



KENYA INSTITUTE OF CURRICULUM DEVELOPMENT
A Skilled and Ethical Society

SENIOR SCHOOL CURRICULUM DESIGN

GRADE 11

MARINE AND FISHERIES TECHNOLOGY

OCTOBER, 2025

First Published in 2025

All rights reserved. No part of this book may be reproduced, stored in a retrieval system or transcribed, in any form or by any means, electronic, mechanical, photocopy, recording or otherwise, without the prior written permission of the publisher.

ISBN:

Published and printed by Kenya Institute of Curriculum Development

TABLE OF CONTENTS

NATIONAL GOALS OF EDUCATION	ii
THE SENIOR SCHOOL IN THE COMPETENCY BASED CURRICULUM	iv
LEARNING OUTCOMES FOR SENIOR SCHOOL	iv
TABLE 1: LIST OF SUBJECTS AT SENIOR SCHOOL	v
TABLE 2: LESSON DISTRIBUTION AT SENIOR SCHOOL	vi
ESSENCE STATEMENT	vii
SUBJECT GENERAL LEARNING OUTCOMES FOR SENIOR SCHOOL	viii
SUMMARY OF STRANDS AND SUB STRANDS	ix
STRAND 1.0: FISH BIOLOGY AND ECOLOGY	1
STRAND 2.0: AQUACULTURE	6
APPENDIX: LIST OF ASSESSMENT METHODS, LEARNING RESOURCES AND NON-FORMAL ACTIVITIES	21

NATIONAL GOALS OF EDUCATION

Education in Kenya should:

1. Foster nationalism and patriotism and promote national unity.

The people of Kenya belong to different communities, races and religions, but these differences need not divide them. They must be able to live and interact as Kenyans. It is a paramount duty of education to help young people acquire this sense of nationhood by resolving conflicts and promoting positive attitudes of mutual respect, to live together in harmony, foster patriotism, and to make a positive contribution to the life of the nation.

2. Promote the social, economic, technological, and industrial needs for national development.

Education should prepare the youth of the country to play an effective and productive role in the life of the nation.

a) Social Needs

Education in Kenya must prepare children for changes in attitudes and relationships which are necessary for the smooth progress of a rapidly developing modern economy. There is bound to be a silent social revolution in the wake of rapid modernisation. Education should assist our youth to adapt to this change.

b) Economic Needs

Education in Kenya should produce citizens with the skills, knowledge, expertise, and personal qualities that are required to support a growing economy. Kenya is building up a modern and independent economy that requires an adequate and relevant domestic workforce.

c) Technological and Industrial Needs

Education in Kenya should provide learners with the necessary skills and attitudes for industrial development. Kenya recognizes the rapid industrial and technological changes taking place, especially in the developed world. We can only be part of this development if our education system is deliberately focused on the knowledge, skills and attitudes that will prepare our young people for these changing global trends.

3. Promote individual development and self-fulfillment.

Education should provide opportunities for the fullest development of an individual's talents and personality. It should help children to develop their potential interests and abilities. A vital aspect of individual development is the building of character.

4. Promote sound moral and religious values.

Education should provide for the development of knowledge, skills and attitudes that will enhance the acquisition of sound moral values and help children to grow up into self-disciplined, self-reliant, and integrated citizens.

5. Promote social equity and responsibility.

Education should promote social equality and foster a sense of social responsibility within an education system which provides equal educational opportunities for all. It should give all children varied and challenging opportunities for collective activities and corporate social service irrespective of gender, ability, or geographical environment.

6. Promote respect for and development of Kenya's rich and varied cultures.

Education should instil in the youth of Kenya an understanding of past and present cultures and their valid place in the contemporary society. Children should be able to blend the best of traditional values with the changing requirements that must follow rapid development in order to build a stable and modern society.

7. Promote international consciousness and foster positive attitudes towards other nations.

Kenya is part of the international community. It is part of the complicated and interdependent network of peoples and nations. Education should therefore lead the youth of the country to accept membership of this international community with all the obligations and responsibilities, rights, and benefits that this membership entails.

8. Promote positive attitudes towards good health and environmental protection.

Education should inculcate in young people the value of good health for them to avoid indulging in activities that will lead to physical or mental ill health. It should foster positive attitudes towards environmental development and conservation. It should lead the youth of Kenya to appreciate the need for a healthy environment.

THE SENIOR SCHOOL IN THE COMPETENCY BASED CURRICULUM

Senior School is the fourth level of Basic Education in the Competency Based Curriculum (CBC) that the learner shall proceed to after the Pre-Primary School, Primary School and Junior School levels. The essence of Senior School is to offer learners a pre-tertiary/university/ pre-career experience in which the learners have an opportunity to choose pathways, tracks and subjects where they shall have demonstrated interest and/or potential at the earlier levels. Senior School comprises three years of education for learners generally in the 16-18 years age bracket and lays the foundation for further education and training at the tertiary level and the world of work. In the CBC vision, learners exiting this level are expected to be *engaged, empowered and ethical citizens* ready to participate in the socio-economic development of the nation.

At this level, the learner shall take seven (7) learning areas as recommended by the *Presidential Working Party on Educational Reforms* (PWPER, 2023). These shall comprise **four compulsory learning areas** namely: English, Kiswahili, Essential Mathematics/Core Mathematics and Community Service Learning (CSL). Learners will choose between Core Mathematics (for learners pursuing the Science Technology Engineering and Mathematics Pathway) and Essential Mathematics (for learners pursuing the non-STEM pathways). The learner will select three learning areas depending on their career choice, aptitude, interest and personality with guidance by the Senior School career teacher.

LEARNING OUTCOMES FOR SENIOR SCHOOL

By the end of Senior School, the learner should be able to:

1. communicate effectively and utilise information and communication technology across varied contexts,
2. apply mathematical, logical and critical thinking skills for problem solving,
3. apply basic research and scientific skills to manipulate the environment and solve problems,
4. exploit individual talents for leisure, self-fulfilment, career growth, further education and training,
5. uphold national, moral and religious values and apply them in day-to-day life,
6. apply and promote health care strategies in day-to-day life,
7. protect, preserve and improve the environment for sustainability,
8. demonstrate active local and global citizenship for harmonious co-existence,
9. demonstrate appreciation of diversity in people and cultures,
10. manage pertinent and contemporary issues responsibly.

TABLE 1: LIST OF SUBJECTS AT SENIOR SCHOOL

Core Subjects	Arts & Sports Science	Social Sciences	Science, Technology, Engineering & Mathematics (STEM)
1. English 2. Kiswahili/KSL 3. Core Mathematics/ Essential Mathematics 4. Community Service Learning (CSL)	5. Sports and Recreation 6. Music and Dance 7. Theatre and Film 8. Fine Arts	9. Literature in English 10. Indigenous Languages 11. Fasihi ya Kiswahili 12. Sign Language 13. Arabic 14. French 15. German 16. Mandarin Chinese 17. Christian Religious Education 18. Islamic Religious Education 19. Hindu Religious Education 20. Business Studies 21. History and Citizenship 22. Geography	23. Biology 24. Chemistry 25. Physics 26. General Science 27. Agriculture 28. Computer Studies 29. Home Science 30. Aviation 31. Building Construction 32. Electricity 33. Metalwork 34. Power Mechanics 35. Woodwork 36. Media Technology 37. Marine and Fisheries Technology

Note:

- Physical Education (PE) and Information Communication and Technology (ICT) will be offered to all learners to facilitate learning, enjoyment and acquisition of life skills.
- Every school shall offer Pastoral/Religious Programme of Instruction (P/RPI) to enhance moral, spiritual and character development of the learners.
- There shall be one (1) lesson for personal or group study to deepen knowledge and enhance skills in areas of choice by the learners.

Table 2 provides guidelines on distribution of lessons at Senior School.

v

TABLE 2: LESSON DISTRIBUTION AT SENIOR SCHOOL

Subjects	No of Lessons Per Week (40 minutes per lesson)
Core Subjects 4	
1. English	5
2. Kiswahili	5
3. Essential Mathematics/Core Mathematics	5
4. Community Service Learning	3
Elective Subjects	
5. Elective 1	5
6. Elective 2	5
7. Elective 3	5
* Physical Education	3
* ICT Skills	2
*PPI	1
* Learner Personal /Group Study	1
Total Number of Lessons	40

vi

ESSENCE STATEMENT

At the Junior School level, learners are introduced to foundational concepts in environmental science and basic biology. These early experiences nurture awareness of aquatic ecosystems and natural resource conservation. As learners transition into Senior School, Marine and Fisheries Technology builds upon this foundation by deepening their understanding and introducing more specialised knowledge and technical skills related to fisheries and marine ecosystems. The Marine and Fisheries Technology curriculum is therefore designed to stimulate learners' interest in the fisheries sector and equip them with essential knowledge, practical skills, positive attitudes and values for participation in both local and international fisheries-related careers. It covers fundamental areas such as fish biology and ecology, aquaculture, capture fisheries, fish production, conservation, the sustainable development of the fisheries industry and the use of natural resources.

By involving learners in experiential and learner-centered activities through classroom instruction, practical work, field trips, projects and simulations, this subject aims to increase their interest and involvement in the fishing industry. Learners will engage in activities like species identification, managing fish ponds, using fishing gear, processing and preservation methods, applying fisheries laws as well as safety and survival techniques. The blended approach in the curriculum mainly will focus on the acquisition of competencies, practical orientation, career pathways, as well as responsibility toward marine conservation and sustainable use of aquatic resources. Through this curriculum, learners are not only prepared for future academic and career opportunities but also empowered to contribute meaningfully to Kenya's growing blue economy and global fisheries industry.

The curriculum lays a strong foundation for further training at tertiary institutions or immediate entry into the workforce. It supports a wide range of career opportunities, including: Fisheries Officer, Marine Biologist, Aquaculture Technician, Fish Farm Manager, Environmental Conservationist, Marine Engineer, Fish Processing Technologist, Fisheries Economist, Coastal and Marine Resource Manager, Maritime Safety Officer, Policy Analyst (Marine and Fisheries) and Entrepreneur in Aquaculture or Fish Processing. In this way, the learners are not only prepared for future academic and career opportunities to the sustainable use and management of marine and freshwater resources, but will also have the option of being empowered to contribute meaningfully to Kenya's growing blue economy and global fisheries industry.

vii

SUBJECT GENERAL LEARNING OUTCOMES FOR SENIOR SCHOOL

By the end of Senior School, the learner should be able to;

- a) Acquire knowledge, skills and attitudes on the basic biology of fish
- b) Develop basic skills in designing and modelling fish production systems in aquaculture
- c) Identify appropriate fishing gears and methods for marine and freshwater fishing
- d) Acquire knowledge on the basic principles of fisheries resource management and conservation
- e) Acquire knowledge on the basic skills required in fish handling, value addition and marketing
- f) Develop basic understanding of fisheries related enterprises
- g) Apply safety and survival techniques in marine and fresh water environments
- h) Acknowledge the laws and policies for preventing over fishing and harmful fishing practices
- i) Appreciate the importance of fisheries resources in the socio-economic development of Kenya.

viii

SUMMARY OF STRANDS AND SUB STRANDS

CODE	STRAND	SUB STRAND
1.0	Fish Biology and Ecology	1.1 Fish Taxonomy 1.2 Fish Physiology
2.0	Aquaculture	2.1 Fish cage 2.2 Fish Harvesting and Post-Harvest Handling 2.3 Fish Value Addition 2.4 Fish Marketing
3.0	Capture Fisheries	3.1 Fundamentals of Fisheries Management 3.2. Fishing gears and Methods

STRAND 1.0: FISH BIOLOGY AND ECOLOGY

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
1.0 Fish Biology and Ecology	1.1 Fish Taxonomy	By the end of the sub strand, the learner should be able to: a) identify fish species in aquatic environments, b) explain the nomenclature/naming of fishes, c) compare external features of common fish species in Kenya, d) appreciate the diversity of fish.	The learner is guided to: - use print and/or electronic media to search for information on identification of fish species in aquatic environments, - discuss the nomenclature/naming (<i>local, English and scientific names</i>) of fishes ('<i>Omena</i>', <i>tilapia</i>, <i>catfish</i>, <i>rabbit fish</i>, <i>tuna</i> and <i>Nile perch</i>) - in groups, brainstorm and compare the external features of fish species in Kenya (<i>scale types, presence or absence of fins, broken or continuous lateral line, presence and absence of barbels</i>), Note: Use whichever fish that is available - visit a fish landing site or a fish farm to observe different fish species and identify specific fish based on their external features.	How can you identify fish species using external body features?

Core competences to be developed:
Digital literacy: As learner uses the digital technology to search for information on fish taxonomy
Values:
Unity: Learner cooperates with other members of the team during group discussions
Pertinent and Contemporary Issues (PCIs)
Conservation: Learner recognises the importance of taxonomy in conservation of fish biodiversity

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
1.0 Fish Biology and Ecology	1.2 Fish Physiology	By the end of the sub strand, the learner should be able to: a) illustrate the digestive system in fish, b) model the circulatory system of fish, c) describe the respiratory system of fish, d) recognise the importance of fish physiology.	The learner is guided to: • use print and /or electronic media to search for information on digestive system in fish (<i>bony fish</i>), • discuss the digestive system of fish in relation to the food they eat (<i>carnivores e.g. Nile perch, omnivores e.g. common carp and herbivores e.g. grass carp, tilapia, rabbit fish</i>), • discuss different parts of circulatory system, • in groups, model and label the circulatory system of fish (<i>Any bony fish</i>), • watch a video clip or listen to a resource person and discuss the respiratory system in fish, • draw a well labeled diagram of fish gills to (include: <i>the gill arches, gill rakers, filaments and lamellae</i>), • dissect fish to observe the gill structure and discuss the process of gaseous exchange in gills (<i>bony fish</i>)	How are fish physiological structures adapted to their functions?

			make charts of the digestive, circulatory and respiratory systems of fish.	
Core competences to be developed: Creativity and imagination: As learner undertakes the task of modelling the circulatory system, and illustrating digestive and respiratory systems.				
Values: Respect: As learner displays team spirit during group discussions and modelling circulatory system as well as illustrating digestive and respiratory systems of fish.				
Pertinent and Contemporary Issues (PCIs) Animal welfare: Learner is ethical during the handling and dissection of in the laboratory.				

Suggested Assessment Rubric

Level Indicator	Exceeds expectation	Meets expectation	Approaches expectations	Below expectations
Ability to identify fish species in aquatic environments (<i>tilapia, cat fish, Nile perch, tuna and rabbit fish</i>)	Correctly and with observable details identifies five fish species in aquatic environments	Correctly identifies five fish species in aquatic environments	Correctly identifies at least three fish species in an aquatic environment	Correctly identifies one fish species in an aquatic environment
Ability to explain the nomenclature/naming of fishes (<i>tilapia, cat fish, Nile perch, tuna and rabbit fish</i>)	Correctly and systematically explains the nomenclature/naming of five common	Correctly explains the nomenclature/naming of five common types of fish	Correctly explains the nomenclature/naming three to four common types of fish	Correctly explains the nomenclature/naming of only one common type of fish

Level Indicator	Exceeds expectation	Meets expectation	Approaches expectations	Below expectations
	types of fish with no errors			
Ability to compare external features of common fish species in Kenya (<i>tilapia, cat fish, rabbit fish, tuna and Nile perch</i>)	Correctly and comprehensively compares external features of more than three common fish species in Kenya	Correctly compares external features of three common fish species in Kenya	Correctly compares external features of two common fish species in Kenya	Correctly compares external features of only one common fish species in Kenya
Ability to illustrate the digestive system in fish	Correctly and skilfully illustrates all the components of digestive system in fish	Correctly illustrates all the components of digestive system in fish	Correctly illustrates some of the components of digestive system in fish	Needs assistance to correctly illustrate components of digestive system in fish
Ability to model the circulatory system of fish	Accurately and skillfully models and labels the whole circulatory system of fish	Correctly models and labels the whole circulatory system of fish	Correctly models and labels some parts of the circulatory system of fish	Needs assistance to correctly model and label the circulatory system of fish
Ability to describe the respiratory system of fish	Comprehensively describes the respiratory system of fish	Sufficiently describes the respiratory system of fish	Partially describes the respiratory system of fish	Rarely describes the respiratory system of fish

STRAND 2.0: AQUACULTURE

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
2.0 Aquaculture	2.1 Fish cage	By the end of the sub strand, the learner should be able to: a) outline factors to consider when selecting a suitable site for fish cage, b) construct a simple fish cage, c) describe the stocking of a fish cage, d) describe the management and maintenance practices undertaken in a fish cage, e) appreciate a fish cage as a production system in aquaculture.	The learner is guided to: • use print, electronic media or listen to a resource person on factors to consider when selecting a suitable site for a fish cage and write notes (<i>e.g. depth of water, water quality, navigation routes, accessibility</i>), • in pairs or groups, brainstorm on different types of fish cages (<i>fixed, floating, submersible and sub-merged</i>), • in pairs or groups, discuss the steps involved in constructing a fish cage, • watch a demonstration on installation of a fish cage, • read relevant books or listen to a resource person about the stocking of a fish cage (<i>e.g. Sourcing of fingerlings, transportation, nursery net and stocking density</i>),	How do various factors affect the management and maintenance of a fish cage?

			• watch a video clip on how to manage (to include: <i>monitoring water quality, feeding, fish diseases, predators and their control, record keeping</i>) and maintain a fish cage (<i>net repairs, cleaning, changing the net</i>). Project: Make a model of a simple fish cage in the school	
Core competences to be developed: • Creativity and Imagination: learner is able to design and model a simple fish cage • Learning to learn: learner engages in group discussion during cage modelling				
Values: Responsibility: Learner is considerate of different users of the aquatic environments while setting up the fish cage				
Pertinent and Contemporary Issues (PCIs): Environmental conservation: Learner is made aware of the importance of controlling water pollution caused by cage fish farming				

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
2.0 Aquaculture	2.2 Fish Harvesting and Post-Harvest Handling	By the end of the sub strand, the learner should be able to: a) explain basic food safety standards when handling fish, b) harvest fish from a fish pond and fish cage, c) describe steps undertaken during post-harvest handling of fish, d) carry out post-harvest handling of fish, e) determine freshness of fish using sensory methods, f) appreciate the role of food safety in handling fish.	The learner is guided to: - in pairs or groups, discuss principles of food safety in handling fish, - watch a video clip, demonstration or listen to resource person on fish harvesting (<i>from a pond and cage</i>), - in groups, discuss steps undertaken during post-harvest handling of fish (such as: <i>cleaning, sorting, scaling and gutting, icing/chilling</i>), - use print and electronic media, listen to a resource person or search for information on good practices during post-harvest handling of fish (<i>during preservation e.g. icing, refrigeration, and chilling</i>), - in groups, practice post-harvest handling of fish, - visit a fish processing factory or a landing site to observe post-harvest handling of fish,	How do harvesting and post-harvest handling techniques affect the quality of fish?

			- search for information on how to distinguish between fresh fish and spoilt fish, - use the sensory methods to determine freshness of fish (<i>smell, touch, taste and sight</i>). Note: Because of the potential health risks, it is recommended that learners at this level refrain from tasting raw fish. Professionals handle this.	
Core competences to be developed: Self-efficacy: learner uses appropriate food safety principles during harvesting and post-harvest handling of fish				
Values: Integrity: Learner is aware of being accountable on how poor fish handling practices can affect the general public due to contamination and spoilage of fish				
Pertinent and Contemporary Issues (PCIs) Animal welfare: Learner recognises the importance of basic food safety standards when handling fish				

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
2.0 Aquaculture	2.3 Fish Value Addition	By the end of the sub strand, the learner should be able to: a) explain reasons for adding value to fish products, b) highlight fish value added products, c) outline methods of fish value addition, d) carry out fish value addition processes, e) appreciate the variety of fish value added products.	The learner is guided to: - search for information on meaning of value addition. - use relevant books, electronic and digital devices to search for information on the reasons for adding value to fisheries and aquaculture products (such as: <i>improve quality, selling price, personal convenience, broaden the market base</i>). - watch video clips or visit a fish processing firm to identify fish value added products (<i>fish fillets, fish samosas, fish finger, fish cake, fish balls, fish sausages, fish burgers</i>). - watch video clips, or listen to a resource person talk about the methods of fish value addition processes (e.g. <i>frying, filleting, smoking, salting, sun drying</i>).	How does fish value addition enhance its safety and quality?

			use various processes to practice fish value addition (<i>frying, filleting, smoking, salting, sun drying</i>).	
Core competences to be developed:				
Critical Thinking and Problem solving: Learner searches and explores for different options on methods of fish value addition				
Values:				
Love: Learner collaborates with the others in carrying out fish value addition processes				
Pertinent and Contemporary Issues (PCIs):				
Health promotion issues: As learner appreciates the safety and nutritive value of fish value added products				

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
2.0 Aquaculture	2.4 Fish Marketing	By the end of the sub strand, the learner should be able to: a) outline ways of preparing fish for marketing, b) describe fish marketing channels c) explain strategies of improving or increasing sales of fish products d) appreciate the variety of fish value added products.	The learner is guided to: • read relevant print materials and listen to a resource person on ways of preparing fish for marketing (<i>weighing, sorting, grading, packaging, branding, labelling</i>), • watch video clips or visit a fish processing farm to observe how fish products are packaged and branded • search for information and discuss fish marketing channels (<i>short marketing and long marketing channels</i>), • in pairs or groups, brainstorm on strategies of improving or increasing sales of fish products (<i>4Ps – Marketing Mix – Product, Price, Place and Promotion</i>).	How do strategies of marketing improve or increase sales of fish products?
Core competences to be developed: Critical Thinking and Problem solving: Learner searches and explores for different options on methods of marketing fish .				
Values: Social justice: Learner collaborates with the others in carrying out during marketing of fish.				
Pertinent and Contemporary Issues (PCIs): Financial literacy: As learner appreciates the financial/monetary value acquired in good fish marketing.				

Suggested Assessment rubric

Level Indicator	Exceeds expectation	Meets expectation	Approaches expectations	Below expectations
Ability to design and construct a simple fish cage	Correctly and skilfully designs and constructs a simple fish cage with no errors	Correctly designs and constructs a simple fish cage with no errors	Constructs designs and a simple fish cage but with some errors	Needs assistance to design and construct a simple fish cage
Ability to manage and maintain a fish cage	Always manages and maintains a fish cage	Usually manages and maintains a fish cage	Often manages and maintains a fish cage	Rarely manages and maintains a fish cage
Ability to explain fish harvesting in a fish pond and post-harvest handling	Accurately explains fish harvesting in a fish pond and post-harvest handling	Correctly explains fish harvesting in a fish pond and post-harvest handling	Correctly explains fish harvesting in a fish pond and post-harvest handling with some errors	Needs assistance to explain fish harvesting in a fish pond and post-harvest
Ability to assemble an aquarium for ornamental fish culture	Skillfully and creatively assembles an aquarium for ornamental fish culture	Correctly assembles an aquarium for ornamental fish culture	Assembles an aquarium for ornamental fish culture but with some errors	Needs assistance to assemble an aquarium for ornamental fish culture
Ability to explain reasons for adding value to fisheries and aquaculture products	Correctly and in depth explains reasons for adding value to fisheries and aquaculture products	Correctly explains reasons for adding value to fisheries and aquaculture products	Correctly explains some reasons for adding value to fisheries and aquaculture products	Needs assistance to correctly explain reasons for adding value to fisheries and aquaculture products

Level Indicator	Exceeds expectation	Meets expectation	Approaches expectations	Below expectations
Ability to identify fish value added products (<i>fish fillets, fish samosas, fish fingers, fish cakes, fish balls, fish sausages, fish burgers</i>)	Correctly identifies more than four fish value added products	Correctly identifies four fish value added products	Correctly identifies three fish value added products	Correctly identifies less than three fish value added products
Ability to outline methods of fish value addition (e.g. <i>frying, filleting, smoking, salting, sun drying</i>)	Correctly and comprehensively outlines four or more methods of fish value addition	Correctly outlines at least three methods of fish value addition	Correctly outlines two methods of fish value addition	Correctly outlines one method of fish value addition
Ability to carry out fish value addition processes	Correctly and skillfully carries out fish value addition processes	Correctly carries out fish value addition processes	Correctly carries out some fish value addition processes	Needs assistance to correctly carry out fish value addition processes

STRAND 3.0: CAPTURE FISHERIES

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
3.0 Capture Fisheries	3.1 Fundamentals of Fisheries Management	By the end of the sub strand, the learner should be able to: a) identify various types of fisheries resources, b) outline the reasons for managing fisheries resources, c) explain various fisheries management measures and approaches, d) appreciate the diversity of different fisheries resources.	The learner is guided to: - read relevant books, listen to a resource person, use digital resources including watching videos and documentaries on types of fisheries resources. (<i>finfish e.g. tuna, tilapia, shellfish e.g. molluscs and crustaceans, marine mammals, aquatic plants, freshwater invertebrates, echinoderm e.g. sea cucumber</i>), - discuss reasons for managing fisheries resources, - have group discussions on the various management measures in fisheries (<i>closed seasons, closed areas, licensing, gear restrictions, catch limits, fish size limits</i>) and approaches (<i>co-management, top-down approach</i>), - field visits to marine protected areas, landing sites and beaches.	How can we sustainably manage our fisheries resources?

Core competences to be developed:
Communication and collaboration: as learner contributes and actively participates in discussion sessions on fisheries management.
Values:
Responsibility: As they learn to protect and manage fisheries resources
Pertinent and Contemporary Issues (PCIs)
Environmental conservation: Learner recognises the importance of managing the fisheries resources for sustainability.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
3.0. Capture Fisheries	3.2. Fishing gears and Methods	By the end of the sub strand, the learner should be able to: a) identify various types of fishing gears, b) outline the factors to be considered in selecting the appropriate fishing gear, c) describe various types of fishing gears and methods, d) describe the different types of fishing vessels and their modes of propulsion, e) draw and label the parts of a fishing boat, f) appreciate different fishing gears and methods.	The learner is guided to: • watch videos and documentaries on fishing activities, • field visit to active beaches and landing sites to appreciate the different types of fishing gears and their usage (<i>traditional e.g. pots, harpoon/spears, traps, and modern e.g. gill net, long line, seine nets, trawl nets</i>), • in groups, explore the internet and discuss on factors to be considered in selecting the appropriate fishing gear, • inviting fisheries experts and industry players to discuss the various types of fishing gears and methods, • use the internet to search for information on different types of fishing vessels (such as: <i>canoe, sail boat, trawler, long liner, purse seiner, gill netter</i>) and modes of propulsion (<i>sail, motorized engine, paddled</i>), • draw and label basic parts of a fishing boat,	What is the relationship between fishing gear, fishing method and the fishing environment?

			In groups, discuss the advantages and disadvantages of using various fishing gears. Project: Construct a model of a simple fishing boat using locally available materials	
Core competences to be developed: Digital Literacy: as learners use the digital technology to search for information on fishing gears and methods used in capture fisheries.				
Values: Unity: learner collaborates with each other when they are sourcing information during group discussion sessions				
Pertinent and Contemporary Issues (PCIs) Environment and technology: Learner recognises the importance of technology in the sustainable exploitation of fisheries resources.				

Suggested Assessment rubric

Level Indicator	Exceeds expectation	Meets expectation	Approaches expectations	Below expectations
Ability to identify different types of fisheries resources. (<i>finfish, shellfish, Marine mammals, aquatic plants, freshwater invertebrates</i>)	Correctly identifies more than five different types of fisheries resources	Correctly identifies five different types of fisheries resources	Correctly identifies at least three of the types of fisheries resources	Identifies less than three types of fisheries resources
Ability to outline the reasons for managing fisheries resources	Always outlines the reasons for managing fisheries resources	Usually outlines the reasons for managing fisheries resources	Often outlines the reasons for managing fisheries resources	Rarely outlines the reasons for managing fisheries resources
Ability to explain various fisheries management measures and approaches (<i>closed seasons, closed areas, licensing, gear restrictions, catch limits, fish size limits</i>)	Correctly and comprehensively explains more than five fisheries management measures and approaches with appropriate examples	Correctly explains five fisheries management measures and approaches	Correctly explains four fisheries management measures and approaches	Correctly explains less than three fisheries management measures and approaches

Level Indicator	Exceeds expectation	Meets expectation	Approaches expectations	Below expectations
Ability to identify various types of fishing gears (<i>Seine net, gill net, hook and line, long-line, trawl net, traps</i>)	Correctly identifies more than five types of fishing gears	Correctly identifies five types of fishing gears	Correctly identifies four types of fishing gears	Correctly identifies less than four types of fishing gears
Ability to outline the factors to be considered in selecting the appropriate fishing gear	Always outlines the factors to be considered in selecting the appropriate fishing gear	Usually outlines the factors to be considered in selecting the appropriate fishing gear	Often outlines the factors to be considered in selecting the appropriate fishing gear	Rarely outlines the factors to be considered in selecting the appropriate fishing gear

APPENDIX: LIST OF ASSESSMENT METHODS, LEARNING RESOURCES AND NON-FORMAL ACTIVITIES

Strand	Suggested Assessment Methods	Suggested Resources	Suggested Non-Formal Activities
1.0 Fish Biology And Ecology	• Observation of learning activities. • Written tests and assignments • Oral assessment • Activity journals	- Digital resources - Print materials (<i>charts, reference books</i>) - Models of the digestive, Circulatory and respiratory systems in fish - Resource person - Realia of fish species - Model, posters and charts of a fish cage - General environment for space (e.g. <i>classroom, beach, work areas like the fish processing factory</i>)	Learners to: a) make charts of the digestive, circulatory and respiratory systems of fish, b) make a model of a simple fish cage in the school.
2.0 Aquaculture	• Written tests and assignments • Graded observation • Recording in the journals	- Video clip on fish harvesting, resource person, print and electronic media - General environment for space for learning - Simple model of a fish cage - Sample of fingerlings - Laboratory	Learners to: a) participate in activities that target advocacy of the economic importance of cultured ornamental fishes, b) make posters on how to set up a simple aquarium, c) set up a simple aquarium.

Strand	Suggested Assessment Methods	Suggested Resources	Suggested Non-Formal Activities
		- Realia of types of cultured ornamental fishes - A simple aquarium	
3.0 Capture Fisheries	• Written test • Oral assessments • Observation of learning • Oral tests • Projects (<i>fish pond and aquarium</i>) • Activity journals	- General environment for space for learning - Samples of types of fisheries resources - types of fishing gears (<i>traditional and modern</i>) - Resource persons - Relevant video clips - Charts and pictures - Realia of different fisheries resources	Learners to: a) sensitise the family, peers and school on the importance of cultured ornamental fishes, b) sensitise the people at home on the safety and survival practices specific to marine and fishing environments to be observed