

NATIONAL OCCUPATIONAL STANDARD FOR AQUACULTURE TECHNICIAN



APPROVING AUTHORITY

This National Occupational Standard has been prepared and published under the authority of the Zambia Qualifications Authority Board on 30th September, 2020.

ZAMBIA QUALIFICATIONS AUTHORITY

The Zambia Qualifications Authority Act No. 13 of 2011 was enacted by the Government of the Republic of Zambia to ***“provide for the development and implementation of a national qualifications framework; establish the Zambia Qualifications Authority; provide measures to ensure that standards and registered qualifications are internationally comparable; and provide for matters connected with, or incidental to the foregoing”***. Among other functions, ZAQA is responsible for *determining national standards for any occupation*, through various sector specific National Occupational Standards Development Teams (NOSDTs).

REVISION OF NATIONAL OCCUPATIONAL STANDARDS

National Occupational Standards shall be revised every after **5 years**, or whenever necessary, by the issue of either amendments or of revised editions. It is important that users of National Occupational Standards (NOS) should ascertain that they are in possession of the latest amendments or editions.

NOS DEVELOPMENT TEAM RESPONSIBLE

This National Occupational Standard was prepared by the Agriculture National Occupational Standards Development Team, upon which the following organisations were represented:

1. Aquaculture Development Association of Zambia (ADAZ);
2. Natural Resources Development College (NRDC);
3. Ministry of Agriculture (MoA);
4. Zambia Agriculture Research Institute (ZARI);
5. Zambian Forum for Agricultural Extension and Advisory Services (ZAFAAS);
6. University of Zambia (UNZA);
7. Zambian Aquaculture Cooperative Society (ZACOSO);
8. Zambia Qualifications Authority (ZAQA) – Secretariat.

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2. Mr. Masautso E. Sakala (Natural Resources Development College);
3. Mr. Katupa Chongo (Ministry of Agriculture);
4. Dr. Batiseba Tembo (Zambia Agriculture Research Institute);
5. Mr. Vincent M. Akamandisa (Zambian Forum for Agricultural Extension and Advisory Services);
6. Dr. Wilson Mwenya (University of Zambia);
7. Mr. Frezharnd Simfukwe (Zambian Aquaculture Cooperative Society).

The Authority wishes to also acknowledge the efforts of all stakeholders that took time to review and submit comments on this NOS and those that participated in the national validation process.

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FOREWORD

The Zambia Qualifications Authority (ZAQA) is a statutory body under the Ministry of Higher Education established by ZAQA Act No. 13 of 2011 to “***provide for the development and implementation of a national qualifications framework; provide measures to ensure that standards and registered qualifications are internationally comparable; and provide for matters connected with, or incidental to the foregoing***”.

Among other functions, ZAQA is responsible for “*determining national standards for any occupation*”, through various sector specific National Occupational Standards Development Teams (NOSDTs) of experts composed of representation from appropriate authorities, government departments, industry, academia, regulators, consumer associations and non-governmental organisations, etc.

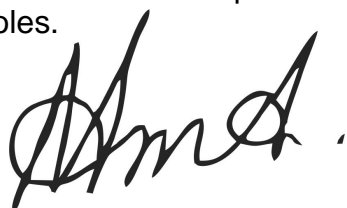
This National Occupational Standard (NOS) has been developed by the Agriculture National Occupational Standards Development Team in accordance with the procedures and guidelines of ZAQA. All users should ensure that they have the latest edition of this publication as National Occupational Standards are revised from time to time.

This NOS shall be used by, among others, industry, employers, quality assurance bodies, awarding and professional bodies and education and training institutions, as a benchmark to identify training needs, develop job profiles/descriptions, develop curricula and learning programmes, in various sectors where the occupation exists. In the Agriculture sector, demonstration of competence against this NOS may be required in order to run a business or practice a craft or profession.

Aquaculture is one of the fastest growing food production systems worldwide and is particularly important in bridging the gap between fish demand and supply in Zambia. Efforts by Government and other stakeholders have resulted in a notable increase in the number of small-scale aquaculture farmers in the country. An Aquaculture Technician is a key personnel in the culture fisheries subsector as he/she is responsible for the biological aspects of cultured organisms, maintaining optimum conditions in the farm for growth and production of cultured organisms.

As aquaculture is a highly technical venture, there is need for Aquaculture Technicians to be equipped with the necessary skills and competences to help them manage the culturing of quality fish, profitably.

This National Occupational Standard highlights core knowledge, skills, competences and personal attributes that Aquaculture Technicians must possess to be successful in their work roles.



Mirriam M. A Chiyaba (Mrs)
Director and Chief Executive Officer

ACRONYMS AND ABBREVIATIONS

AT	Aquaculture Technician
CS	Core Skill
OK	Organisational Knowledge
NOS	National Occupational Standard
NOSDT	National Occupational Standards Development Team
PC	Performance Criteria
PS	Professional Skill
RPL	Recognition of Prior Learning
TK	Technical Knowledge
ZAQA	Zambia Qualifications Authority
ZQF	Zambia Qualifications Framework

GLOSSARY OF TERMS

For the purposes of this NOS, the following terms and definitions shall apply:

Core Skills/Generic Skills: are a group of skills that are key to learning and working in today's world. These skills are typically needed in any work environment. In the context of the NOS, these include communication related skills that are applicable to most job roles.

Function: is an activity necessary for achieving the key purpose of the sector, occupation, or area of work, which can be carried out by a person or a group of persons. Functions are identified through functional analysis and form the basis of NOS.

Job Role: defines a unique set of functions that together form a unique employment opportunity in an organisation.

Knowledge and Understanding: are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.

National Occupational Standards (NOS): are statements of the standards of performance individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding. They are precise descriptions of what an individual is expected to be able to do in his/her work role.

National Occupational Standards (NOS) Code: is a unique reference code that identifies a NOS.

National Occupational Standards Development Team (NOSDT): means an established group of national stakeholders/experts responsible for the development of National Occupational Standards within a specific economic sector or occupation.

Occupation: is a set of job roles, which perform similar/related set of functions in an industry.

Organisational Context: includes the way the organisation is structured and how it operates, including the extent of operative knowledge that managers have in their relevant areas of responsibility.

Performance Criteria: are statements that together specify the standard of performance required when carrying out a task.

Scope: is the set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on the quality of performance required.

Sector: is a conglomeration of different business operations having similar businesses and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.

Sub-Sector: is derived from a further breakdown based on the characteristics and interests of its components.

Technical Knowledge: is the specific knowledge needed to accomplish specific designated responsibilities.

Unit Title: gives a clear overall statement about what the incumbent should be able to do.

1. OVERVIEW

This is an introductory section providing a brief summary and specific information or commentary about the content of the NOS and the targeted sector and occupation to help the user judge whether it is relevant to them.

NOS Code	NOS.AT.01
Occupation	Aquaculture
Job Title	Aquaculture Technician
Job Description	An Aquaculture Technician is responsible for maintaining all aspects of the fish farm and farm organisms which are used as food and also exported
Job Purpose	This job role is responsible for the biological aspects of cultured organisms, maintaining optimum conditions in the farm for growth and production of cultured organisms
ZQF Level	6
Sector	Agriculture
Sub sector	Fisheries and Aquaculture
Other Economic Sector(s) in which the Occupation is Practiced	N/A
Other Similar Jobs Performed in the Occupation	Aquaculture Farmer, Aquaculture Worker, Fisheries Assistant, Fish Seed Grower, etc.
Minimum Educational Job Entry Qualification(s)	Level 4 Certificate or equivalent
Practicing License Requirements (if any)	N/A
Training/RPL (Optional)	On the job training/Prior work in fish farming operations
Minimum Job Entry Age	18
Prior Experience (Optional)	Preferably 6 months of work experience in a similar role
Performance Criteria	As described in the Units under Section 4

2. SCOPE

This National Occupational Standard specifies the fundamental knowledge and understanding, skills and competences that Aquaculture Technicians must possess to be successful in their job roles. It is applicable to Aquaculture Technicians working in the fisheries and aquaculture subsector, governmental, Private Sector or non-governmental organisations, etc.

3. PERSONAL ATTRIBUTES (VALUES, ETHICS AND ATTITUDES)

An Aquaculture Technician must have the ability to plan and prioritise. The individual must possess decent communication skills. In addition, the individual must have stamina and personal hygiene, be able to attend to work for long hours if required, should be able to swim, must be honest and have integrity.

4. UNITS AND ELEMENTS

This National Occupational Standard is divided into 3 units representing the tasks that a job holder should undertake in his/her day to day work. Each unit is further broken down into elements depicting the number of activities to be carried out for the successful execution of a particular task.

UNIT 1 [This Unit is about selecting sources of water, water treatment, eradication of predators and pond fertilisation to develop the desirable bloom].

Unit No.	01
Unit Title	Perform pond preparation activities
Description	This Unit is about selecting sources of water, water treatment, eradication of predators and pond fertilisation to develop the desirable bloom
Scope	This Unit covers the following: <ul style="list-style-type: none"> • Choose sources and methods of water intake • Carry out treatment of water • Carry out eradication of predators • Ensure pond fertilisation
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria (PC)
Choose method of water intake	To be competent, the individual must be able to: PC1. select the appropriate sources of water intake either from a lake, river, stream or borehole PC2. select the proper physical and biological methods of water filtration before taking the water into the reservoir if source is from either a lake, river or stream
Carry out treatment of wat	To be competent, the individual must be able to: PC3. select the suitable water treatment procedure/method such as physical and biological
Carry out eradication of predators	To be competent, the individual must be able to: PC4. select the appropriate method for management and control of predators and aquatic weed
Ensure pond fertilisation	To be competent, the individual must be able to: PC5. select appropriate organic and inorganic fertilisation methods for primary productivity in the pond PC6. maintain the recommended transparency of water at the optimum level
Knowledge and Understanding (K)	
A. Organisational Context (Knowledge of the company/ organisation and its processes)	The individual on the job must demonstrate knowledge and understanding of: OK1. organisation fishing culture methods and techniques OK2. organisation rules and regulations to be followed according to fishing industry standards OK3. organisation procedure for maintenance aquaculture facilities such as fish ponds, cages, tanks, etc.
B. Technical Knowledge	The individual on the job must demonstrate knowledge and understanding of: TK1. suitable water treatment procedures TK2. how to maintain the bloom of phytoplankton at the fish farm at the desired level as indicated by transparency of water
Skills (S)	
A. Core Skills/ Generic Skills	Reading Skills
	The individual on the job must be able to: CS1. read internal information documents sent by internal teams

	CS2. read equipment manuals and process documents to understand the equipments operation and process requirement
	Writing Skills
	The individual on the job must be able to: CS3. record and maintain all the information regarding fish farming CS4. record information on water treatment and fertilisation of ponds
	Oral Communication (Listening and Speaking skills)
B. Professional Skills	The individual on the job must be able to: CS5. effectively communicate with the staff and colleagues
	Decision Making Skills
	The individual on the job must be able to: PS1. decide on the correct methods to be used for pond preparation activities and culture of aquatic organisms
	Plan and Organise
	The individual on the job must be able to: PS2. plan and organise the work order and jobs received from the supervisor PS3. plan and prioritise the work based on the instructions received from the supervisor PS4. plan to utilise time effectively
	Customer Centricity
	The individual on the job must be able to: PS5. manage good relationships with the manager and farm staff
	Problem Solving Skills
	The individual on the job must be able to: PS6. identify pond management problem and provide a best solution
	Analytical Thinking
	The individual on the job must be able to: PS8. monitor the farm conditions and condition of aquatic organisms and suggest improvements if any
	Critical Thinking
	The individual on the job must be able to: PS9. use common sense and make judgments on day to day basis PS10. use reasoning skills to identify and resolve basic problems

UNIT 2 [This Unit is about carrying out culture of aquatic organisms in the farm].

Unit No.	02
Unit Title	Carry out culture of aquatic organisms
Description	This Unit is about culturing aquatic organisms in the farm with proper feeding and management practices to achieve maximum production
Scope	This Unit covers the following: <ul style="list-style-type: none"> • Choose appropriate technology for fish culture • Use appropriate feeds and feeding practices • Ensure proper disease control and management
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria (PC)
Choose appropriate technology for culture	To be competent, the individual must be able to: PC1. culture the aquatic organisms using good management practices PC2. use <i>periphytons</i> wisely PC3. ensure proper stocking of fingerlings after proper acclimation PC4. harvest the culture organisms in using different methods PC5. make arrangements for preservation of organisms immediately after harvest
Use appropriate feeds and feeding practices	To be competent, the individual must be able to: PC6. formulate feed with appropriate protein content PC7. employ proper feeding practices
Ensure proper disease management	To be competent, the individual must be able to: PC8. check for diseased or dying fish PC9. in case of a disease outbreak, take appropriate measures to prevent spread of diseases PC10. diagnose the problem/disease and treat appropriately PC11. monitor the condition of fish in the quarantine tank for signs of improvement
Knowledge and Understanding (K)	
A. Organisational Context (Knowledge of the company/ organisation and its processes)	The individual on the job must demonstrate knowledge and understanding of: OK1. organisation's good management practices for culture of aquatic organisms OK2. organisation's procedures and methods for harvesting of culture organisms
B. Technical Knowledge	The individual on the job must demonstrate knowledge and understanding of: TK1. fish management practices TK2. use of feeds with water stability TK3. harvesting procedures of cultured aquatic organisms
Skills (S)	
A. Core Skills/ Generic Skills	Reading Skills
	The individual on the job must be able to: CS1. read internal information documents sent by internal teams/ supervisor

	CS2. read equipment manuals and process documents to understand the equipment operation and process requirement
	Writing Skills
	The individual on the job must be able to: CS3. record and maintain all the information regarding farming
	Oral Communication (Listening and Speaking skills)
B. Professional Skills	The individual on the job must be able to: CS4. effectively communicate with the staff and colleagues
	Decision Making Skills
	The individual on the job must be able to: PS1. use the correct methods for culture
	Plan and Organise
	The individual on the job must be able to: PS2. plan and organise the work order and jobs received from the supervisor PS3. plan and prioritise the work based on the instructions received from the supervisor PS4. plan to utilise time and equipments effectively
	Customer Centricity
	The individual on the job must be able to: PS5. manage good relationships with the manager and farm staff
	Problem Solving Skills
	The individual on the job must be able to: PS6. study the problem and provide a best solution PS7. quickly identify problems and solve them immediately
	Analytical Thinking
	The individual on the job must be able to: PS8. estimate and analyse the population of organisms in the pond
	Critical Thinking
	The individual on the job must be able to: PS9. determine how to improve production in the farm

UNIT 3 [This Unit is about following safety, hygiene and sanitation practices for culture operations].

Unit No.	03
Unit Title	Ensure safety, hygiene and sanitation practices for culture operations
Description	This Unit is about maintaining safety, hygiene and sanitation practices for culture fishing
Scope	This Unit covers the following: <ul style="list-style-type: none"> • Ensure safety measures and upkeep of water bodies used in fish culture • Maintain personal hygiene and safety • Maintain health and hygiene of fish at various level of growth/maturity
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria (PC)
Ensure safety measures and upkeep of water bodies used in fish culture	To be competent, the individual must be able to: PC1. ensure suitable measures for protection of cultured organisms from natural calamities such as flood, protect dyke from erosion or break PC2. ensure protection and prevent escape of the cultured aquatic organisms into the natural water body PC3. identify common predators and preying organisms in water bodies PC4. apply suitable methods such as fencing to keep away predators in water bodies to protect fish culture PC5. restrict entry of unauthorised persons into the premises PC6. be fully aware of the dosage, toxicity level and method of application of chemicals/medicines used for fish culture PC7. ensure all chemicals are adequately labelled and stored safely PC8. identify a quarantine area and implement protocols of quarantine
Maintain personal hygiene and safety	To be competent, the individual must be able to: PC9. be aware of the possibilities of bacterial (water borne, air borne, formite borne) and other contamination from human handling fish PC10. apply effective systems and routines to ensure healthy and hygienic conditions during all stages of fish culture including transportation and marketing PC11. ensure that the fish culture premises are constantly monitored/inspected for breaches in the protection provided by health and hygiene measures PC12. undertake basic safety checks before operation of any equipments PC13. wear protective clothing and gear as and when required and ensure adherence to safety guidelines PC14. report potential hazards to the manager immediately PC15. follow standard procedures to deal with accidents and emergency situations

	PC16. use first aid kit as and when required and provide appropriate treatment in case of any injuries
Maintain health and hygiene of spawn/seedlings at various level of growth/ maturity	To be competent the individual must be able to: PC17. ensure salinity of water is maintained to specifications at all times with frequent tests PC18. ensure specified feed is provided to organisms at regular intervals to prevent cannibalism and ensure that excess feeding is avoided PC19. perform routine tests for virus infections PC20. ensure all utensils and vessels used are decontaminated and cleaned PC21. restrict access only to authorised personnel PC22. implement effective security measures for prevention of theft/sabotage
Knowledge and Understanding (K)	
A. Organisational Context (Knowledge of the company/ organisation and its processes)	The individual on the job must demonstrate knowledge and understanding of: OK1. organisation standards and procedures followed safety, hygiene and sanitation OK2. personal hygiene and fitness requirements OK3. job responsibilities/duties for following food safety, hygiene and sanitation OK4. personal protective equipment and clothing to be used OK5. safe methods to use materials and equipment OK6. housekeeping methods and importance OK7. safe disposal methods for waste OK8. methods for minimising environmental damage OK9. importance of following health, hygiene and safety standards and the impact of not following the standards
B. Technical Knowledge	The individual on the job must demonstrate knowledge and understanding of: TK1. prevention of infections TK2. personal hygiene requirement TK3. method of maintaining safety checklists TK4. routine physiochemical testing of water
Skills (S)	
A. Core Skills/ Generic Skills	Reading Skills
	The individual on the job must be able to: CS1. read internal information documents sent by internal teams/manager CS2. read equipment manuals and process documents to understand the equipment operation and process requirement
	Writing Skills
	The individual on the job must be able to: CS3. record information on water treatment and fertilisation of ponds and other important aspects
	Oral Communication (Listening and Speaking skills)
The individual on the job must be able to: CS4. effectively communicate with the manager, fellow technicians and labourers regarding all important aspects	

B. Professional Skills	Decision Making Skills
	The individual on the job must be able to: PS1. handle tasks on a day to basis PS2. handle issues in case the supervisor is not available
	Plan and Organise
	The individual on the job must be able to: PS3. plan and use suitable techniques for the work assigned PS4. plan and prioritise the work based on the instructions received PS5. plan to utilise time and equipment effectively
	Customer Centricity
	The individual on the job must be able to: PS6. maintain good relationships with the manager and farm staff
	Problem Solving Skills
	The individual on the job must be able to: PS7. study the problem and report to the concerned authority PS8. immediately identify problems and solve them
	Analytical Thinking
	The individual on the job must be able to: PS9. monitor condition of aquatic organisms and suggest improvements, if any
	Critical Thinking
The individual on the job must be able to: PS10. use common sense and make judgments on day to day basis PS11. use reasoning skills to identify and resolve basic problems	

5. EQUIPMENT, TOOLS AND CONSUMABLE MATERIALS

These include fish water source, brood stock, fry/fingerings/stunted juvenile, ponds, boats and docks, submersible cages and nets, aerators and diffusers, filters and tanks, fish feed, chemicals and medicines, fish storage and transportation equipment and facilities, note pads/books and pens, protective equipment, company's standard operating procedures, reporting templates, calculator, etc.

6. DILEMMAS/CHALLENGES AND COMPLEXITIES FOR A JOB HOLDER

Dilemmas associated with the job of Aquaculture Technician include working in dangerous areas, lifting relatively heavy materials, handling dangerous hormones and medicines, long working hours, pressure from customers, subordinates, supervisors and colleagues, language barriers, working in extreme weather such as rainy and cold conditions, outbreak of fish diseases, stunted fish, fish eating predators, exposure to smells from overstayed water and chemicals, etc.

6.1 Alternative Choices (Solutions) to Dilemmas and Complexities

Solutions to dilemmas include exercising regularly to maintain physical fitness, learning local languages, undertaking training in customer service and team management, wearing protective clothing, sticking to company's standard operating procedures at all times, consulting extensively within and outside one's department/team, etc.

7. WORKING CONDITIONS/ENVIRONMENT

Working conditions include working/moving on lakes, rivers or swampy areas, working in rural and slippery areas, cold, hot and rainy conditions, stand/walk for long hours, dealing with donors/funders, getting in contact with water (getting and staying wet) for long periods of time, etc.

8. PARTIES INVOLVED/INTERACTING WITH THE JOB HOLDER OR TRAINEE

8.1 Internal/Within the Organisation

Trainers, managers, subordinates (aquaculture workers), colleagues, etc.

8.2 External/Outside the Organisation

Customers, trainers, government regulators/funders, suppliers of equipment/tools/consumables, Aquaculture Technicians from other organisations, donor agencies/non-governmental organisations, etc.

9. PHYSICAL DEMANDS ON THE BODY

- Be able to walk and stand for long periods of time;
- Bend, stretch, twist, or reach out;
- Be able to lift relatively heavy materials, tools and equipment;
- Coordinate movement of several parts of the body, such as arms and legs, while the body is moving;
- Be able to withstand feelings of wetness, itching, or coldness on the body for long periods of time;
- Etc.

ANNEX A

Criteria for Assessments based on this NOS

A.1 Guidelines for Assessment

A.1.1 Criteria for assessment for curricula and learning programmes based on this NOS will be created by curricula and programmes developers. Each Performance Criteria (PC) will be assigned marks proportional to its importance in the NOS. Curricula and programmes developers will also lay down proportion of marks for theory and practical skills for each performance criteria, giving more weight to practical skills.

There shall be allocated the 'Total Mark', which will be the sum of all marks in each Unit, distributed across the number of PCs in that particular Unit. The 'Out Of' mark will be the mark allocated to each PC, which will be shared between theory and practical skills assessments.

A.1.2 Awarding/assessment bodies or institutions and other users of the NOS will create unique question papers for the theory part and evaluations for skill practical part for their respective candidates.

ANNEX B NOS Version Control

This Annex gives details necessary for the tracking of the NOS versions based on the number of revisions.

NOS Code	NOS.AT.01		
ZQF Level	6	Version Number	01
Sector	Agriculture	Date of Approval	September, 2020
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