projector, LRS=Library space, LRC=Library Collection TND=Teaching Aids, FDT=Field Tents, TFF=Other field facilities, FQT=Field equipment, CSS=Classes, VRR=Overall rating

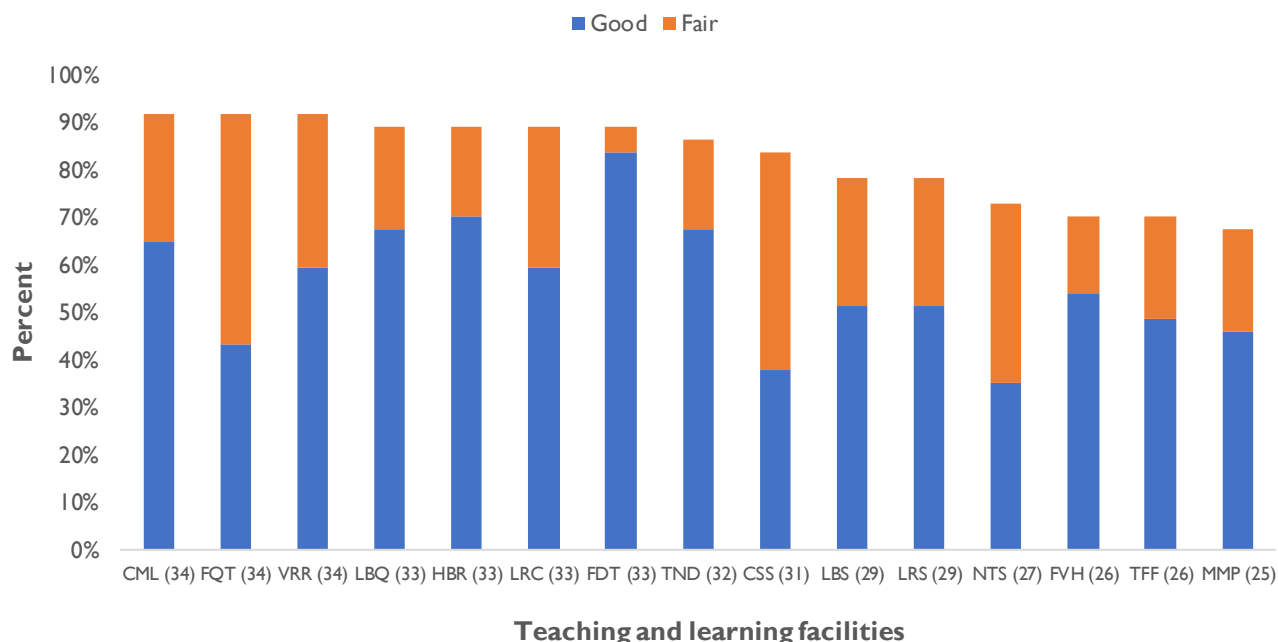


Figure 3.18: Quality of teaching facilities in CBNRM Academic Institutions.
Numbers in parentheses are sample sizes

3.1.3.11 Sources of teaching and learning materials

Books were mentioned by the majority (38.7%; n=29) of trainers as references for facilitating competency-based learning. The corresponding figure for Journal articles was 25.3 % (n=19). Online sources, hand-outs, professional experience in the sector as well as brochures and research reports were also mentioned. Notably, the majority (78.4%; n=29) of the respondents indicated that these training materials (**Appendix XVII**) were up-to-date.

3.1.3.12 Teacher-Student interactions

Most (74.5%; n=35) respondents acclaimed that classrooms space was fairly suitable for effective teacher-student interactions during the learning sessions. Moreover, laboratory, field practical, seminar presentation and lecture learning sessions combined were rated as 'good' or 'excellent' by 82% (n=120) of respondents, while 81% of them (n=30) affirmed that in-class teacher-student contact hours were adequate to facilitate learning. Overall, the circumstances for enhancing teacher-student classroom interaction appears reasonably good.

3.1.3.13 Assessment mode and procedures

Figure 3.19 shows that 49% (n=17) of the academic staff preferred a 'Combination of Periodical Examination and Continuous Assessment' as the main mode of student assessment.

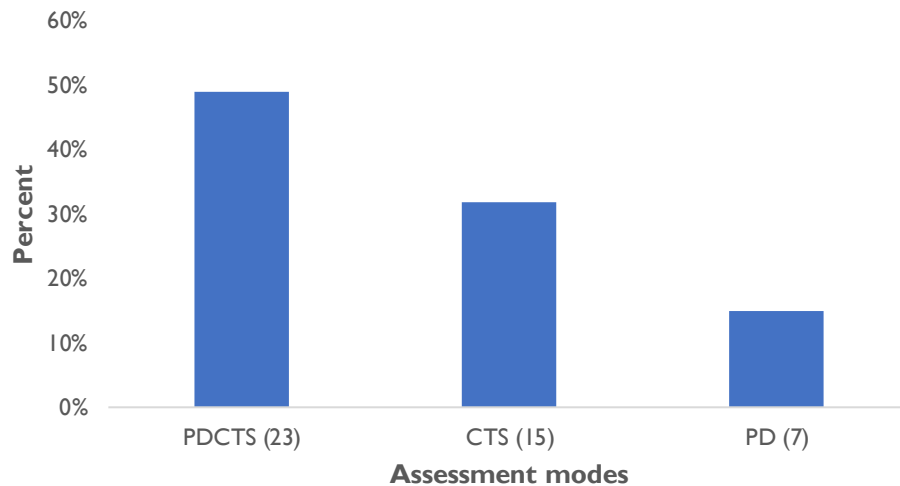


Figure 3.19: Preferred student assessment methods¹³ for CBNRM-related modules.
Numbers in parentheses are sample sizes

As for the allocation of marks, 70.3% of them (n=26) indicate a ratio of continuous assessment to final examination as 3:2. As for examination setting and marking, “Inspected Individual-Panel Moderated” was pinpointed as a method of preference for examination moderation by most (72.9%; n=27) respondents.

3.2.3.14 General comments on CBNRM training programs

- i. Emphasize on student-centered learning
- ii. Evaluate and adapt teaching methods based on preferences and needs
- iii. Adopt In-service teaching courses for junior instructors
- iv. Promote problem-solving skills for students
- v. Adopt nature-based solutions to conservation challenges
- vi. Promote student industrial attachments to enhance their skills

¹³ PDCTS= Periodical Examination and Continuous Assessment; CTS= Continuous Assessment; PD= Periodical Examination

CHAPTER IV: CONCLUSIONS & RECOMMENDATION

This TNA exercise has surfaced a number of critical findings related to WM and CBNRM training especially in view of incorporating R&I components. From the findings, several conclusions and recommendations can be made as follows:

1. Overall, there is an acute scarcity of WM and CBNRM staff; particularly for non-degree although this is the qualifications most needed on the ground. The training is therefore not demand driven. There is a therefore clear need to train more of non-degree staff.
2. The ongoing training on WM and CBNRM is not particularly sensitive to R&I components although. There is a need to ensure the Curricula under preparation incorporate appropriate R&I components.
3. Employers expect clear-cut but gradual qualification-related separation of duties for employees from hands-on for non degrees to managerial and supervisory duties for degree staff. The Curricula under preparation should therefore reflect this need in content and structure.
4. Creativity and innovation in addressing WM and CBNRM emerged as key competencies under demand. The training Curricula under preparation should therefore ensure the graduants are adequately both creative and innovative in addressing WM and CBNRM challenges.
5. Information and Communication soft skills appear to be another WM and CBNRM training component in relatively high demand. These should as well be dully considered in the process of Curricula development.
6. The quality and adequacy of training facilities were at most rated at about 50%, which is raises concerns. To embark on major changes Training it is paramount to have measures in place to improve the training environment.

Appendix I: Questionnaire for obtaining feedback from employers to enrich the curricula development process

PART I: INTRODUCTION

Dear esteemed respondent,

The College of African Wildlife Management (CAWM), Mweka is currently reviewing and developing curricula related to Waste Management (WM) in SADC region. In order to accomplish this task, the College is conducting Training Needs Assessment to establish Labour market demands. As an important stakeholder, you are hereby requested to complete this questionnaire towards development of client oriented and competence-based curriculum. Your contribution is highly valued and appreciated.

PART II: CHARACTERISTICS OF THE EMPLOYER

I a) Institution name.....

I b) Physical Address.....

I c) E-mail.....

I d) Mobile Number.....

I e) Institutional category

Government Entity	()
Research and Training Institution	()
Local and National Grouping (NGO, CBO, CSO)	()
Value Chain Actor (Private institution)	()
Expert Group	()

I f) The main function(s) of your institution

Waste Management	()
Tourism	()
Research	()
Training	()
Community Development Initiatives	()

Others (please specify)

2 Current *number* of Waste Management related employees in your institution with the following qualifications (Please indicate the current number and required number of employees **e.g. Current number for Certificate: 23, Required number for Certificate: 40**)

SN	Qualification	Current number	Required number
2	Certificate		
3	Diploma		
4	Bachelor Degree		
5	Master Degree		
6	PhD		

3. Please rank the following attributes in order of importance considered during recruitment of personnel related to Waste Management

ATTRIBUTE	EXTENT OF IMPORTANCE [Please Tick as Appropriate]		
	Very important	Moderately Important	Not Important
Relevant working experience			
Reputation of Institution where the applicant was trained			
Contents of the completed professional program			
Grades in the transcript (GPA)			
Practical competence on waste management			
General practical experience			
Referees' recommendations			
General interview results			
Language proficiency			

Oral communication			
Self confidence			
Personality			
Proficiency in technologies			
Innovative ability			
Other (<i>Specify</i>):			

PART III: HUMAN RESOURCE REQUIREMENTS

4 a) Please list the specific duties to be performed by employees/personnel with different academic qualifications related to Waste Management

Qualification	Specific duties performed with employees
Certificate (E.g., Certificate in Waste Management)	
Diploma	
Bachelor Degree	
Master Degree	
PhD	

5 a) Please provide expected competence for effective delivery of duties related to Waste Management in your institution

Qualification	Expected competence
Certificate	
Diploma	
Bachelor Degree	
Master Degree	
PhD	

5 b) Please suggest additional competence necessary for employees related to Waste Management your institution (**List the competence based on qualification**)

5 c) Please provide soft skills required for effective delivery of duties related to Waste Management in your institution (e.g., **Communication, teamwork, time management**)

	Soft skills corresponding to Organization core duties (e.g., Communication, teamwork, time management)
1.	
2	
3	

6 In your opinion, how important are the following programs in the labor market?

PROGRAM	Very important	Important	Not Important
Certificate in Waste Management			
Diploma in Waste Management			
Bachelor Degree in Waste Management			
Master Degree in Waste Management			
PhD in Waste Management			

7. Please provide any other comments to improve content of curricula related to Waste Management Programs.....

Thank you very much for your time!

Appendix II: Questionnaire for seeking feedback on curriculum content from academic staff

PART I: INTRODUCTION

Dear esteemed respondent,

The College of African Wildlife Management (CAWM), Mweka is currently in the process of reviewing or developing curricular related to Waste Management in SADC region. To accomplish this task, the College is conducting a situation

analysis as part of the process. The College therefore, requests you as an academic staff to kindly fill in the Questionnaire hereunder for the curriculum review and development process. **Thank you for continued cooperation.**

PART II: PARTICULARS OF THE ACADEMIC STAFF

- I a) Institution name.....
 I b) Designation (e.g., Lecturer, Professor)
 I c) Physical address.....
 I d) Email.....
 I e) Mobile number.....
 I f) Department.....

2 a) Name of Curriculum offered (e.g., BSc. Waste Management)

2 b) Mention modules/courses related to Waste Management offered in your Institution.....

PART III: FEEDBACK ON CONTENTS OF MODULE TAUGHT

3 a) List Waste Management related modules/courses that you are teaching.....

3 b) Please provide a brief summary of the contents of the module(s)/course(s) mentioned in 3a above.....

3 c) Do you think the module(s)/course(s) mentioned in 3a above best reflects their contents?

Yes () No ()

3 d) If **NO** in 3c, what are you proposing as a new name of the module/course?

4 a) Does this module *sufficiently* address the aims of the training Curriculum?

Yes () No ()

4 b) If **NO** in 4a, what are the deficiencies?

.....

4 c) Does the module/course enable the students to gain the intended competence at this level? Yes () No ()

4 d) If **NO** in 4c, what are the deficiencies?

.....

4 e) Does the module/course have a *practical* component?

Yes () No ()

4 f) What is the approximate ratio of time allocated to theory and practical sessions in percentage

(%).....

4 g) If **Yes** in 4e, how do you rate *time* allocated to teaching in terms of theory and practical?

Excellent ()

Good ()

Fair ()
 Poor ()

4 h) If **NO** in 4e, do you think the module will benefit from a practical component?

Yes () No ()

4 i) If yes in 4h, suggest time allocation for practical and theory allocation in percentage

(%).....

5. Comment on the appropriateness of pre-requisite requirements (if any) to enhance comprehension of the module/course.....

PART IV: GENERAL FEED-BACK ON ADEQUACY OF TEACHING AND LEARNING FACILITIES

6 a) How would you describe classrooms in terms of space versus number of students for the module/course you are teaching?

The right size ()

Larger for the class size ()

Smaller for the class size ()

6 b) How can you describe teacher-student *interaction* during the following sessions?

SN	TEACHING SESSION	NUMBER OF STUDENTS <i>(Please Tick as appropriate)</i>			Remarks
		Poor	Fair	Good	
1	Lecture				
2	Seminar presentations				
3	Laboratory				
4	Field practical sessions				
5	Other <i>(Specify)</i>				

6 c) Please indicate the **availability** of the teaching aids and learning facilities

SN	Facility/equipment/ service	Availability	
		Yes	No
1.	Laboratory space		
2.	Laboratory equipment		
3.	Computer Lab		
4.	Internet services		
5.	Field vehicles		
6.	Herbarium		
7.	Multimedia Projector		
8.	Library space		
9.	Library collection		
10.	Teaching aids		
11.	Field tents		
12.	Other field facilities		
13.	Field equipment		
14.	Classes		

6 d) Please rank the **adequacy** of the teaching aids and learning facilities

SN	Facility/equipment/ service	Adequacy			
		Poor	Fair	Good	Excellent
1.	Laboratory space				
2.	Laboratory equipment				
3.	Computer Lab				
4.	Internet services				
5.	Field vehicles				
6.	Herbarium				
7.	Multimedia Projector				
8.	Library space				
9.	Library collection				
10.	Teaching aids				
11.	Field tents				
12.	Other field facilities				
13.	Field equipment				
14.	Classes				
15.	Overall rating				

6 e) Please rank the **quality** of the teaching aids and learning facilities

SN	Facility/equipment/ service	Quality			
		Poor	Fair	Good	Excellent
1.	Laboratory space				
2.	Laboratory equipment				
3.	Computer Lab				
4.	Internet services				
5.	Field vehicles				
6.	Herbarium				
7.	Multimedia Projector				
8.	Library space				
9.	Library collection				
10.	Teaching aids				
11.	Field tents				
12.	Other field facilities				
13.	Field equipment				
14.	Classes				
15.	Overall rating				

6 f) How would you rate the overall *maintenance* of the teaching aids and learning facilities?

- Excellent ()
 Good ()
 Fair ()
 Poor ()

PART V: GENERAL FEEDBACK ON ADEQUACY OF TEACHING AND LEARNING MATERIALS

7 a) What are the main sources of your teaching and learning materials?

- The textbook(s) specified for the module ()
 Handouts ()
 Journal articles ()
 Others (please specify)

7 b) List key literature/reading materials for the modules you are teaching. **Please Use the format: [Author Name], [Year of Publishing], [Title Name], [Publisher Company]**.....

7 c) How up-to-date are the literature/reading materials listed in 7b?

- Up to date (within 10 years or less) ()
 Somewhat up to date ()
 Outdated ()

7 d) If literature/reading list is outdated, please *propose the* up-to dated list. **Please Use the format: [Author Name], [Year of Publishing], [Title Name], [Publisher Company]**.....

7 e) How would you rank the *adequacy* of teaching materials?

Items		Adequacy				Remarks
		Poor	Fair	Good	Excellent	
1	Text books					
2	Journal Articles					
3	Flip charts					
4	Writing Boards					
5	Stationery					
6	Computer software's					
7	Overhead projectors					

PART VI: FEEDBACK ON TEACHING AND LEARNING PROCESS

8 a) From your experience, how *prepared* are the students when attending training?

- Well prepared ()
 Partially prepared ()
 Poorly prepared ()

8 b) How would you rate the students' *study habits*?

Excellent ()

Good ()

Fair ()

Poor ()

8 c) How *interested* are the students in learning?

Very interested ()

Partially interested ()

Not interested at all ()

8 d) How *motivated* are the students in learning?

Highly motivated ()

Partially motivated ()

Not motivated at all ()

8 e) How would you rate students' *understanding* of the module at the end of the module/course?

Excellent ()

Good ()

Fair ()

Poor ()

8 f) What do you think are the most effective modes of teaching for the module/course?

Lecturers ()

Seminars ()

Laboratory demonstrations ()

Workshop training ()

Others (please specify)

8 g) How *adequate* are the class contact hours allocated for this module/course?

Adequate ()

Somewhat adequate ()

Inadequate ()

8 h) Comment on the College/university strategies to promote quality teaching.....

.....

PART VII: GENERAL FEEDBACK ON STUDENTS'ASSESSMENT

9 a) What are the appropriate assessment instruments for the modules/courses?

Periodical Examinations ()

Continuous Assessment (through either test, portfolio, quizzes, homework, weekly assignments, coursework reports etc. or any combination thereof) ()

Combination of Periodical Examinations and Continuous Assessment ()

Others (please specify)

9 b) What is the appropriate marks allocation for continuous assessment (CA) and final examination (FE) for the module/course?

100 FE and 0 CA []

80 FE and 20 CA []

60 FE and 40 CA []
 40 FE and 60 CA []
 20 FE and 80 CA []
 0 FE and 100 CA []
 Other (*Please Specify*)

9 c) What is the appropriate procedure for setting exams for the module/course (e.g., Panel, individual Module Lecturers)

9 d) What is the appropriate procedure for marking exam for the module/course (e.g., Panel, individual)

9 e) What is the appropriate examination question types for the module/course?

Multiple choice ()

Fill in the blank ()

Problem solving ()

Essay type questions ()

Combination of the above ()

Other (*Please Specify*)

10. Please provide any other comment (s) to improve teaching and learning of the module/course

Thank you for your time!

Appendix III: List of TNA tool validation participants

	Name	Institution	Country	Email
1	Koziba Chibona	Skyberry	Botswana	koziba@skyberrybotswana.co.bw
2	Dr. George Wambura	SADC Secretariat	Botswana	gwambura@sadc.int
3	Ndapanda Kanime	SADC Secretariat	Botswana	nkanime@sadc.int
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10	Dr. Gabriel Mayengo	CAWM	Tanzania	mayengogabriel@gmail.com
11	Maria Millinga	CAWM	Tanzania	jeansmariah@gmail.com
12	Dr. James Wakibara	CAWM	Tanzania	james.wakibara.jw@gmail.com
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19	Audax Bahweitema	CAWM	Tanzania	audax.bahweitema@mwekawildlife.ac.tz
20	Dr. Kwaslema Malle Hariohay	CAWM	Tanzania	Kwaslema2000@gmail.com

Appendix IV: Guiding Questions for Key Informant Interviews

Target Group	Questions
Academic staff	<ol style="list-style-type: none"> 1. What is WM/CBNRM related modules/courses that you are teaching 2. What is the content of the module(s)/course(s) you have mentioned. 3. What are the main sources of your teaching and learning materials? 4. What is the approximate ratio of time allocated to theory and practical sessions in percentage (%)? 5. What do you think are the most effective modes of teaching for the module/course? 6. What are the appropriate assessment instruments for the modules/courses? 7. What is the appropriate marks allocation for continuous assessment (CA) and final examination (FE) for the module/course?
Employers	<ol style="list-style-type: none"> 1. What is the current <i>number</i> of WM/CBNRM related employees in your institution based on qualifications levels? 2. What the importance attributes considered during recruitment of personnel related to WM/CBRNM? 3. Please provide specific duties to be performed by employees/personnel with different academic qualifications related to WM/CBNRM 4. Please provide expected competence for effective delivery of duties related to WM/CBNRM in your institution 5. Please provide soft skills required for effective delivery of duties related to Waste Management in your institution

Appendix V: List of Key Interview Informant Participants

	Name	Institution	Country	Theme
Academic Staff				
1	Dr Kadewa	Malawi University of Science and Technology	Malawi	WM
2	Dr Ponyandira	Lilongwe Agriculture and Natural resources	Malawi	CBNRM
3	Dr Msafiri Mkonda	Sokoine University of Agriculture -SUA	Tanzania	WM
4	Dr Nyangi Chacha	Ardhi University	Tanzania	WM
5	Dr Mitulo Silengo	Mulungushi University	Zambia	CBNRM
Employer				
6	Dr Douglas Mkweta	Ministry of Local Governments	Malawi	WM
7	Brighton Kumchedwa	Directorate of Parks and Wildlife	Malawi	CBNRM
8	Dr Victoria Kachimera	Environmental Affairs Department	Malawi	WM
9	Isabel Ramos	International Union for Conservation of Nature (IUCN),	Mozambique	CBNRM
10	Joseph Chuwa	Regional Natural Resource Office	Tanzania	CBNRM
11	Michael Mhina	National fish quality and control laboratory	Tanzania	CBNRM
12	Fanuel Kasenene	Mwanza City Council	Tanzania	WM
13	Enock Mwangilwa	Wildlife and Environmental conservation	Zambia	CBNRM
14	Alstone Mwanza	Private Consultant	Zambia	CBNRM

Appendix VI: List of institutions visited during TNA

	Institution	Country	Theme
1	Lilongwe University of Agriculture and Natural Resources	Malawi	CBNRM
2	Malawi College of Forestry and Wildlife	Malawi	CBNRM
3	Wildlife and Environmental Society of Malawi	Malawi	CBNRM
4	African Parks	Malawi	CBNRM
5	MMCT	Malawi	CBNRM
6	National CBNRM Forum	Malawi	CBNRM
7	Department of National Parks and Wildlife	Malawi	CBNRM
8	Malawi University of Business and Applied Sciences (MUBAS)	Malawi	WM
9	Lilongwe University of Agriculture and Natural Resources	Malawi	WM
10	Centre for Environmental Policy and Advocacy	Malawi	WM
11	Waste and Hygienic Solutions	Malawi	WM
12	Lilongwe City Council	Malawi	WM
13	Catholic University of Mozambique - FAGREFF	Mozambique	CBNRM
14	Lurio university	Mozambique	CBNRM
15	Rovuma University-Higher Institute of Rural Development and Biosciences	Mozambique	CBNRM
16	Kwaedza Simukai Manica Association	Mozambique	CBNRM
17	Amanhecer Association for the Protection of Land and Natural Resources, known as KUBECERA-PTRN	Mozambique	CBNRM
18	WWF Mozambique	Mozambique	CBNRM
19	Provincial Directorate of Territorial Development and Environment of Niassa	Mozambique	CBNRM
20	UCA - Union of Peasants and Associations of Lichinga	Mozambique	CBNRM
21	Faculty of Engineering, Eduardo Mondlane University	Mozambique	WM
22	Ministry of Land and Environment	Mozambique	WM
23	Conscious Generation	Mozambique	WM
24	Pasiansi Wildlife Training Institute	Tanzania	CBNRM
25	International Union for Conservation of Nature	Tanzania	CBNRM
26	The Nature Conservancy	Tanzania	CBNRM
27	Sokoine University of Agriculture	Tanzania	CBNRM
28	The Nelson Mandela African Institution of Science and Technology	Tanzania	CBNRM
29	Moshi District Council (MDC)	Tanzania	CBNRM
30	Pasiansi wildlife training institute	Tanzania	CBNRM
31	Meserani snake park	Tanzania	CBNRM
32	GIZ	Tanzania	CBNRM
33	Chem chem Association	Tanzania	CBNRM
34	Tanzania Wildlife Authority (TAWA)	Tanzania	CBNRM
35	Ardhi University	Tanzania	WM
36	University of Dar es Salaam	Tanzania	WM
37	The Open University of tanzania	Tanzania	WM
38	The University of Dodoma	Tanzania	WM
39	The State University of Zanzibar (SUZA)	Tanzania	WM
40	Water institute	Tanzania	WM
41	Mwanza City Council	Tanzania	WM
42	Multi Cable Limited	Tanzania	WM
43	Dar es Salaam City Council	Tanzania	WM
44	Moshi Municipal Council	Tanzania	WM
45	Arusha district council	Tanzania	WM
46	Vice President Office	Tanzania	WM
47	Dodoma City Council	Tanzania	WM
48	Kasisi Agricultural Training Centre (KATC)	Zambia	CBNRM
49	Livingstone International University of Tourism Excellence and Business Management (LIUTEBM)	Zambia	CBNRM
50	The Copperbelt University	Zambia	CBNRM
51	Zambia Open University	Zambia	CBNRM
52	Department of National Parks and Wildlife	Zambia	CBNRM

	Institution	Country	Theme
53	Zambia Community Based Natural Resources Management Forum	Zambia	CBNRM
54	University of Zambia	Zambia	WM
55	Mulungushi University	Zambia	WM
56	Natural Resources Development College (NRDC)	Zambia	WM
57	Lusaka Apex Medical University	Zambia	WM
58	Manja Pamodzi Foundation	Zambia	WM
59	Lusaka City Council	Zambia	WM
60	Zambia Environment Management Agency	Zambia	WM

Appendix VII: List of participants in DACUM

Name of participant		Institution	Country	Email address
International participants				
1	Koziba Chibona	Skyberry Botswana	Botswana	koziba@skyberyybotswana.co.bw
2	Patrick Nyirenda	Environmental Affairs	Malawi	patricknyirenda42@yahoo.cm
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6	Sidonia Gueze	MTA/DINAB	Mozambique	smuhorro@hotmail.com
7	Sergio Manhique	Municipal Directorate of Environment and Health	Mozambique	sergiopaulomanhique@gmail.com
8	Julieta Joao	Department of Waste Management Ministry of Land and Environment	Mozambique	julycoss39@gmail.com
9	Simwanga Mutende	Zambia Community Based Natural Resource Management	Zambia	mutendemmah.simz@gmail.com
10	Dr. Betty Msimuko	Principal Natural Resources Officer Ministry of Lands and Natural Resources	Zambia	bettymsimuko@yahoo.com
11	Victor Kagoli	Lusaka City Council	Zambia	kagolivictor@yahoo.com
12	Lishaya Masiya	L&N Matrix Limitd	Zambia	lishayamwanda@gmail.com
Local participants				
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18	Dr. William Bukuku	National Council for Technical and Vocational Education and Training (NACTVET)	Tanzania	bukuku@nacte.go.tz
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21	Noel Sanga	Tanzania National Parks (TANAPA)	Tanzania	noelorgen001@gmail.com
22	David Mwakipesile	Grumeti Fund Tanzania (GFT)	Tanzania	david@grumetifund.or.tz
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	Name of participant	Institution	Country	Email address
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Appendix VIII: DACUM Charts

(a) WM

i. NTA 4

DUTIES	TASKS					
A Identify waste management problems and challenges	A1 Conduct field inspection	A2 Interview field workers/pickers	A3 Alert the officer responsible on possible pending waste management challenges	A4 Identify waste problem areas (hotspots)	A5	A6
B Undertake regular waste collection	B1 Identify waste collection points	B2 Prepare waste collection schedule	B3 Identify waste collection equipment and facilities	B4 Provide waste collection PPE	B5 Assign waste collection teams	B6 Collection of waste
C Conducting waste sorting	C1 Prepare stations for waste sorting	C2 Classifying waste	C3 Weighing waste	C4 Recording waste data	C5 Propose sustainable waste management strategies (Reduce/Recycle/Reuse)	C6
D Operate waste management equipment, facilities and machines	D1 Identifying waste management equipment and machines	D2 Inspect waste management equipment and machines	D3 Service waste management equipment and machines	D4	D5	D6

ii. NTA 5

DUTIES	TASKS					
A Undertake waste management activities	A1 Supervise waste generation points	A2 Supervise waste characterization and storage and facilities	A3 Supervise waste collection and transportation	A4	A5	
B Undertake waste characterization	B1 Collect waste for reuse	B2 Collect waste for recycling	B3 Undertake recycling of waste for circular economy	B4 Identify waste reduction strategies	B5 Identify partners/ stakeholders for recycle /reuse/reduce strategies for circular economy	
C Community engagement and awareness to influence behavior change	C1 Conduct sensitization meetings on sustainable waste management	C2 Conduct awareness on waste minimization	C3 Use waste for innovation	C4	C5	

D	D1	D2	D3	D4	D5
Identify waste management problems and challenges	Conduct field inspection	Analyze report from interview field workers/pickers	Propose solutions to waste management problems and challenges		

iii. NTA 6

DUTIES	TASKS				
A Mobilize equipment and resources for waste management	A1 Identify equipment and resources for waste management	A2 Prepare procurement plan for waste management equipment and resources	A3 Initiate requisition of waste management equipment and resources	A4 Consult stakeholders for resource mobilization	A5
B Supervise waste disposals and treatment options	B1 Supervise waste management streams (generation, storage, sorting, collection and transportation)	B2 Plan recycling programs	B3 Plan reuse programs	B4 Plan for waste incineration and compositing	B5 Plan for sanitary landfill waste
C Enforce waste management laws and by-laws	C1 Identify waste management enforcement gaps	C2 Develop enforcement plan for waste management	C3 Organize enforcement teams for waste management	C4 Facilitate resources for enforcement programs	C5 Review enforcement plan for waste management
D Advocate on policy and by-laws	D1 Conduct advocacy/ outreach campaigns	D2 Participate in policy review on waste management	D3 Mobilize stakeholders to influence emerging issues on waste management	D3	D4
E Conducting capacity building programs	E1 Identify training needs and target groups	E2 Develop training materials	E3 Develop TORs	E4 Develop training budget	E5 Facilitate training
F Propose budget requirements	F1 Develop activities plan	F2 Identify budget requirements	F3 Develop revenue mobilization plan	F4 Develop revenue and expenditure budget	F5 Develop budget control mechanisms

iv. NTA 7-8:

DUTIES	TASKS			
A Develop guidelines from main policy to guide working directions	A1 Mobilize a team developing guidelines	A2 Prepare Terms of Reference	A3 Prepare budgets	A4 Consult relevant stakeholders
C Interpret policies issued from regulatory bodies	C1 Identify officers to be oriented	C2 Orient officers to the new policies	C3 Develop by-laws for implementation of the policy	C4
D Sourcing equipment and resources used in the production	D1 Identify equipment and resources	D2 Planning and budget for the equipment and resources	D3 Procure and distribute equipment and working tools	D4
E Develop and review policy and by-laws	E1 Identify gaps in the policy and by-laws	E2 Identify stakeholders	E3 Create frameworks too work with	E4
F Develop research projects	F1 Identify gaps in the sector	F2 Collaboration with stakeholders	F3 Develop research concepts	F4 Identify emerging issues
G Planning and budgeting	G1 Identify sources of revenue	G2 Prepare work plans	G3 Prepare budgets and ensure proper allocation	G4
H Manage contracts for waste management service providers	H1 Designation of areas of operation to contractors	H2 Develop contract documents and MOUs	H3 Define scope of work	H4
I Plan capacity building programs	I1 Identify training needs	I2 Identify training institutions	I3 Develop training program	I4

DUTIES	TASKS							
A Design and coordinate research and consultancy	A1 Identify research problems	A2 Develop research proposals	A3 Coordinate data collection and collation	A4 Perform appropriate data analysis	A5 Interpret research results	A6 Write a research report	A7 Disseminate findings	A8 Prepare consultancy terms of references
	A9 Identify and procure consultancy opportunities	A10						
B Oversee management and administration of organization resources	B1 Support implementation of national legal and regulatory frameworks	B2 Assist implementation of institutional legal and regulatory frameworks	B3 Coordinate implementation of human capacity needs	B4 Direct implementation of trainings	B5 Oversee management of assets	B6 Manage administrative contracts and staff appraisals		
C Oversee management of finances	C1 Internalize implementation of financial national legal and regulatory frameworks	C2 Internalize implementation of financial institutional legal and regulatory frameworks	C3 Manage implementation of financial resources	C4 Oversee compliance of legal and regulatory frameworks				
D Coordinate community work programmes on environment and waste	D1 Design community-based programmes addressing environment and waste	D2 Oversee implementation of community-based programmes addressing environment and waste	D3 Design community capacity building programmes on environment and waste	D4 Design environment and waste management strategies	D5 Coordinate promotion of indigenous knowledge in addressing waste management issues	D6 Oversee community projects implementation in addressing waste issues	D7 Design community benefit sharing schemes from wastes	D8
E Superintend the design and implementation of systems	E1 Design environment and waste management plan	E2 Oversee implementation of management plan	E3 Design monitoring and evaluation framework for management plan	E4 Coordinate implementation of legal and regulatory frameworks for environment and waste	E5 Oversee frameworks for environment and waste management	E6 Formulate and advocate sectoral policies addressing environment and waste		

DUTIES	TASKS							
F Spearhead management of environment and waste	F1 Coordinate implementation of law enforcement in addressing environment and waste management issues	F2 Oversee environmental and waste management monitoring plans	F3 Coordinate utilization of environment and waste resources	F4 Oversee development of infrastructures in support of environment and waste management	F5 Facilitate contractual agreements	F6 Harmonize domestication of international agreements and protocols on environment and waste	F7 Review, interpret and implement national legal and regulatory instruments on environment and waste management	
G Coordinate nature-based business development	G1 Develop business strategies and plans	G2 Identify and develop entrepreneurial opportunities on environment and waste	G3 Supervise development of environment and waste activities	G4 Supervise development of environment and waste infrastructures	G5 Facilitate involvement of community and private sectors on investment opportunities on environment and waste			
H Consolidate budget and financial reports	H1 Analyze needs and resources required for management	H2 Develop a budget plan	H3 Coordinate implementation of the budget plan	H4 Monitor and adjust the budget	H5 Coordinate financial audits	H6 Compile financial reports		
I Coordinate planning, monitoring and evaluation of the work programmes	I1 Coordinate management instruments (plans, guidelines and strategies)	I2 Develop data collection tools	I3 Design monitoring tools and systems	I4 Design evaluation tools and systems	I5 Monitor project activities, output and progress	I6 Work with data platforms, databases and select technologies to capture and organize data	I7 Coordinate training for field staff in monitoring and evaluation of environment and waste	I8 Conduct data quality assessments
	I9 Lead evaluation teams	I10 Manage external evaluation consultants						
J Establish partnerships with collaborators	J1 Identify potential collaborators	J2 Evaluate potential partners	J3 Develop a collaboration program	J4 Establish communication channels	J5 Facilitate community engagement	J6 Facilitate stakeholders' engagement	J7 Establish and maintain collaboration	J8 Develop conflict resolution strategy
K Coordinate fund mobilization	K1 Develop resource mobilization strategy	K2 Identify funding opportunities	K3 Coordinate development of grants proposals					

b) CBNRM

i. NTA 7-8

DUTIES	TASKS							
A Engage stakeholders in conservation projects	A1 Identify relevant stakeholders	A2 List stakeholders	A3 Conduct stakeholder analysis	A4 Prepare stakeholders workshop	A5 Develop projects based on stakeholders' interests	A6	A7	A8
B Raise conservation awareness	B1 Identify conservation awareness program	B2 Establish platforms for awareness raising	B3 Identify target groups for education programs	B4 Formulate platform methodologies	B5 Develop conservation campaign	B6 Prepare budget for awareness education	B7	B8
C Conduct fund raising for resources mobilization	C1 Identify gaps	C2 Conduct resources need assessment	C3 Identify interested donors and funders	C4 Develop grant proposals	C5 Submit proposals	C6 Implement project	C7 Submit reports	C8 Diversify sources of fund
D Conduct advocacy and lobbying for natural management policy and reforms	D1 Conduct survey assessment on policy gaps	D2 Prepare policy brief	D3 Engage with policy makers to communicate area of concentration or that need improvement	D4 Prepare schedule of amendment	D5 Submit the schedule of amendment	D6 Conduct follow up meeting with decision makers		
E Ensure accountability and responsibility in managing natural resources	E1 Ensure governing bodies understand their roles	E2 Ensure technical teams perform their duties	E3 Conduct performance appraisal	E4 Conduct periodic financial audit				
F Manage finances and accounts of CBNRM	F1 Develop financial and accounting systems	F2 Develop annual plan and budget	F3 Adherence and compliance of national and international finance and accounting standards	F4	F5	F6	F7	F8
G Conduct monitoring and evaluation of the projects	G1 Identify the project to be monitored and evaluated	G2 Develop M&E framework	G3 Implement M&E framework	G4 Analyze the framework	G5 Write report for the project			

DUTIES	TASKS							
H Manage human resources	H1 Recruit employees	H2 Build capacity to the employees	H3 Conduct performance appraisal	H4 execute termination	H5 Develop staff motivation scheme	H6	H7	H8
I Provide conservation education to community living adjacent to the PA and other institutions	I1 Conduct awareness need analysis	I2 Identify the target groups	I3 Identify tools for providing conservation education	I4 Develop approaches of conducting conservation education	I5 write a report on conservation education	I6 disseminate report of conservation education		
J Participate in human wildlife management	J1 Identify types of human wildlife conflicts	J2 Identify the HWC hotspots	J3 Develop mitigation strategies for managing HWC	J4 Implement HWC mitigation strategies	J5 Evaluate the implementation of HWC mitigation strategies	J6		
K Facilitate community law enforcement	K1 Identify challenging areas	K2 Identify the resources available	K3 Develop ant-poaching action plans	K4 Implement action plan	K5 Evaluate the effectiveness of the antipoaching action plan	K6	K7	
L Collaborate with local community to identify income generating activities	L1 Conduct needs assessment of income generating activities	L2 Develop annual priorities of the income generating activities	L3 Conduct cost benefit analysis	L4 Formulate community entrepreneur groups	L5 Conduct training on running entrepreneur projects	L6 Disbursing funds to the entrepreneur groups	L7 Monitor stages of project implementations	L8 Evaluate project implementation
M Facilitate various groups of visitors into the community	M1 Identify attractions found in the community	M2 Develop community attraction visit guidelines	M3 Promote community attractions	M4 Supervise the implementation of the guideline	M5 Evaluate guideline implementation			
N Conduct baseline survey and analysis	N1 Establish research areas of concertation	N2 Prepare data collection methodologies	N3	N4				
O Conduct natural resources inventories	O1 Conduct fauna inventory	O2 Conduct plants inventory						

DUTIES	TASKS							
P Conduct research on community based natural resources management	P1 Identify research priority areas	P2 Develop data collection methods	P3 Conduct data analysis	P4 Write a report on research findings	P5 Disseminate research findings			
Q Apply entrepreneurship to establish natural resources development ventures	Q1 Develop concept of entrepreneurship in community based natural resources management areas	Q2 Describe creativity and innovations	Q3 Describe enterprises start up procedures	Q4 analyze enterprises operating environment	Q5 Describe enterprise capital management in conservation ventures	Q6 Develop a community based natural resources business plan		
R Prepare annual plan and budget	R1 identify organization goals and objectives	R2 Identify the organization priorities	R3 develop annual action plan	R4 implement annual action plan	R5 Monitor implementation of the annual action plan			
P Develop General management plan	P1 prepare management plan team	P2 Gather data	P3 evaluate data and resource information	P4 conduct SWORT analysis	P5 develop mission and vision	P6 prepare a draft GMP	P7 Conduct consultation on the draft GMP	P8 Assess some mission of the draft GMP
	P9 approval and endorsement	P10 develop, monitor and evaluation of the endorse GMP	P11 review of the updated GMP plan					
S Conduct environmental and social impact assessment	S1 Develop concept of EIA	S2 conduct screening and scoping of EIA	S3 Engage the stakeholder during EIA	S4 Conduct the mitigation measures for EIA	S6 Prepare the EIA for CBNRM	S7 use environmental monitoring and auditing for CBNRM projects		
T Conduct habitat management	T1 Assess habitat condition	T2 Develop plan for managing the habitat	T3 Implement habitat management plan	T4 Evaluate the habitat management plan				

DUTIES	TASKS							
A. Design and coordinate research and consultancy	A1. Identify research problems.	A2. Develop research proposals.	A3. Coordinate data collection and collation	A4. Perform appropriate data analysis.	A5. Interpret research results.	A6. Drafting a research report.	A7. Disseminate findings.	A8. Prepare consultancy terms of references
	A9. Identify and procure consultancy opportunities							
B. Oversee management and administration of organization resources	B1. Support implementation of national legal and regulatory frameworks	B2. Assist implementation of institutional legal and regulatory frameworks	B3. Coordinate implementation of human capacity needs	B4. Direct implementation of trainings	B5. Oversee management of assets	B6. Manage administrative contracts and staff appraisals		
C. Oversee management of finances.	C1. Internalize implementation of financial national legal and regulatory frameworks	C2. Internalize implementation of financial institutional legal and regulatory frameworks	C3. Manage implementation of financial resources	C4. Oversee compliance of legal and regulatory frameworks				
D. Coordinate community work programs	D1. Design community-based programmes	D2. Design community capacity building programmes	D3. Design community capacity building programmes	D4. Design human wildlife co-existence strategies	D5. Coordinate promotion of Indigenous knowledge in CBNRM	D6. Oversee community projects implementation.	D7. Design community benefit sharing schemes.	D8
E. Superintend the design and implementation of systems.	E1. Design management plan	E2. Oversee implementation of management plan	E3. Design monitoring and evaluation framework for management plan	E4. Coordinate implementation of legal and regulatory frameworks for wildlife	E5. Oversee frameworks for consumptive and non-consumptive utilization of wildlife resources	E6. Formulate and advocate sectoral policies		

DUTIES	TASKS							
F. Spearhead management of wildlife resources	F1. Coordinate implementation of law enforcement	F2. Oversee ecological monitoring (habitat, population status and threats) of In-situ and Ex-situ resources (zoos, farms, botanical gardens etc.)	F3. Coordinate sustainable utilization of wildlife resources.	F4. Oversee development of infrastructures in support of wildlife management	F5. Facilitate contractual agreements.	F6. Harmonize domestication of international agreements and protocols	F7. Review, interpret and implement national legal and regulatory instruments on natural resources.	
G. Coordinate nature-based business development	G1. Develop business strategies and plans.	G2. Identify and develop entrepreneurial opportunities.	G3. Supervise development of tourism activities and infrastructures	G4. Facilitate involvement of community and private sectors on investment opportunities (concessions)				
H. Consolidate budget and financial reports	H1. Analyze needs and resources required for management	H2. Develop a budget plan	H3. Coordinate implementation of the budget plan	H4. Monitor and adjust the budget	H5. Coordinate financial audits	H6. Compile financial reports		
I. Coordinate planning, monitoring, and evaluation of the work programmes	I1. Coordinate management instruments (plans, guidelines, and strategies)	I2. Develop data collection tools	I3. Design monitoring tools and systems	I4. Design evaluation tools and systems	I5. Monitor project activities, output and progress	I6. Work with data platforms, databases and select technologies to capture and organize data	I7. Coordinate training for field staff in monitoring and evaluation	I8. Conduct data quality assessments
I9. Lead evaluation teams	I10. Manage external evaluation consultants							
J. Establish partnerships with collaborators	J1. Identify potential collaborators	J2. Evaluate potential partners	J3. Develop a collaboration program	J4. Establish communication channels	J5. Facilitate community engagement	J6. Facilitate stakeholders' engagement.	J7. Establish and maintain collaboration	J8. Develop conflict resolution strategy
K. Coordinate fund mobilization	K1. Develop resource mobilization strategy	K2. Identify funding opportunities	K3. Coordinate development of grants proposals	K4. Implement habitat management plan	K5. Evaluate the habitat management plan			

Appendix IX: List of participants in TNA

(a) CBNRM

Theme		Institution	Country	Email	Category of institution
Academic Staff					
1	Research and Training	Agricane Malawi Ltd	Malawi	b.carruthers@agricane.com	University/College
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10	Research and Training	Malawi University of Business and Applied Sciences	Malawi	rmbewe@mubas.ac.mw	University/College
11	Research and Training	Malawi University of Business and Applied Sciences	Malawi	fthomson@poly.ac.mw	University/College
12	Research and Training	Malawi University of Business and Applied Sciences (MUBAS)	Malawi	ckaonga07@gmail.com	University/College
13	Research and Training	Malawi University of Science and Technology (MUST)	Malawi	mchagunda@must.ac.mw	University/College
14	Research and Training	Catholic University of Mozambique - FAGREFF	Mozambique	ameleco@ucm.ac.mz	University/College
15	Research and Training	Lurio university	Mozambique	fish.isabel@gmail.com	University/College
16	Research and Training	Rovuma University	Mozambique	cjoao@unirovuma.ac.mz	University/College
17	Research and Training	Rovuma University	Mozambique	isaimutombo@gmail.com	University/College
18	Research and Training	Rovuma University	Mozambique	gguibunda@unirovuma.ac.mz	University/College
19	Research and Training	Rovuma University	Mozambique	aafonso@unirovuma.ac.mz	University/College
20	Research and Training	Rovuma University-Higher Institute of Rural Development and Biosciences	Mozambique	fnhachungue@unirovuma.ac.mz	University/College
21	Research and Training	Pasiansi Wildlife Training Institute	Tanzania	jmakunga1@gmail.com	University/College

	Theme	Institution	Country	Email	Category of institution
22	Research and Training	Pasiansi Wildlife Training Institute	Tanzania	oscarlipiki26@gmail.com	University/College
23	Research and Training	Pasiansi Wildlife Training Institute	Tanzania	charles.abach@pasiansiwildlife.ac.tz	University/College
24	Research and Training	Pasiansi Wildlife Training Institute	Tanzania	hamisphilimon@gmail.com	University/College
25	Research and Training	Sokoine University of Agriculture	Tanzania	ndibalema@sua.ac.tz	University/College
26	Research and Training	Sokoine University of Agriculture	Tanzania	zion@sua.ac.tz	University/College
27	Research and Training	The Nelson Mandela African Institution of Science and Technology	Tanzania	angela.mkindi@nm-aist.ac.tz	University/College
28	Research and Training	University of Dar es Salaam	Tanzania	cnyamkinda@gmail.com	University/College
29	Research and Training	University of Dar es Salaam	Tanzania	monicashewona@gmail.com	University/College
30	Research and Training	University of Dar es Salaam	Tanzania	wildornithology@udsm.ac.tz	University/College
31	Research and Training	The Copperbelt University	Zambia	dinapopo2000@gmail.com	University/College
32	Research and Training	Kasisi Agricultural Training Centre (KATC)	Zambia	olovudobewit@gmail.com	University/College
33	Research and Training	Livingstone International University of Tourism Excellence and Business Management (LIUTEBM)	Zambia	darlingtonemwewa@gmail.com	University/College
34	Research and Training	Livingstone International University of Tourism Excellence and Business Management (LIUTEBM)	Zambia	kmwanza53@gmail.com	University/College
35	Research and Training	Mulungushi University	Zambia	Bhalubanza@mu.ac.zm	University/College
36	Research and Training	The Copperbelt University	Zambia	chilambwealice@gmail.com	University/College
37	Research and Training	Zambia Open University	Zambia	shadreckmutti@gmail.com	University/College
Employers					
38	Local and National Grouping	Wildlife and Environmental Society of Malawi	Malawi	wesml@wesm.mw	Civil Society Organization
39	Government Entity	Malawi University of Business and Applied Sciences	Malawi	cbisani@poly.ac.mw	University/College
40	Research and Training Institution	Malawi college of Forestry and Wildlife	Malawi	andersonendema@gmail.com	University/College
41	Local and National Grouping	African Parks	Malawi	matias@africanparks.org	Non-Governmental Organization
42	Expert Group	Mulanje Mountain Conservation Trust (MMCT)	Malawi	moffat@mountmulanje.org.mw	Non-Governmental Organization
43	Local and National Grouping	National CBNRM Forum	Malawi	kajikhomere@gmail.com	Central Government Authority

	Theme	Institution	Country	Email	Category of institution	
44	Government Entity	Department of National Parks and Wildlife	Malawi	dpw@wildlifemw.net	Central Authority	Government
45	Government Entity	Monduli District Council	Tanzania	annmbise29@gmail.com	Local Government Authority	
46	Local and National Grouping	Kwaedza Simukai Manica Association	Mozambique	admin@kwaedza.org	Civil Society Organization	
47	Local and National Grouping	Amanhecer Association for the Protection of Land and Natural Resources (KUBECERA-PTRN)	Mozambique	kubecera@gmail.com	Civil Society Organization	
48	Local and National Grouping	WWF Mozambique	Mozambique	mfoloma@wwf.org.mz	Civil Society Organization	
49	Government Entity	Provincial Directorate of Territorial Development and Environment of Niassa	Mozambique	afonsomponda33@gmail.com	Central Authority	Government
50	Value Chain Actor	UCA - Union of Peasants and Associations of Lichinga	Mozambique	uca_lichinga@yahoo.com.br	Private institution	
51	Research and Training Institution	Pasiansi Wildlife Training Institute	Tanzania	winnienyari5@gmail.com	University/College	
52	Local and National Grouping	International Union for Conservation of Nature	Tanzania	fadhili.njilima@iucn.org	Non-Governmental Organization	
53	Local and National Grouping	The Nature Conservancy	Tanzania	amallya@tnc.org	Non-Governmental Organization	
54	Government Entity	Department of Forestry Zanzibar	Tanzania	salmenhafez@gmail.com	Central Authority	Government
55	Local and National Grouping	Nourish Africa	Tanzania	Info.nourishafrica@gmail.com	Central Authority	Government
56	Government Entity	Same District Council	Tanzania	ded@samedc.go.tz	Local Government Authority	
57	Value Chain Actor	Meserani snake park	Tanzania	meseranisnakepark@gmail.com	Private institution	
58	Research and Training Institution	Tanzania Wildlife Research institute (TAWIRI)	Tanzania	imamagosi@gmail.com	Central Authority	Government
59	Value Chain Actor	Otterlo Business Corporation Ltd	Tanzania	otterlotzt@gmail.com	Private institution	
60	Government Entity	Moshi District Council (MDC)	Tanzania	innocentpl@yahoo.com	Local Government Authority	
61	Local and National Grouping	Tanzania Natural Resource Forum (TNRF)	Tanzania	z.faustin@tnrf.org	Civil Society Organization	
62	Local and National Grouping	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) Tanzania	Tanzania	cristina.georgii@giz.de	Non-Governmental Organization	
63	Government Entity	Arusha District Council	Tanzania	adamujotham@gmail.com	Local Government Authority	

	Theme	Institution	Country	Email	Category of institution	
64	Government Entity	USAID Tanzania	Tanzania	mkanyangemu@usaid.gov	Central Authority	Government
65	Local and National Grouping	Asasi ya Kijamii ya Randilen	Tanzania	manager@randilen.org	Community-Based Organization	
66	Local and National Grouping	Chem chem Association	Tanzania	martin.ben@cc-association.or.tz	Local Government Authority	
67	Government Entity	Tanga Regional Commissioner's Office	Tanzania	tsosiya@gmail.com	Local Government Authority	
68	Local and National Grouping	Burunge wildlife management area	Tanzania	burungewma@gmail.com	Central Authority	Government
69	Government Entity	Ministry of Natural Resources and Tourism	Tanzania	bernard.marcelline@maliasili.go.tz	Central Authority	Government
70	Government Entity	Tanzania Wildlife Authority (TAWA)	Tanzania	william.kitebi@tawa.go.tz	Central Authority	Government
71	Local and National Grouping	African Wildlife Foundation	Tanzania	pmagingi@awf.org	Central Authority	Government
72	Local and National Grouping	WWF Tanzania	Tanzania	rkatondo@wwftz.org	Non-Governmental Organization	
73	Local and National Grouping	Nsefu Community Resources Board	Zambia	nsefuzncrba@gmail.com	Community-Based Organization	
74	Government Entity	National Heritage Conservation Commission (NHCC-Zambia)	Zambia	richmbombo@yahoo.co.uk	Central Authority	Government
75	Government Entity	Ministry of Lands and Natural Resources	Zambia	bettymsimuko@yahoo.com	Central Authority	Government
76	Value Chain Actor	Kinako Game Ranch Limited	Zambia	Kinakogameranchlimited@gmail.com	Private institution	
77	Research and Training Institution	Mulungushi University	Zambia	jmwale@mu.ac.zm	University/College	
78	Local and National Grouping	Zambia Community Resource Board Association (ZCRBA)	Zambia	kutembasakambuta@gmail.com	Community-Based Organization	
79	Research and Training Institution	Kasisi Agricultural Training Centre (KATC)	Zambia	directorktc@gmail.com	University/College	
80	Research and Training Institution	Department of National Parks and Wildlife	Zambia	Mwendalubihazyondo@gmail.com	Central Authority	Government
81	Local and National Grouping	Zambia Community Based Natural Resources Management Forum	Zambia	ceciliabanda@gmail.com	Community-Based Organization	
82	Government Entity	National Remote Sensing Centre	Zambia	nrsc@nrsc.org.zm	Central Authority	Government

	Theme	Institution	Country	Email	Category of institution
83	Research and Training Institution	Center for international forestry research	Zambia	L.Masheke@ cifor-icraf. Org	Central Government Authority
84	Value Chain Actor	BioCarbon Partners Ltd	Zambia	mmailoux@biocarbonpartners.com	Private institution

(b) WM

	Theme	Institution	Country	Email	Category of institution
		Academic Staff			
1	Research and Training	Malawi University of Business and Applied Sciences (MUBAS)	Malawi	ckaonga07@gmail.com	University/College
2	Research and Training	Malawi University of Science and Technology	Malawi	jtaulo@must.ac.mw	University/College
3	Research and Training	Malawi University of Business and Applied Sciences (MUBAS)	Malawi	ckaonga07@gmail.com	University/College
4	Research and Training	Malawi University of Business and Applied Sciences (MUBAS)	Malawi	kklulu@poly.ac.mw	University/College
5	Research and Training	Lilongwe University of Agriculture and Natural Resources	Malawi	pmdolo@luanar.ac.mw	University/College
6	Research and Training	Malawi University of Science and Technology	Malawi	jtaulo@must.ac.mw	University/College
7	Research and Training	Faculty of Engineering, Eduardo Mondlane University	Mozambique	cecoma@uem.ac.mz	University/College
8	Research and Training	Eduardo Mondlane University	Mozambique	afonso.d.macheca@uem.ac.mz	University/College
9	Research and Training	Ardhi University	Tanzania	shadrack.sabai@aru.ac.tz	University/College
10	Research and Training	Ardhi University	Tanzania	nyangic@yahoo.com	University/College
11	Research and Training	University of Dar es Salaam	Tanzania	edwinndiba2016@gmail.com	University/College
12	Research and Training	University of Dar es Salaam	Tanzania	88waziamtiga@gmail.com	University/College
13	Research and Training	The Open University of tanzania	Tanzania	manenosaid@gmail.com	University/College
14	Research and Training	University of Dodoma	Tanzania	japhetelis@yahoo.com	University/College
15	Research and Training	The University of Dodoma	Tanzania	mswimaf@yahoo.com	University/College
16	Research and Training	The University of Dodoma	Tanzania	fmahenge2018@gmail.com	University/College
17	Research and Training	The State University of Zanzibar (SUZA)	Tanzania	saabdulla2012@yahoo.com	University/College
18	Research and Training	Ardhi University	Tanzania	mhinagiven@gmail.com	University/College

	Theme	Institution	Country	Email	Category of institution
19	Research and Training	Water institute	Tanzania	edmund@gmail.com	University/College
20	Research and Training	Mulungushi University	Zambia	mitulo.silengo@gmail.com	University/College
21	Research and Training	University of Zambia	Zambia	garikaimembele@gmail.com	University/College
22	Research and Training	Mulungushi University	Zambia	gtembo@mu.edu.zm	University/College
23	Research and Training	Natural Resources Development College	Zambia	oliverzero.mulenga@gmail.com	University/College
24	Research and Training	Natural Resources Development College (NRDC)	Zambia	mwapechuludegree@gmail.com	University/College
25	Research and Training	Kasisi Agricultural Training Centre	Zambia	dhadunka74@gmail.com	University/College
26	Research and Training	Kasisi Agricultural Training Centre	Zambia	bamu2081@gmail.com	University/College
Employers					
27	Government Entity	Malawi University of Business and Applied Sciences	Malawi	vice-chancellor@mubas.ac.mw	University/College
28	Local and National Grouping	Centre for Community Organisation and Development (CCODE)	Malawi	malawiccode@gmail.com	Community-Based Organisation
29	Government Entity	Environmental Affairs Department	Malawi	clement.tikiwa@gmail.com	Central Government Authority
30	Value Chain Actor	FEMIV Creations	Malawi	rmbale@gmail.com	Private Institution
31	Local and National Grouping	Civil Society Network on Climate Change	Malawi	julius@cisonccmw.org	Civil Society Organizations
32	Value Chain Actor	Ngoto Enterprises	Malawi	frankmvalo@gmail.com	Private Institution
33	Local and National Grouping	Centre for Environmental Policy and Advocacy	Malawi	herbert@cepa.org.mw	Central Government Authority
34	Value Chain Actor	Waste and Hygienic Solutions	Malawi	Wastehygiene@aol.com	Private Institution
35	Government Entity	Blantyre City Council	Malawi	sseunda@gmail.com	Local Government Authority
36	Government Entity	Lilongwe City Council	Malawi	thokomkaka@gmail.com	Local Government Authority
37	Government Entity	Mzuzu University	Malawi	ur@mzuni.ac.mw	University/College
38	Local and National Grouping	EcoGen Limited	Malawi	tamanda@ecogenmw.com	Central Government Authority
39	Government Entity	National commission for Science and Technology	Malawi	fmunthali@ncst.mw	Central Government Authority
40	Government Entity	Environmental Affairs Department	Malawi	patricknyirenda42@yahoo.com	Central Government Authority
41	Local and National Grouping	Association for Sustainable Development - ABIODES	Mozambique	abiodes@abiodes.org.mz	Civil Society Organizations

	Theme	Institution	Country	Email	Category of institution
42	Local and National Grouping	Confederation of Economic Associations (CTA)	Mozambique	buachisso@cta.org.mz	Civil Society Organizations
43	Value Chain Actor	Ecoplus Mozambique, Ida	Mozambique	pedro.parruque@ecoplus.co.mz	Private Institution
44	Government Entity	Ministry of Land and Environment	Mozambique	smuhorro@gmail.com	Central Government Authority
45	Government Entity	INNOQ, IP	Mozambique	smendes275@gmail.com	Central Government Authority
46	Group of Experts	ECOLIFE SA	Mozambique	jose.machado@ecolife.co.mz	Central Government Authority
47	Local and National Grouping	Conscious Generation	Mozambique	rcharumar@gmail.com	Non-Governmental Organization
48	Local and National Grouping	Environmental Management and Economic Development Organisation (EMEDO)	Tanzania	emedotz@yahoo.com mugema64@gmail.com	Non-Governmental Organization
49	Government Entity	Mwanza City Council	Tanzania	magdakondo16@gmail.com	Local Government Authority
50	Expert Group	Mwanza City Council	Tanzania	kasenenefanuel01@gmail.com	Local Government Authority
51	Value Chain Actor	Multi Cable Limited	Tanzania	hr.mwanza@multicable.co.tz	Non-Governmental Organization
52	Local and National Grouping	Youth Environment Vision (YEV).	Tanzania	info@yevision.org	Community-Based Organisation
53	Value Chain Actor	The Recycler	Tanzania	philipo@recycler.co.tz	Private Institution
54	Local and National Grouping	Governance Links Tanzania	Tanzania	kasongidonald@gmail.com	Non-Governmental Organization
55	Government Entity	Meru District Council	Tanzania	ded@merudc.go.tz	Local Government Authority
56	Local and National Grouping	Nipe Fagio	Tanzania	info@nipefagio.co.tz	Non-Governmental Organization
57	Value Chain Actor	Zanrec	Tanzania	madhojustin@gmail.com	Private Institution
58	Value Chain Actor	Sabo group of companies T Ltd	Tanzania	Boniface.vk@gmail.com	Private Institution
59	Government Entity	Meru District Council	Tanzania	sayi.manyanda@merudc.go.tz	Local Government Authority
60	Government Entity	Moshi District Council	Tanzania	peterjtungu@gmail.com	Local Government Authority
61	Government Entity	Dar es Salaam District Council	Tanzania	arafa.mangungu@yahoo.com	Local Government Authority
62	Government Entity	Same District Council	Tanzania	yusterstewart@gmail.com	Local Government Authority
63	Government Entity	Moshi Municipal Council	Tanzania	ckimaroki@gmail.com	Local Government Authority
64	Value Chain Actor	Chilambo General Trade Company Limited	Tanzania	chilambogeneral1@gmail.com	Private Institution

	Theme	Institution	Country	Email	Category of institution
65	Government Entity	Arusha District Council	Tanzania	nchimbionas86@gmail.com	Local Government Authority
66	Government Entity	University of Dar es Salaam	Tanzania	joseph.mtamba@udsm.ac.tz	University/College
67	Research and Training Institution	The Open university of Tanzania	Tanzania	paul.ikwaba@out.ac.tz	University/College
68	Government Entity	Muheza District Council	Tanzania	iyuluabubakary@gmail.com	Local Government Authority
69	Value Chain Actor	Kanjenjere Trading Company	Tanzania	kassimally1@gmail.com	Private Institution
70	Government Entity	Lushoto District Council	Tanzania	rwezahurao@gmail.com	Local Government Authority
71	Government Entity	Babati District Council	Tanzania	ded@babatidc.go.tz	Local Government Authority
72	Value Chain Actor	Kium Cleaners	Tanzania	NA	Private Institution
73	Government Entity	Vice President Office	Tanzania	kemilembe.mutasa@vpo.go.tz	Central Government Authority
74	Government Entity	National Environment Management Council (NEMC)	Tanzania	innocentbm2000@yahoo.com	Central Government Authority
75	Government Entity	Dodoma District Council	Tanzania	yusuph.pille@dodomacc.go.tz	Local Government Authority
76	Government Entity	Monduli District Council	Tanzania	annmbise29@gmail.com	Local Government Authority
77	Government Entity	Ardhi University	Tanzania	aru@aru.ac.tz	University/College
78	Value Chain Actor	Chabri Energy Co.Ltd	Tanzania	chabrienergyltd@gmail.com	Private Institution
79	Government Entity	Arusha City Council	Tanzania	cd@arushacc.go.tz	Local Government Authority
80	Local and National Grouping	Know your Wildlife and the Environment Zambia (KWEZ) Initiative Organization	Zambia	gideon.kwezi21@gmail.com	Community-Based Organisation
81	Value Chain Actor	Nudefeet Footwear	Zambia	Nudefeet@gmail.com	Private Institution
82	Expert Group	Kwithu Lodge	Zambia	musondakasani@gmail.com	Non-Governmental Organization
83	Research and Training Institution	Lusaka Apex Medical University	Zambia	Registrar@lamu.edu.zm	University/College
84	Value Chain Actor	Manja Pamodzi Foundation	Zambia	Emmanuel.Kapesa@zm.ab-inbev.com	Private Institution
85	Value Chain Actor	Environment Savers of Zambia	Zambia	esaverszambia@gmail.com	Private Institution
86	Value Chain Actor	H.W SOLID WASTE MANAGEMENT	Zambia	Witiharooni@yahoo.com	Private Institution
87	Value Chain Actor	L&N Matrix	Zambia	info@lnmatrix.com	Private Institution

	Theme	Institution	Country	Email	Category of institution
88	Local and National Grouping	John Snow Health	Zambia	NIL	Civil Society Organizations
89	Government Entity	Lusaka City Council	Zambia	kagolivictor@yahoo.com	Local Government Authority
90	Government Entity	Mulungushi University	Zambia	ckwaleyela@gmail.com	University/College
91	Government Entity	Zambia Environment Management Agency	Zambia	info@zema.org.zm	Central Government Authority

Appendix VIII: List of duties (provided by employers) to be performed by WM employees (WM) by academic qualification

Duties expected of Employees		
Qualifications	Number	Specific duties
Certificate	13	<ul style="list-style-type: none"> - General duties including record keeping - Waste Handlers and car drivers - Plumbing and foremanship - Land preparation and installations - Confirming and preparation for biogas system - Inspection of facilities to check compliance - Waste data collection and recording - Supporting Waste collection, sorting, segregation and transportation - Making of plastic products - Collection and disposal of waste at community level - Operational management assistance - Collect waste payments from clients - Assist in management of waste facilities and recycling programs
Diploma	20	<ul style="list-style-type: none"> - Financial management - Support planning and implementation of activities - Delivery of different outputs, monitoring and evaluation - In charge of installation of biogas system - Coordinate certificate holders in their daily roles - Facilitating community training/meetings/workshops/sensitization - Conducting waste separation and brand audit - Organizing community clean up and community bazar - Participating in project assessment and evaluation - Supervise and manage waste management operations - Social media campaigning in waste management - Plan collection and transportation of waste - Supervise and monitor waste collection teams. - Monitor waste pickers initiatives and progress - Supervise implementation of waste management and sanitation contracts - Data collection in field - Conducting environmental inspection and write reports on inspection - Collect waste payments from clients - Patrol performing and ensure regulatory compliance with environmental policy in waste management - Keep records and maintain files
Bachelor Degree	23	<ul style="list-style-type: none"> - Stakeholders' coordination in waste management - Proposal Development, - Prepare data collection tools, analyses the collected data, and prepare a research/baseline/evaluation report - Planning, monitoring and implementation of waste management activities - Operations Manager: to manage the operations and the workforce - Managerial and decision making - Sales and installation in the organization - Undertake inspections based on issues identified by certificate and diploma holders. - Project management and implementation. - Compliance manager for environmental regulations

Duties expected of Employees		
Qualifications	Number	Specific duties
Master Degree		<ul style="list-style-type: none"> - Supervise and manage waste management operations, collection, transportation and disposal - Prepare training manuals and training the trainers on the approved technology - Fundraising for the solid waste projects and programs - Human resources management, financial resources management. - Department leading/management - Analyze data to identify trends and areas for improvement. - Coordinate and manage waste disposal and waste reduction strategies. - Implement and oversee suitable waste management programs. - Conduct workshops and outreach activities/training - Financial accounting - Participate in preparing the work plan and budget - Administration management, supervision and technically reports management. - Developing policies, procedures, and guidelines for department operations
	25	<ul style="list-style-type: none"> - Developing and reviewing curriculum, teaching and learning materials. - Initiating and undertaking research projects, consultancies and outreach programs. - Developing and implementing resource mobilization strategies. - Mentoring lecturers and tutors. - Representing the Department in various fora. - Publishing and disseminating research findings. - Program development and management, monitoring and supervision - Designing and implementing programs and projects on waste management - Influencing policy and practices on waste management - Advisory roles on Waste management - Provide technical guidance and collaborate with stakeholders - Planning and budgeting - Head Waste Management administration - Policy review and approval, approving for resources allocation for program/project - Staff performance appraisal - Conduct in-depth research on innovative waste management technologies. - Design and manage large-scale waste management projects. - Monitor the implementation of Environmental Management Policies and Laws - Assisting Lectures in teaching Lectures, Research and community service - Assist in identifying Best Available Practices (BAP) and Best Available Technologies (BAT) to prevent environmental effects - Collects and documents data/information from monitoring environmental trends - Assists in registering and administering all submitted ESIA/EA projects - Assist in organizing the Environmental Experts (EE) Advisory and Disciplinary Committee meetings, registration, deregistration and regulation

Duties expected of Employees		
Qualifications	Number	Specific duties
PhD	13	- Prepares documents for recommendation to the Minister responsible for Environment
		- Provide extension services in waste management operations
		- Developing and reviewing curriculum teaching and learning materials.
		- Initiating and undertaking research projects, innovation, consultancies, and outreach programs.
		- Mentoring lecturers and tutors.
		- Publishing and disseminating research findings.
		- Strategic program/project development and management
		- High level planning of waste management in co-ordination with other sectors
		- Contribute to the development of national or regional waste management policies.
		- Lead interdisciplinary research projects on waste-to-energy technologies.
		- Advise governmental bodies on sustainable waste management practices.
		- Monitor financial and project implementation sustainability
		- Teaching, research and consultancy of issues related to waste management
		- Facilitate Legal and regulatory frameworks
		- Advisory Board and Board Management

Appendix IXI: List of competencies (provided by employers) performed by WM employees (WM) by academic qualification

Expected competencies		
Qualification	Number	Mentioned
Certificate	15	<ul style="list-style-type: none"> - Creativeness and innovative - Procurement basic skills - Community mobilization basic skills - Event management skills i.e., workshops, data and information recording skills i.e., writing and filling the meeting minutes - Basic community development skills - Practical solid waste value chain and technology - Artisanal skills or craftsmanship - Driver's license - Patrol skills in waste collection sites - Basic record keeping skills - Financial literacy - Skills and understanding on waste including characterization, waste segregation, processing and plant/machine operating - General sanitation principles/ Practical skills. - Ability to conduct health inspection and create awareness - Knowledge about waste management stream and requirements
Diploma	13	<ul style="list-style-type: none"> - Community engagement skills - Facilitation skills - Creativeness and innovative - Field data collection and analytical skills - Entrepreneurship skills. - Report writing skills - Practical skills on solid waste technologies especially on recycling technology - Proficiency in conducting waste assessment and audits as well as generating reports. - Understanding of health and safety guidelines - Demonstration of knowledge and practical skills in the execution of work as well as supporting, coaching and overseeing the lower levels in the implementation of waste management duties. - Computer knowledge - In depth understanding of solid waste, waste characterization, waste management hierarchy-Waste management systems, waste valorization. - Branding skills and marketing skills
Bachelor Degree	17	<ul style="list-style-type: none"> - Creative with innovative mind - Planning and monitoring skills - Solution-oriented and comprehensive knowledge of waste management principles. - Analytical skills. - Abilities and capabilities in Project management. - Be able to produce financial management and technical reports - Sales and Marketing skills - Field sampling techniques, sorting and management - Exhibit strong mentorship in the duties pertaining to waste management. - Resource Mobilization, Project Management, Organizational and Business Development. - Conversant with policies - Business management skills

Expected competencies		
Qualification	Number	Mentioned
Master Degree		<ul style="list-style-type: none"> - Managing waste facilities and all recycling programs - Able to market the company, handle issues related to new clients and negotiate contracts. - Able to apply new knowledge in waste management - Broad knowledge and expertise in waste management - Ability to work and collaborate with stakeholder
	14	<ul style="list-style-type: none"> - Head Waste Management administration services - In-depth understanding of advanced waste management technologies. - Ability to design and implement large-scale waste reduction strategies. - Leadership skills for managing complex waste management projects. - Ability to coordinate and operate independently - Capable of supervising research work - Developing projects design and management - Knowledge of the waste value chain - Proactive thinking and design of products - Conduct community diagnosis - Conduct tailored research and work with stakeholders - Apply most experimental and experience-based information for better waste management initiatives - Broad knowledge and technical expertise in finding solutions to various waste management problems. - Knowledge about multilateral environmental agreements in waste management
PhD	13	<ul style="list-style-type: none"> - Planning and liaison - Expertise in shaping waste management policies - Leadership Skills - Interdisciplinary research on cutting-edge waste-to-energy technologies. - Advisory role for governmental bodies on sustainable waste management practices. - Significant contributions to academic research and publications in the field of waste management. - Have the ability to initiate and execute diverse arena of research projects in waste management - Developing projects design management, provision of extension education to community - Supervision and management skills - Outreach services; developing procedures and guidelines - Advanced research skills in waste management. - Come up with interventions based on evidence - Ability to formulate innovative and adoptable solutions

Appendix XI: Some literature sourced WM-related programs and modules in the Target countries (courses, programs)

Country	Institution	UGD ¹⁴	PGD ¹⁵	WM related Programs	Modules
Malawi	Lilongwe University of Agriculture and Natural Resource ¹⁶	30	25	BSc. Environmental Management BSc. Environmental Science Diploma in Environmental Science	Waste Management Environmental Pollution and Control Water Quality Monitoring and Treatment Introduction to Environmental Management
	Malawi University of Business and Applied Sciences (MUBAS) ¹⁷	37	28	MSc. Environmental Sanitation MSc Environmental Protection and Management BSc. Environmental Management and Technology BSc. Environmental Health Diploma in Occupational Safety and Health	Solid Waste Management Water and Wastewater Treatment Waste Characteristics and Pollution Solid waste management; Industrial waste management;
	Malawi University of Science and Technology ¹⁸	7	2	BSc. Sustainable Energy Systems	Bioenergy Energy Environment and Climate Change
Mozambique	Eduardo Mondlane University ¹⁹	185	80	BSc. Environmental Engineering BSc. Chemical Engineering BSc. Mechanical Engineering BSc. Industrial Management Engineering	Urban Solid Waste Management and Treatment Environmental Engineering Laboratories Environmental Impact Assessment Environmental Risk Assessment and Management Environmental Management System Solid Waste Management Economy, Legislation, Environment and Society
Tanzania	Ardhi University ²⁰	8	8	BSc. Environmental Science and Management BSc. Environmental Laboratory Science and Technology BSc. Environmental Engineering BSc. Municipal and Industrial Services Engineering	Air Pollution Prevention and Control Solid Waste Management and Infrastructure Environmental biotechnology Agro-waste processing Wastewater treatment technologies

¹⁴ Undergraduate

¹⁵ Post-Graduate

¹⁶ <https://www.luanar.ac.mw>

¹⁷ <https://www.mubas.ac.mw/>

¹⁸ <https://www.must.ac.mw/>

¹⁹ <https://uem.mz/index.php/en/home-english/>

²⁰ <https://www.aru.ac.tz>

Country	Institution	UGD ¹⁴	PGD ¹⁵	WM related Programs	Modules
	The Open University of Tanzania ²¹	57	56	Master of Science in Environmental Studies (MES) Bachelor of Science in Environmental Studies Master of Environmental Studies (MES)	Environmental Pollution and Waste Management Environmental Science
	The State University of Zanzibar (SUZA) ²²	58	2	MSc Environmental studies BSc Environmental Health Diploma in Environmental Health Sciences	Waste and Waste Management; Introduction to Environmental Health Environmental Science Infection Prevention and Control (IPC)
	University of Dodoma ²³	99	89	PhD. Environmental Sciences PhD. Environmental Sciences and Conservation PhD. Geography and Environmental Studies PhD. Geology, Petroleum Geosciences, Mineral Exploration, Environmental Engineering and Renewable Energy Master of Integrated Water Resources Management BA Environmental Economics and Policy Bachelor of Environmental Disaster Management Bachelor of Geography and Environmental Studies BSc. Environmental Engineering BSc. Environmental Sciences	Disaster Management Environmental Economics Environmental Policy Environmental Conservation Education GIS and Remote Sensing Waste Management Land Use Management Environmental Impact Assessment
	University of Dar es Salaam ²⁴	90	21	PhD Environmental Science MSc. Integrated Sanitation Management BSc. Civil Engineering BA in Geography and Environmental Studies	Solid Waste Management (Management of Solid and Hazardous waste) Waste Water Management; Sanitation Technologies Decentralized Waste Water Treatment
	Water Institute ²⁵	13	2	Master Degree in Water supply and Sanitation Engineering Bachelor Degree in Water Resources and Irrigation Engineering Bachelor Degree in Sanitation engineering Bachelor Degree in Community development for water supply and sanitation Diploma in Water Quality and Laboratory Technology Diploma in Sanitation Engineering	Solid Waste Management

²¹ <https://www.out.ac.tz>

²² <https://suza.ac.tz/soe/academic-programmes/>

²³ <https://www.udom.ac.tz/programmes>

²⁴ <https://www.udsm.ac.tz/web/index.php/study/catalogue/T>

²⁵ <https://www.waterinstitute.ac.tz/>

Country	Institution	UGD ¹⁴	PGD ¹⁵	WM related Programs	Modules
Zambia	Natural Resources Development College ²⁶	8		Diploma in Operation and Maintenance of Water System Engineering Diploma in Water Engineering	Water Supply and Sanitation
	University of Zambia ²⁷	29	39	Doctor of Philosophy in Environmental Education Master of Education in Environmental Education BSc. Environmental and Natural Resources Management BSc. Geography Bachelor of Education (Environmental Education and Management)	Fundamentals of Physical Geography Environment and Development; Environmental Planning and Management
	Mulungushi University ²⁸	13	8	MSc. Sanitation BSc. Environmental Studies BSc. Civil Engineering	Waste Management Environmental Engineering Sanitation and Public Health; Environmental Impact Assessment

²⁶ <https://www.nrdc.biz>

²⁷ <https://www.unza.zm/>

²⁸ <https://www.mu.ac.zm>

Appendix XI: Literature materials for WM programs identified by respondents

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21. Rice, E.W., and Bridgewater L., (2012). Standard methods for the examination of water and wastewater. American Public Health Association
22. Letcher, T., and Vallero, D. A. (Eds.). (2019). Waste: A handbook for management. Academic Press.
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24. Murov, S. L. (2014). Experiments in General Chemistry: Cengage Learning
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30. Sincero, A.P., and Sincero, G.A. (1999) Environmental Engineering Prentice-Hall of India
31. Masters, G.M. (2000). Introduction to Environmental Engineering Prentice-Hall International
32. Drinan J. E.,(2000), Water and Wastewater Treatment: A Guide for the Non-engineering Professionals, CRC Press, ISBN 1420031791, 9781420031799 American Water Works Association and American Society of Civil Engineers (May 1, 2004), Water Treatment Plant Design ,McGraw-Hill, ISBN -13 978-0071745727
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Appendix XIV: List of duties (provided by employers) performed by CBNRM employees by academic qualifications

Duties performed by Employees		
Qualification	Number	Specific duties
Certificate	13	<ul style="list-style-type: none"> - Assist in practical aspects for students - Community Engagement - Human Wildlife Conflict management - Lawn management - Extension education to the community - Perform duties of patrol and wildlife law procedure. - Work with communities on various CBNRM activities - Drivers and office attendants - Inspecting the tourists permits in and out of the protected area - Law enforcement (patrol, intelligence) - Rescue wild animals which are stuck in dump/wells - Control and manage wildfire - Assist in providing community education
Diploma	- 8	<ul style="list-style-type: none"> - Build capacities of communities in natural resources-based enterprises - Support planning and monitoring of projects - Community Extension Services - Supporting academic staff on training and administration - Research assistants, data analysis and reports writings - Assistant natural resources conservation officer - Facilitate the work plan and budget development in a respective section - Supervise patrols and assigning patrol teams
Bachelor Degree	- 15	<ul style="list-style-type: none"> - Coordinator on project activities with field staff - Teaching and supervising research works for the students - Assist in planning and budgeting - Planning and execution of wildlife activity and project design management. - Coordinating community conservation work implementation - Collaborate with other stakeholders in implementing Community-Based Natural Resource Management activities - Supervising assistant forest, wildlife and tourism officers - Mobilize and allocate the resources according plan and budget - Coordinate and conduct trainings or capacities building - Analyses data, report writing, supervision and management of field data - Lead community consultations and participatory planning processes. - Analyze ecological and socio-economic data for informed decision-making. - Develop and implement sustainable resource management strategies. - Organizing extension services - Geographical Information System services and data management
	- 13	<ul style="list-style-type: none"> - Provide strategical advice - Supporting the development and review of curriculum - Initiating and undertaking research projects, consultancies and outreach programs. - Developing, enforcing and monitoring the adoption and adaptation of various new technologies and concepts. - Developing and implementing resource mobilization strategies. - Publishing and disseminating research findings - Planning and execution of wildlife activity and project design management. - Collaborate with other stakeholders in implementing Community-Based Natural Resource Management activities - Develop research proposal for soliciting research funds - Prepare the annual reports - Design and conduct advanced research on CBNRM best practices.
Master Degree		

Duties performed by Employees		
Qualification	Number	Specific duties
PhD	- 8	- Develop and implement policy recommendations for sustainable resource management.
		- Lead and manage CBNRM projects
		- Project evaluation and reporting
		- Research and project design, management and monitoring
		- Initiate, Develop research proposals for research funds
		- Linking the organization with external stakeholders NGOs within the country and international NGOs
		- Design the organization mission and vision
		- Policy development of the organization
		- Training and writing articles and mentoring
		- Research and new business development

Appendix XII: List of competencies (provided by employers) expected of CBNRM employees by academic qualification

Expected competencies		
Qualification	Number	Mentioned
Certificate	- 12	<ul style="list-style-type: none"> - Understand participatory resources management and monitoring and governance in CBNRM - Equipment handling and maintenance - Effectiveness in the use of field equipment's - Basic forest/wildlife ecology knowledge, - ICT skills - Basic understanding of natural resource principles. - Proficiency in basic field techniques - Extension education to the community, perform duties of patrol and wildlife law procedure - Intelligence led operations - Collection of Field data - Physical fitness - Have solid knowledge in resolving a problem
Diploma	- 12	<ul style="list-style-type: none"> - Develop business plans, Marketing, and financial management - Support project proposal writing. - GIS skills - Report writing - ICT skills - Field practical competence - Ability to collaborative with various stakeholders - Good understanding of CBNRM principles in wildlife management; - Ability to implement basic CBNRM strategies - Collection of Field data - Ability to supervise program works - Respond and solve existing problems in communities
Bachelor Degree	- 12	<ul style="list-style-type: none"> - Skills in Community engagement - Policy analysis and understanding of the Global Framework and its protocol - Understanding in business development and operations. - Independently conduct research to inform policy and advocate - GIS skills - Strategic thinking - Theory and field practical experience - Self-driven, motivated and doer - Effective leadership and team management - Proficiency in utilized advanced technology for data analysis - Ability to link CBNRM and wildlife Management/ conservation - Project design management
	- 11	<ul style="list-style-type: none"> - Skills in Community engagement - Organization development - Marketing skills - Project management - Decision making process - Managing contracts - International policy development and negotiations - Critical thinking - Problem solving - Ability to provide strategic insights for sustainable resources management. - Supervisory and managerial skills
Master Degree		

Expected competencies		
Qualification	Number	Mentioned
PhD	- 6	<ul style="list-style-type: none"> - Knowledge Global Framework and its protocols, - Analytical and research skills - Critical thinking - Policy advocacy skills - Supervisory and managerial skills - Coordinate activities between the Institution and government

Appendix XIII: Some literature sourced CBNRM-related Academic programs in the Target countries

Country	Institution	UGD	PGD	Programs related to CBNRM
Malawi	Lilongwe University of Agriculture and Natural Resources ²⁹	12	25	MSc. in Environmental Forestry MSc. in Environment and Climate Change Sciences BSc Natural Resources Management (Land and Water), BSc Natural Resources Management (Wildlife and Ecotourism BSc Forestry
	Malawi University of Science and Technology (MUST) ³⁰	13	12	MSc in Biodiversity in informatics Master of Science in innovation BSc. Sustainable Energy Systems BA in Indigenous Knowledge Systems and Practice
Mozambique	Catholic University of Mozambique ³¹	26	25	Master in Sustainable Development and Tourism Management Masters in Geographic Information Systems and Monitoring of Natural Resources Bachelor Degree in Forestry Engineering BSc in Forest and Fauna Resources Management BSc in Tourism and Hospitality Management
	Lurio University ³²	23	12	Master's in Conservation Biology BSc. Natural Resources Management, BSc. Biological sciences and applied Ecology BSc. Tourism and Hospitality
	Rovuma University ³³	29	16	MSc Global Change: Ecosystem Science and Policy (joint degree) Degree in Environmental Management and Community Development
Tanzania	Sokoine University of Agriculture ³⁴	35	58	Master of Science in Environmental and Natural Resource Economics Master of Science in Forest Resource Assessment and Management Master of Science in Forestry Master of Science in Management of Natural Resources for Sustainable Agriculture Master of Science in Wildlife Management

²⁹ <https://www.luanar.ac.mw/luanar/prospectus.pdf>

³⁰ <https://www.must.ac.mw/programs/undergraduate?page=1>

³¹ <https://www.courseseye.com/colleges-and-universities/7503-catholic-university-of-mozambique.aspx>

³² <https://www.unilurio.ac.mz/unilurio/index.php/pt/ensino/cursos/graduacao>

³³ https://www.uni-giessen.de/en/study/courses/a-z?b_start:int=30

³⁴ <https://www.dus.sua.ac.tz/undergraduate-study-programmes/degree-programmes>

Country	Institution	UGD	PGD	Programs related to CBNRM
				MSc in Land Use Planning and Management MSc. in Aquaculture Bachelor's Degree in Wildlife Management Bachelor's Degree Tourism Management Bachelor of Rural Development Bachelor of Arts in Development Planning and Management
	University of Dodoma ³⁵	77	57	Master of Science in Natural Resource Management Master of Science in Biodiversity Conservation BSc. In Biology Bachelor of Commerce in Tourism and Hospitality Management Bachelor of Arts in Tourism and Cultural Heritage Master of Science in Biodiversity and Ecosystem Management
	University of Dar es Salaam ³⁶	85	164	Master of Science In Fisheries And Aquaculture Master of Science In Applied Zoology Master of Science In Biodiversity Conservation Master of Science In Applied Botany Master of Science In Sustainable Fisheries Management Master of Science In Natural Resource Assessment And Management Master of Science In Climate Change And Sustainable Development BSC Wildlife Science and Conservation BSc in Applied Zoology Bachelor of Commerce in Tourism and Hospitality Management BA in Heritage Management
	The Nelson Mandela African Institutions of Science and Technology ³⁷	0	30	Master of Science in Biodiversity and Ecosystem Management (BEM)
	The Institute of Rural Development Planning ³⁸	0	12	Master Degree in Rural Development Planning)
	The State University of Zanzibar ³⁹	0	8	Master of Science in Climate Change and Natural Resources Management

³⁵ <https://www.udom.ac.tz/programmes>

³⁶ <https://www.udsm.ac.tz/web/index.php/study/catalogue?page=5&per-page=25>

³⁷ <https://www.nm-aist.ac.tz/index.php/admissions>

³⁸ <https://irdp.ac.tz/Pages/1YQdJ2dOGp>

³⁹ <https://www.suza.ac.tz>

Country	Institution	UGD	PGD	Programs related to CBNRM
Zambia	Livingstone International University of Tourism Excellence and Business Management (LIUTEBM) ⁴⁰	0	10	BSc in Wildlife & Natural Resources Management BA in Eco-Tourism Management BA in Hospitality Management
	Mulungushi University ⁴¹	0	77	BSc in Natural Resources Management BSc in Land and Water Resources Management
	The Copperbelt University ⁴²	72	18	Master of Science in Biodiversity & Ecology Master of Science in Climate Change Bachelor of Science in Sustainable Natural Resources Management and Clinic Bachelor of Science in Forestry Bachelor of Science in Wildlife Management BSc in Biodiversity and Ecology
	Zambia Open University ⁴³	23	25	Master of Social work and Community Development Master of Science in Environment and Natural Resource Management BSc in Agricultural Sciences
	University of Zambia ⁴⁴	0	158 Master	Master of science in breeding and seed systems Master of science in Sustainable Land and Environmental Management

⁴⁰ https://liutebmuniversity.org/?page_id=249

⁴¹ https://www.mu.ac.zm/images/List_of_Undergraduate_Programmes.pdf

⁴² <https://www.cbu.ac.zm/opus/moodle/>

⁴³ <https://zambian-open-university-zaou-courses-offered/>

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Appendix XIV: Literature material for CBNRM programs identified by respondents

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