Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

SHORT COURSE

FISH FARMING AND PROCESSING

FFPPD001

Prevention of Fish Diseases and Predators

TRAINER'S MANUAL

August 2025

Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

PREVENTION OF FISH DISEASES AND PREDATORS

LUXEMBOURG AID & DEVELOPMENT

2025

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KIGALI-RWANDA

Original published version: August 2025.

ACKNOWLEDGEMENTS

Rwanda TVET Board (RTB) would like to recognize all parties who contributed to the development of the trainer's and trainee's manuals for the short course in Fish Farming and Processing for the module: "**FFPPD001 - PREVENTION OF FISH DISEASES AND PREDATORS**".

Thanks to the EU, Government of Luxembourg, and KWIHAZA Project for support on the implementation of this project.

We also wish to acknowledge all trainers, technicians and practitioners for their contribution to this project.

The management of Rwanda TVET Board appreciates the efforts of its staff who coordinated this project

This training manual was developed:

Under Rwanda TVET Board (RTB) guiding policies and directives

Under European Union financing

Under Luxembourg financing

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TABLE OF CONTENT

LIST OF ABBREVIATIONS AND ACRONYMS

CBT: competency based Training

CBET: Competency-Based Education and Training

CBT: Competency Based Training

DO: Dissolved Oxygen

EU: European Union

FAO: Food and Agriculture Organisation

NH4+: Ammonia

pH: Potential Hydrogen

PPE: Personal Protective Equipment

QACs: Quaternary Ammonium Compounds

RQF: Rwanda Qualification Framework

RTB: Rwanda TVET Board

TVET: Technical and Vocational Education and Training

WHO: World Health Organization

INTRODUCTION

This trainer's manual encompasses all necessary skills, knowledge and attitudes required to prevent fish diseases and predators. Students undertaking this module shall be exposed to practical activities that will develop and nurture their competences. The writing process of this training manual embraced competency-based education and training (CBET) philosophy by providing practical opportunities reflecting real life situations.

The trainee's manual is subdivided into units, each unit has got various topics, you will start with a self-assessment exercise to help you rate yourself on the level of skills, knowledge, and attitudes about the unit. A discovery activity is followed to help you discover what you already know about the unit.

After these activities, you will learn more about the topics by doing different activities by reading the required knowledge, techniques, steps, procedures, and other requirements under the key facts section, you may also get assistance from the trainer. The activities in this training manual are prepared such that they give opportunities to students to work individually and in groups.

After going through all activities, you shall undertake progressive assessments known as formative and finally conclude with your self-reflection to identify your strengths, weaknesses, and areas for improvement.
Do not forget to read the point to remember the section which provides the overall key points and takeaways of the unit.

PREVENT FISH DISEASES AND PREDATORS

Learning Outcomes	Learning Hours	Topics
1. Manage Predators	30	1.1. Identification of common fish predators
		1.2. Measures against fish predators
		1.3. Monitoring of implemented measures
2. Manage fish diseases	20	2.1. Identification of sick and injured fish
		2.2. Isolation of sick and injured fish
		2.3. Providing first aids to sick or injured fish
		2.4. Monitoring health status of fish stock and documentation of bindings
2. Implement Hygiene and Biosecurity Measures	30	3.1. Application of hygienic measures
		3.2. Monitoring of access to fish farm and use of disinfectants and PPE
		3.3. Implementation of disinfection and use of PPE


PLEASE
PROTECT
ME

Learning outcome 1: Self-Assessment

1. Ask trainees to look at the unit illustration in their Trainee's Manuals and together discuss:

   What does the illustration show?

   What do you think will be topics to be covered under this unit based on the illustration?

After the discussion, inform students that this unit is intended to provide them with the knowledge, skills and attitudes to Manage Predator. They will cover the skills required to identify common fish predators, measure against fish predators and monitor implemented measures.

2. Ask trainees to fill out the self-assessment at the beginning of the unit in their Trainee's Manuals. Explain that:

   a. The purpose of the self-assessment is to become familiar with the topics in the unit and for them to see what they know or do not know at the beginning.

   b. There are no right or wrong ways to answer this assessment. It is for their own reference and self-reflection on the knowledge, skills and attitudes acquisition during the learning process.

   c. They should think about themselves: do they think they have the knowledge, skills or attitudes to do this? How well?

   d. They read the statements across the top and put a check in column that best represents their level of knowledge, skills or attitudes.

   e. At the end of the unit, they will do a self-reflection, which includes re-taking the self-assessment and identifying their strengths, areas of improvement and actions to be taken.

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify fish predators	1. Design farm prevention plan for control of predators	1. Be decision maker, Innovative when designing prevention plan and strategies
2. Understand fish predators' behaviors	2. Install and maintain materials and equipment used to prevent fish predators	2. Have teamwork spirit and self-motivation when installing and maintaining materials used to prevent predators
3. Describe techniques/ measures of controlling predators	3. Apply prevention measures for controlling predators	3. Be responsible when monitoring and taking decisions regarding predator's motivation
4. Use fish health log template	4. Monitor fish health	4. Be precise when filling and analysing fish health log template

Steps:

Discovery activity

Task 1

1. Using an appropriate methodology such as pair-share, large group discussion and presentation, the objective is to foster engagement and knowledge exchange among students.
2. Take students through the following steps:
    a) Firstly, organize trainees into pairs or small groups and guide them through a structured discussion about questions on task 1 in trainee's manual. Ensure active participation and understanding of instructions.
    b. Secondly, bring the trainees back together as a large group for presentations. Each pair or group should summarize their discussions, sharing insights and learnings with the class. Encourage all trainees to contribute their own experiences and reflections.
    c. Conclude the activity with feedback and reflection. Emphasize that the purpose was not to find right answers but to provide a look into trainees' scheduling of laundry roaster.
3. Introduce Topic 1.1**:** Identification of common fish predators

Topic 1.1: Identification of common fish predators

Objectives:

By the end of the topic, trainees will be able to:

a. Identify properly the common type of predators in the fish farm

b. Identify properly the tools and materials to be used while identifying common fish predators in the fish farm

c. Describe correctly the predation methods in the fish farm

d. Apply properly predation methods in the fish farm

Time Required: 10 hours.

Learning Methodology:

Case studies, group discussions, field visit, visual aids, problem solving exercises, demonstration, practical work, brainstorming, group work, presentation, think-pair-square-share, pair work, individual work, observation, role-play, field visit

Materials, Tools and Equipment Needed:

Traps, Fishing gear, screens, floating barrier, baits and lures, Nets, happas, measuring devices, data collection tools

Preparation:

- ❑ Read and understand the scenario before giving it to the students
- ❑ Gather in advance tools, materials, and equipment needed to deliver the session.
- ❑ Arrange a conducive learning environment

Cross Cutting Issues:

- ✓ **Gender balance:** Mix girls and boys to promote cross-gender interaction. Encourage both genders to take on roles of leadership.
- ✓ **Inclusive education:** Ensure inclusivity while allocating tasks to students and provide facilities/environment that enable/allows participation of all.

Prerequisites:

- Practice occupational health and safety procedures
- Establish Fish Farming facilities

Activity 1: Problem-Solving

Task 2

1. Using various methodologies like pair-share, or small group discussions, Instruct the trainees to join their respective groups and read the following **scenario: Identifying fish predators:**
   Rwasave is a well-known fish farm that has operated for many years in the Southern Province. As a fish farming technician, you are called by the farm manager, who reports the following issues: a significant decrease in the number of fish in the ponds and visible signs of bites and injuries on some fish. As a result, you decide to begin an investigation by identifying possible predators that could be causing the problem.

2. **Tell them to discuss and answer the following questions:**
   1) What is a fish predator?
   2) What are the possible predators that can attack the fish farm?
   3) What are the characteristics of predators?
   4) Enumerate fish predation methods

   ✓ Allow 5 minutes for discussion.
   ✓ Move around the classroom to check progress and provide clarification if any.
   ✓ Nominate or tell the group to nominate one speaker to share the findings of the group
   ✓ Give 2-3 minutes per group

3. After presentations of all groups, thank them and then provide the correct responses:

   <u>Answers of the questions</u>
   1) **Fish predators** are a diverse group of animals that hunt and consume fish.
   2) **Possible predators that can attack the fish farm**

   ✓ **Avian (Birds):** Herons, kingfishers, ospreys, cormorants, eagles, Marabou stork
   ✓ **Mammalian:** Raccoons, raccoons, mink, bears
   ✓ **Reptiles:** Snakes, turtles
   ✓ **Other Fishes (larger fishes):** Largemouth Bass, Pike, Walleye, Catfish, tuna, grouper, and sharks
   ✓ **Amphibian:** Large frogs, large Salamanders
   ✓ **Human Predators**

- ✓ **Harmful invertebrates:** Water beetles, water bugs, dragon flies, dragon flies

3) **Characteristics of predators:** good vision, specialized hunting tools, stealth and patience, speed and agility, good sense of timing, Persistence, Adaptability, Opportunistic Feeding

4) **Predation Methods:** Ambush, pursuit (speed and agility **in water or air),** camouflage, Group Hunting:

4. Wrap up by Highlighting key points related to the scenario:

- Identification of common fish predators
- Predation methods
- Tool and material to be used while identifying common fish predators

5. After the sharing session, let trainees to the **Key facts 1.1** for further enhancement and answer any questions they have.

Activity 2: Guided Practice

Task 3

1. Using an appropriate methodology such as individual work, pair-share, small group work, guide trainees to carry out the activities provided under task 3 in their Trainee's Manuals. Make sure instructions are understood, all the trainees are actively participating, and necessary materials/tools are provided and being used.
2. During the task, trainees should be given a degree of independence to apply the knowledge and skills acquired in activity. Attend to each group, individual and provide support where necessary. Your role is to guide them by using probing questions such as Why? What? How? to enable them to come to informed responses.
3. While trainees are still performing the task, use this opportunity to discuss or address cross-cutting issues that may arise such as gender, inclusivity, financial education among others, even during group formation. Also attitudes and behavior changes should be handled during this activity.
4. Using an appropriate methodology such as question and answer in a large group, pair presentations or small group presentations, guide trainees to share their

answers to the class. Write their responses for reference. Encourage all trainees to give their views.

5. After the sharing session, refer trainees to **identify common fish predators** and discuss them together while harmonizing their responses provided in the sharing session and answer any questions they have.
6. Use the observation/performance checklist below while assessing identification of any possible predators that could attack the fish stock.

Indicator (Elements to be checked)	Observation		Marks allocation
	Yes	No	
✓ Avians are identified			
✓ Mammals are identified			
✓ Reptiles are identified			
✓ Other fishes are identified			
✓ Amphibians are identified			
✓ Humans are identified			
✓ Harmful invertebrates are identified			

Activity 3: Application

Task 4

1. Using an appropriate methodology such as individual work, pairs, or small groups, trainees will read the statement provided on **task 4** in the trainees' manual and perform the task stipulating to inspect the ponds and surrounding area to identify possible fish predators that may be attacking the stock and categorize the identified fish predators by types. Ensure that all instructions are clear and understood by the trainees and encourage active participation among all students. This activity requires students to work independently with limited support from the trainer.
2. Provide necessary materials for the task to be completed effectively.

3. Let the trainees Identify suitable workplaces for them or identify workplaces for them, which may include:
   - ✓ Locations within the school compound
   - ✓ Local farms
4. Encourage trainees to actively observe technicians as they perform their tasks.
5. Allow trainees to participate in hands-on activities whenever possible to gain practical experience.
6. Encourage trainees to ask as many questions as possible regarding:
   - ✓ The tasks being performed
   - ✓ Tools and equipment in use
   - ✓ Best practices and safety measures
7. After the visit, have each trainee write a report that includes:
   - ✓ An overview of the workplace
   - ✓ Key observations and experiences
   - ✓ Answers to questions raised during the visit
8. Organize a session for trainees to present their reports to the class.
9. Facilitate discussion to encourage sharing of insights and foster collaborative learning.

Topic 1.2: Measures against fish predators

Objectives:

By the end of the topic, trainees will be able to:

a. Control properly fish predators using physical barriers
b. Remove correctly fish predators using trapping
c. Apply properly biological and Ecological Controls against fish predators in fish farm
d. Apply properly smart management practices against fish predators in fish farm

Time Required: 10 hours.

Learning Methodology:

Case studies, group discussions, field visit, visual aids, problem solving exercises, demonstration, practical work, brainstorming, group work, presentation, think-pair-square-share, pair work, individual work, observation, role-play, field visit

Materials, Tools and Equipment Needed:

Traps, Fishing gear, screens, floating barrier, baits and lures, Nets, happas, measuring devices, data collection tools

Preparation:

- ❑ Read and understand the scenario before giving it to the students
- ❑ Gather in advance tools, materials, and equipment needed to deliver the session.
- ❑ Arrange a conducive learning environment

Cross Cutting Issues:

✓ **Gender balance:** Mix girls and boys to promote cross-gender interaction. Encourage both genders to take on roles of leadership.

✓ **Inclusive education:** Ensure inclusivity while allocating tasks to students and provide facilities/environment that enable/allows participation of all

Prerequisites:

- Practice occupational health and safety procedures
- Establish Fish Farming facilities
- Monitor fish stocking and growth activities

Activity 1: Problem-Solving

Task 5

1. Using various methodologies like pair-share, or small group discussions, Instruct the trainees to join their respective groups and read the following **scenario: Measures against fish predators:**

Rwasave is a well-known fish farm that has operated for many years in the Southern Province. As a fish farming technician, you are called by the farm manager, who reports the following issues: a significant decrease in the number of fish in the ponds and visible signs of bites and injuries on some fish. Therefore, you decide to begin an investigation by identifying possible predators that could be causing the problem. As a result, you identify potential predators including birds (like herons and kingfishers), snakes, frogs, wild cats, and even human poachers. To manage these predators, you begin applying various control measures.

2. Tell them to discuss and answer the following questions:

1) Why is it important to implement predator control measures in aquaculture systems?

2) List and explain at least three methods used to control or prevent fish predators in a fish farm.
3) How can physical barriers help reduce predator attacks in fish ponds?
4) Identify physical barriers that help keep predators away from fish.
5) What are examples of scare tactics that help keep predators away from fish?

- ✓ Allow 5 minutes for discussion.
- ✓ Move around the classroom to check progress and provide clarification if any.
- ✓ Nominate or tell the group to nominate one speaker to share the findings of the group
- ✓ Give 2-3 minutes per group

3. After presentations of all groups, thank them and then provide the correct responses:

Answers to the questions

1) Why is it important to implement predator control measures in aquaculture systems?

Implementing predator control is important in aquaculture to:

- **Reduce fish losses:** Predators such as birds, mammals, and other fish can significantly reduce fish populations.
- **Protect farm profitability:** Less predation means better yields and higher economic returns.
- **Prevent stress and injury to fish:** Predator presence can cause stress, which lowers fish immunity and growth rates.
- **Avoid disease introduction: Some** predators can carry or spread diseases and parasites to cultured fish.

2) Three methods used to control or prevent fish predators in a fish farm.

- **Physical Barriers (e.g., nets, fences)**

  These block predators from accessing fish. Nets over ponds prevent birds from diving or swooping in, while fences keep out land animals.

- **Scare Tactics (e.g., decoys, noise devices)**

  These are designed to frighten predators away. For example, scarecrows or reflective tape can discourage birds from approaching.

- **Habitat Modification**

  Removing nearby vegetation or structures that offer cover for predators (like snakes or birds) makes the area less attractive to them.

3) How can physical barriers help reduce predator attacks in fishponds?

- Physical barriers physically prevent predators from accessing fish.
- They create a separation between predators and fish, reducing or eliminating the opportunity for attacks.
- They also act as a deterrent by making access to the pond more difficult or impossible for birds, mammals, and other predators.

4) Physical barriers that help keep predators away from fish.

- **Overhead netting:** Blocks birds like herons and cormorants.
- **Perimeter fencing:** Keeps out mammals like raccoons, otters, or cats.
- **Underwater mesh screens:** Prevent entry of predatory fish or turtles.
- **Bird wires or lines:** Thin wires crisscrossed above ponds to deter birds from landing or fishing.

5) Examples of scare tactics that help keep predators away from fish

- **Scarecrows or predator decoys:** Human shaped dummies or fake owls/eagles to scare birds.
- **Reflective tape or CDs:** Movement and light reflection scare away birds.
- **Noise devices:** Alarms or loud sudden sounds startle predators**.**
- **Motion-activated sprinklers or lights:** Surprise predators when they approach the pond.

4. Wrap up by Highlighting key points related to the scenario:

- Importance of implementing predator control measures in aquaculture systems
- Methods used to control or prevent fish predators in a fish farm.

5. After the sharing session, let trainees to the **Key facts 1.2** for further enhancement and answer any questions they have.

Activity 2: Guided Practice

Task 6

1. Using an appropriate methodology such as individual work, pair-share, small group work, guide trainees to carry out the activities provided under **task 6** in their Trainee's Manuals. Make sure instructions are understood, all the trainees are actively participating, and necessary materials/tools are provided and being used.
2. During the task, trainees should be given a degree of independence to apply the knowledge and skills acquired in activity. Attend to each group, individual and provide support where necessary. Your role is to guide them by using probing questions such as Why? What? How? to enable them to come to informed responses.
3. While trainees are still performing the task, use this opportunity to discuss or address cross-cutting issues that may arise such as gender, inclusivity, financial education among others, even during group formation. Also attitudes and behavior changes should be handled during this activity.
4. Using an appropriate methodology such as question and answer in a large group, pair presentations or small group presentations, guide trainees to share their answers to the class. Write their responses for reference. Encourage all trainees to give their views.
5. After the sharing session, refer trainees to apply **measures against fish predators** and discuss them together while harmonizing their responses provided in the sharing session and answer any questions they have.

   Use the observation/performance checklist below while assessing applied measures against fish predators in the fish farm

Indicator (Elements to be checked)	Observation		Marks allocation
	Yes	No	
✓ Avians are identified			

✓ Bird nets or scare devices re install to keep away predatory birds.			
✓ Aquatic (reptiles) are identified			
✓ Screens, barriers, or fencing are used to prevent entry of frogs, snakes, or unwanted fish			
✓ Mammals are identified			
✓ Good pond dikes and fencing are maintained to stop mammals from accessing ponds			

Activity 3: Application

Task 7

1. Using an appropriate methodology such as individual work, pairs, or small groups, trainees will read the statement provided on **task 7** in the trainees' manual and perform the task stipulating **to apply preventive measures against identified fish predators.** Ensure that all instructions are clear and understood by the trainees and encourage active participation among all students. This activity requires students to work independently with limited support from the trainer.
2. Provide necessary materials for the task to be completed effectively.
3. Let the trainees Identify suitable workplaces for them or identify workplaces for them, which may include:
   - ✓ Locations within the school compound
   - ✓ Local farms
4. Encourage trainees to actively observe technicians as they perform their tasks.
5. Allow trainees to participate in hands-on activities whenever possible to gain practical experience.
6. Encourage trainees to ask as many questions as possible regarding:

- ✓ The tasks being performed
- ✓ Tools and equipment in use
- ✓ Best practices and safety measures

7. After the visit, have each trainee write a report that includes:
   - ✓ An overview of the workplace
   - ✓ Key observations and experiences
   - ✓ Answers to questions raised during the visit
8. Organize a session for trainees to present their reports to the class.
9. Facilitate discussion to encourage sharing of insights and foster collaborative learning.

Topic 1.3: Monitoring of implemented measures

Objectives:

By the end of the topic, trainees will be able to:

a. Describe correctly the purpose of monitoring the implementation of measures against predators in fish farm

b. Apply properly monitoring methods of implemented measures against predators in fish farm

c. Implement properly regular surveys while monitoring implemented measures against predators in fish farm

Time Required: 10 hours.

Case studies, group discussions, field visit, visual aids, problem solving exercises, demonstration, practical work, brainstorming, group work, presentation, think-pair-square-share, pair work, individual work, observation, role-play, field visit

Materials, Tools and Equipment Needed:

Traps, Fishing gear, screens, floating barrier, baits and lures, Nets, happas, measuring devices, data collection tools, flashlights, fences

Preparation:

- ❑ Read and understand the scenario before giving it to the students
- ❑ Gather in advance tools, materials, and equipment needed to deliver the session.
- ❑ Arrange a conducive learning environment

Cross Cutting Issues:

- ✓ **Gender balance:** Mix girls and boys to promote cross-gender interaction. Encourage both genders to take on roles of leadership.
- ✓ **Inclusive education:** Ensure inclusivity while allocating tasks to students and provide facilities/environment that enable/allows participation of all

Prerequisites:

- Practice occupational health and safety procedures
- Establish Fish Farming facilities
- Monitor fish stocking and growth activities

Activity 1: Problem-Solving

Task 8

1. Using various methodologies like pair-share, or small group discussions, Instruct the trainees to join their respective groups and read the following **scenario: monitoring of implemented measures:** Rwasave is a well-known fish farm that has operated for many years in the Southern Province. As a fish farming technician, you are called by the farm manager, who reports the following issues: a significant decrease in the number of fish in the ponds and visible signs of bites and injuries on some fish. Therefore, you decide to begin an investigation by identifying possible predators that could be causing the problem. As a result, you identify potential predators including birds (like herons and kingfishers), snakes, frogs, wild cats, and even human poachers. To manage these predators, you begin applying various control measures.
2. Tell them to discuss and answer the following questions:
    a) What is the purpose of monitoring the implementation of measures against predators?
    b) What are the monitoring methods of implemented measures?

c) Why is regular survey important?

- ✓ Allow 5 minutes for discussion.
- ✓ Move around the classroom to check progress and provide clarification if any.
- ✓ Nominate or tell the group to nominate one speaker to share the findings of the group
- ✓ Give 2-3 minutes per group

3. After presentations of all groups, thank them and then provide the correct responses:

Answers of the questions

1) **The purpose of monitoring the implementation of measures against predators in fish farming**

- To ensure that the preventive measures (such as fencing, netting, scare devices, or biological control) are working effectively.
- To detect weaknesses or failures early before predators cause major losses.
- To reduce fish mortality and increase production efficiency.
- To maintain biosecurity and sustainability of the farm.

2) **Monitoring methods of implemented measures in fish farming**

- Regular inspection of physical barriers (nets, screens, fences, bird wires).
- Observation of predator activity around ponds (footprints, droppings, disturbances).
- Use of farm logs/checklists to record predator sightings and damages.
- Camera surveillance or traps for continuous monitoring.
- Evaluation of fish behavior and stock (stress, injuries, abnormal swimming).
- Periodic assessment of fish survival and growth rates to detect hidden predation.

3) **Why is regular survey important in fish farming?**

- To provide early warning of predator presence or disease outbreak.
- To help in adjusting management practices promptly (e.g., repairing nets, reinforcing barriers).
- To ensure efficient resource use by focusing efforts where risks are highest.
- To protect investment by minimizing losses from predators and other hazards.
- To maintain a healthy environment for fish growth and productivity.

4. Wrap up by Highlighting key points related to the scenario:

- Purpose of monitoring the implementation of measures against predators
- Monitoring methods of implemented measures
- Implement regular surveys

5. After the sharing session, let trainees to the **Key facts 1.3** for further enhancement and answer any questions they have.

Activity 2: Guided Practice

Task 9

1. Using an appropriate methodology such as individual work, pair-share, small group work, guide trainees to carry out the activities provided under **task 9** in their Trainee's Manuals. Make sure instructions are understood, all the trainees are actively participating, and necessary materials/tools are provided and being used.
2. During the task, trainees should be given a degree of independence to apply the knowledge and skills acquired in activity. Attend to each group, individual and provide support where necessary. Your role is to guide them by using probing questions such as Why? What? How? to enable them to come to informed responses.
3. While trainees are still performing the task, use this opportunity to discuss or address cross-cutting issues that may arise such as gender, inclusivity, financial education among others, even during group formation. Also attitudes and behavior changes should be handled during this activity.
4. Using an appropriate methodology such as question and answer in a large group, pair presentations or small group presentations, guide trainees to share their answers to the class. Write their responses for reference. Encourage all trainees to give their views.
5. After the sharing session, refer trainees to **monitor implemented measures** and discuss them together while harmonizing their responses provided in the sharing session and answer any questions they have.
6. Use the observation/performance checklist below while checking the completion of monitoring of implemented measures form/template.

Indicator (Elements to be checked)	Observation		Marks allocation
	Yes	No	
✓ Name of fish farm is mentioned			
✓ Responsible person is mentioned			

✓ Date for daily inspection of nets, screens, or fences are mentioned			
✓ Measure implemented are stated			
✓ Status of implemented measures are mentioned			
✓ Issues found are mentioned			
✓ Action taken is/are mentioned			
✓ General observation/comments are given			

Activity 3: Application

Task 10

1. Using an appropriate methodology such as individual work, pairs, or small groups, trainees will read the statement provided on **task 10** in the trainees' manual and perform the task stipulating to monitor the implementation measures to ensure if these measures are effective. Ensure that all instructions are clear and understood by the trainees and encourage active participation among all students. This activity requires students to work independently with limited support from the trainer.
2. Provide necessary materials for the task to be completed effectively.
3. Let the trainees Identify suitable workplaces for them or identify workplaces for them, which may include:
   - ✓ Locations within the school compound
   - ✓ Local farms
4. Encourage trainees to actively observe technicians as they perform their tasks.
5. Allow trainees to participate in hands-on activities whenever possible to gain practical experience.
6. Encourage trainees to ask as many questions as possible regarding:
   - ✓ The tasks being performed

- ✓ Tools and equipment in use
- ✓ Best practices and safety measures

7. After the visit, have each trainee write a report that includes:
   - ✓ An overview of the workplace
   - ✓ Key observations and experiences
   - ✓ Answers to questions raised during the visit
8. Organize a session for trainees to present their reports to the class.
9. Facilitate discussion to encourage sharing of insights and foster collaborative learning.

Formative Assessment

1. **Which of the following is a biological method of controlling fish predators?**

   a) Installing nets

   b) Using scarecrows

   c) Introducing predator-resistant fish species

   d) Using electric fencing

2. **Birds like kingfishers and herons are considered:**

   a) Beneficial to fish farming

   b) Insects that help fish grow

   c) Aquatic plants

   d) Fish predators

3. **Which of these is a non-lethal method to prevent fish predators?**

   a) Shooting the predator

   b) Poisoning the water

   c) Using nets and screens

   d) Draining the pond

4. **The best time to monitor predator activity around fishponds is:**

   a) Midday

   b) During heavy rainfall

   c) Early morning and late evening

   d) At feeding time

5. List of two physical methods used to prevent fish predators.

Answer:

- ✓ Installing predator-exclusion nets
- ✓ Erecting perimeter fencing
- ✓ Perimeter fencing and secure gates
- ✓ Overhead bird netting or monofilament grid lines across ponds
- ✓ Fine-mesh screens/grates on inlets and outlets
- ✓ Predator-exclusion cages/cover nets over nursery hapas/tanks
- ✓ Steepening/lining pond banks, maintaining adequate water depth at edges
- ✓ Repairing levees, filling burrows, maintaining intact dikes
- ✓ Pond covers for raceways/tanks

6. Briefly explain why regular monitoring is important in managing fish predators.

Answer:

Regular monitoring helps detect predator presence early, assess the effectiveness of control measures, and prevent significant stock losses before damage becomes severe.

- ✓ Detects predator activity early before major losses
- ✓ Helps choose the right control method for the specific predator
- ✓ Checks whether current deterrents are working and need adjustment
- ✓ Prevents stress-related problems (disease outbreaks, poor growth)
- ✓ Supports record-keeping and compliance with farm protocols

7. **Identify one sign of predator presence at a fishpond.**

Answer:

- ✓ Fish injuries or missing fish (e.g., bite marks, scratches, or torn fins)
- ✓ Footprints, tracks, droppings/scat on dikes
- ✓ Feathers, plucked piles, or pellets
- ✓ Drag marks, disturbed banks, broken vegetation
- ✓ Damaged nets/screens or new holes in fencing
- ✓ Injured fish (puncture/tear wounds), missing fish, scales on banks
- ✓ Turbid water/fish jumping near edges; surface ripples or splashes

8. **Name two scare tactics used to control bird predators in fishponds.**

Answer:

- ✓ Using scarecrows
- ✓ Installing reflective tape or shiny objects
- ✓ Auditory: propane cannons, distress-call speakers, periodic alarms
- ✓ Human/guard animal patrols and varying disturbance patterns

9. Why is regular pond inspection important in predator control?

Answer:

Regular inspections allow for early identification of predator activity, quick response to prevent losses, and maintenance of effective deterrents.

- ✓ Finds breaches or weak points (nets, screens, fences) to fix immediately
- ✓ Spots new predator routes or perches and removes them
- ✓ Limits cumulative losses by acting the same day
- ✓ Guides updates to the predator control plan based on real observations

10. **Read each statement and write "True" or "False".**
    - **a.** A fish farm located near a natural water body with a high predator population is at a lower risk of predation than a farm in an isolated area**. False**
    - **b.** Habitat modification, such as removing vegetation around a pond, can be an effective way to control certain predators. **True**
    - **c.** The use of fine-mesh screens is primarily a method to control large, adult predators. **False**
    - **d.** Predators only cause direct losses by consuming fish; they have no other negative impacts on a fish farm. **False**
    - **e.** An effective predator control plan should be static and not require regular monitoring or adjustment. **False**

11. **Scenario:** During your morning inspection, you notice fish jumping near the pond edges and several feathers floating on the surface. Some fingerlings have injuries.
    a. Identify the likely predator.
    b. Propose two immediate control measures.
    c. Suggest one long-term prevention strategy.

Enswers

- **a.** Likely predator: Bird predator such as heron or kingfisher
- **b.** Two immediate control measures:
    - ✓ Install overhead netting to block access
    - ✓ Use scare devices such as reflective tape or noise deterrents
- **c.** One long-term prevention strategy: Maintain permanent predator barriers such as full pond net covering or vegetative clearing around pond edges

Self-Reflection

1. Ask learners to re-take the self-assessment at the beginning of the unit. They should then fill in the table in their Trainee's Manual to Identify their areas of strength, areas for improvement and actions to take to improve.
1. Discuss trainees' results with them. Identify any areas that are giving many trainees difficulties and plan to give additional support as needed (ex. use class time before you begin the next learning outcome to go through commonly identified difficult concepts).

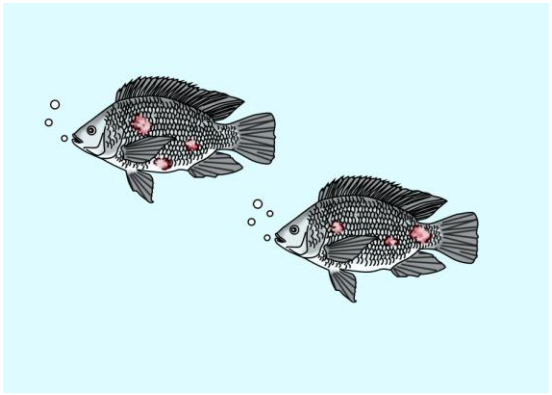
Points to Remember

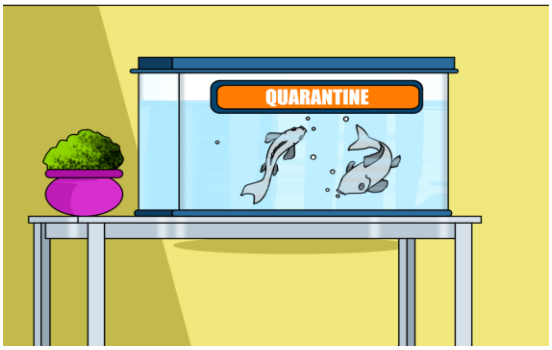
- **Managing predators involves identifying common threats like birds and snakes, applying preventive measures such as netting or fencing, and regularly monitoring their effectiveness to protect fish stock and improve survival rates.**
- **Understanding the specific predator types present in an area, their hunting habits, and their preferred environments is key to implementing effective and humane prevention strategies.**
- **Overfishing has significantly reduced many fish populations worldwide.**
- **The best measures are non-lethal, environmentally friendly, and preserve natural predator-prey balance while protecting fish from excessive loss.**
- **Ensure predator control methods comply with wildlife protection laws.**

Further Information for the Trainer

Make further research Identification of common fish predators, measures against fish predators as well as monitoring of implemented measures

1. [Anonymous]. (2005?). Aquaculture and wildlife interactions: Predators include diving ducks, cormorants, herons, shags, seals, etc., causing major losses in fish farms [PDF]. ResearchGate.
2. Alceste, & Authors. (2022). Effectiveness of physical barriers and enhanced fertilization in controlling predation on tilapia and catfish aquaculture systems by four piscivorous water bird families. Frontiers in Sustainable Food Systems
3. Food and Agriculture Organization of the United Nations. (n.d.). Application of appropriate technology: Predatory control. In FAO Aquaculture: Appropriate Technology for Mortality During Grow-Out. FAO.
4. Food and Agriculture Organization of the United Nations (FAO). (n.d.). Tools and methods: Monitoring and feedback. In [Title of Report]. FAO.
5. Mobile2b GmbH. (2010–2025). Fish farming and aquaculture practices checklist [Checklist].

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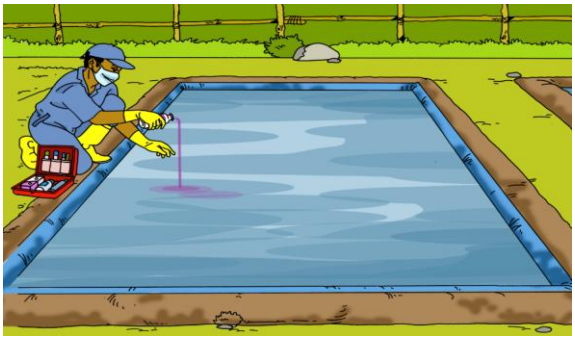



RECORD KEEPING
BORKS

Learning outcome 2: Self-Assessment

1. Ask trainees to look at the unit illustration in their Trainee's Manuals and together discuss:

   What does the illustration show?

   What do you think will be topics to be covered under this unit based on the illustration?

2. After the discussion, inform students that this unit is intended to provide them with the knowledge, skills and attitudes to **manage fish diseases**. They will cover the skills required to **identification of sick and injured fish, isolation of sick and injured fish, providing first aids to sick or injured fish and monitoring health status of fish stock and documentation of findings**

3. Ask trainees to fill out the self-assessment at the beginning of the unit in their Trainee's Manuals. Explain that:

   a. The purpose of the self-assessment is to become familiar with the topics in the unit and for them to see what they know or do not know at the beginning.

   b. There are no right or wrong ways to answer this assessment. It is for their own reference and self-reflection on the knowledge, skills and attitudes acquisition during the learning process.

   c. They should think about themselves: do they think they have the knowledge, skills or attitudes to do this? How well?

   d. They read the statements across the top and put a check in column that best represents their level of knowledge, skills or attitudes.

   e. At the end of the unit, they will do a self-reflection, which includes re-taking the self-assessment and identifying their strengths, areas of improvement and actions to be taken.

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify signs of sick and injured fish	1. Treat sick and injured fish	1. Demonstrate compassion, patience, and attentiveness when treating sick and injured fish
2. Knowledge of fish anatomy and physiology	2. Dissect fish	2. Being observant during dissection of fish
3. Knowledge of Common fish diseases	3. Diagnose fish diseases	3. Being self-motivated during fish diseases diagnosis
4. Understand importance and steps of isolation of sick and injured fish	4. Manage isolated sick and injured fish	4. Demonstrate compassion and attentiveness when managing isolated sick and injured fish
5. Knowledge of fish parasites	5. Identify fish parasites	5. Being precise when identifying fish parasites
6. knowledge of water quality parameters	6. Measure water quality and interpret it parameters	6. Being observant when measuring water parameters
7. Knowledge on treatment/first aid of sick fish	7. Provide first aids to sick or injured fish	7. Team-work spirit when careering sick or injured fish
8. Understand steps for monitoring fish health and documentation of findings	8. Monitor health status of fish stock and document findings	8. Exhibit diligence, accuracy, and consistency when monitoring the health status of fish stock and documenting findings

Steps:

Discovery activity

Task 11

1. Using an appropriate methodology such as pair-share, large group discussion and presentation, the objective is to foster engagement and knowledge exchange among students.
2. Take students through the following steps:
    a) Firstly, organize trainees into pairs or small groups and guide them through a structured discussion about questions on **task 11** in trainee's manual. Ensure active participation and understanding of instructions.
    d. Secondly, bring the trainees back together as a large group for presentations. Each pair or group should summarize their discussions, sharing insights and learnings with the class. Encourage all trainees to contribute their own experiences and reflections.
    e. Conclude the activity with feedback and reflection. Emphasize that the purpose was not to find right answers but to provide a look into trainees' scheduling of laundry roaster.
3. Introduce Topic 2.1**:** Identification of sick and injured fish

Topic 2.1: Identification of sick and injured fish

Objectives:

By the end of the topic, trainees will be able to:

a. Identify properly the behaviours of sick and injured fish in fish farm
b. Identify properly the physical signs of the sick fish in fish farm
c. Identify properly the sick fish and injured fish in fish farm

Time Required: 5 hours.

Learning Methodology:

Case studies, group discussions, field visit, visual aids, problem solving exercises, demonstration, practical work, brainstorming, group work, presentation, think-pair-square-share, pair work, individual work, observation, role-play, field visit

Materials, Tools and Equipment Needed:

Manual and protocol guides, isolation nets, happas, tanks, check list, logbooks, waste bags, medications, disinfectant, detergents, brooms, brushes, scrubbers, sprayers, waste containers, composting bins, test strips, digital meter, transport container, vehicles, isolation tank, PPE, CCTV cameras

Preparation:

- ❑ Read and understand the scenario before giving it to the students
- ❑ Gather in advance tools, materials, and equipment needed to deliver the session.
- ❑ Arrange a conducive learning environment

Cross Cutting Issues:

- ✓ **Gender balance:** Mix girls and boys to promote cross-gender interaction. Encourage both genders to take on roles of leadership.
- ✓ **Inclusive education:** Ensure inclusivity while allocating tasks to students and provide facilities/environment that enable/allows participation of all

Prerequisites:

- Practice occupational health and safety procedures
- Establish fish farming facilities communication skills
- Monitor fish stocking and growth activities
- Feed fish

- Manage water quality

Activity 1: Problem-Solving

Task 12

1. Using various methodologies like pair-share, or small group discussions, Instruct the trainees to join their respective groups and read the following **scenario (Identification of fish and injured fish)**

   As technician in fish farming, you get a call from fish farmer and ask you for advice. He/She reported you that in the morning, they notice that some fish are swimming erratically, a few have red sores near their fins, and one is floating sideways. The farm has recently experienced heavy rainfall, and water has not been changed for 4 days.

2. Tell them to discuss and answer the following questions:

   1) What are the behaviours of sick fish and injured fish?
   2) What are the common physical signs that indicate a fish is sick or injured?
   3) Why is early identification of sick and injured fish important in aquaculture?
   4) What problem you think happened in the farm (talked in scenario above)?
   5) What advice can you give to the farmer?

✓ Allow 5 minutes for discussion.
✓ Move around the classroom to check progress and provide clarification if any.
✓ Nominate or tell the group to nominate one speaker to share the findings of the group
✓ Give 2-3 minutes per group

3. After presentations of all groups, thank them and then provide the correct responses:

Answers of the questions

1) **Behaviors of sick fish and injured fish**
   - ✓ Loss of appetite or refusal to feed.
   - ✓ Lethargy (remaining at the bottom or surface, not swimming actively).
   - ✓ Abnormal swimming (spiraling, erratic movement, isolation from the group).
   - ✓ Gasping for air at the water surface.
   - ✓ Rubbing body against objects (“flashing”) due to irritation.

2) **Common physical signs that indicate a fish is sick or injured?**
   - ✓ Visible wounds, ulcers, or bleeding spots.
   - ✓ Frayed or damaged fins.
   - ✓ Swollen abdomen or eyes (dropsy, pop-eye).
   - ✓ White spots, cotton-like growths, or mucus on body/gills.
   - ✓ Discoloration or loss of normal body shine.
   - ✓ Parasites attached to skin or gills.
3) **Early identification of sick and injured fish is important in aquaculture because:**
   - ✓ It prevents the spread of contagious diseases to the whole stock.
   - ✓ It reduces mortality and economic losses.
   - ✓ It allows for timely treatment and recovery of affected fish.
   - ✓ It improves overall farm productivity and biosecurity.
   - ✓ It protects fish welfare and reduces stress on healthy fish.
4) **Based on the scenario, here's the most likely problem in the farm:**

   The fish are showing abnormal swimming, red sores, and buoyancy issues. Combined with the fact that there was heavy rainfall and no water change for 4 days, the problem is likely: **Poor water quality / environmental stress** caused by:
   - ✓ Rainfall diluting and disturbing water chemistry (pH fluctuation, low dissolved oxygen).
   - ✓ Waste accumulation (ammonia, nitrites) due to lack of water exchange.
   - ✓ This stress made the fish more vulnerable to bacterial infections (such as Aeromonas or Vibrio), which often causes red sores/ulcers.

   So, the farm is likely facing water quality deterioration leading to stress or induced bacterial disease outbreak.
5) **Advice to the farmer:**
   - ✓ Test water parameters (dissolved oxygen, ammonia, nitrite, pH).
   - ✓ Change part of the water gradually to improve quality.
   - ✓ Increase aeration to restore oxygen levels.
   - ✓ Remove and isolate sick fish for treatment.
   - ✓ Apply veterinary-approved treatment (e.g., antibacterial bath/medicated feed).
   - ✓ Strengthen biosecurity and regular monitoring to prevent recurrence.

4. Wrap up by Highlighting key points related to the scenario:

- Behavior of sick and injured fish
- Physical signs of fish and/or injured fish
- Identification of sick and injured fish template

5. After the sharing session, let trainees to the **Key facts 2.1** for further enhancementand answer any questions they have.

Activity 2: Guided Practice

Task 13

7. Using an appropriate methodology such as individual work, pair-share, small group work, guide trainees to carry out the activities provided under **task 13** in their Trainee's Manuals. Make sure instructions are understood, all the trainees are actively participating, and necessary materials/tools are provided and being used.
8. During the task, trainees should be given a degree of independence to apply the knowledge and skills acquired in activity. Attend to each group, individual and provide support where necessary. Your role is to guide them by using probing questions such as Why? What? How? to enable them to come to informed responses.
9. While trainees are still performing the task, use this opportunity to discuss or address cross-cutting issues that may arise such as gender, inclusivity, financial education among others, even during group formation. Also attitudes and behavior changes should be handled during this activity.
10. Using an appropriate methodology such as question and answer in a large group, pair presentations or small group presentations, guide trainees to share their answers to the class. Write their responses for reference. Encourage all trainees to give their views.
11. After the sharing session, refer trainees to **identify fish and injured fish** and discuss them together while harmonizing their responses provided in the sharing session and answer any questions they have.
12. Use the observation/performance checklist below while assessing identification of fish and injured fish in the farm

Indicator (Elements to be checked)	Observation		Marks allocation
	Yes	No	
Sick and injured fish are well identified			
✓ Fish species are identified			

✓ Number of fish observed are recorded			
✓ Signs of illness are identified and recorded			
✓ Signs of injury are identified and recorded			
✓ Environmental conditions are observed and recorded			
✓ Actions to be taken are mentioned			

Activity 3: Application

Task 14

1. Using an appropriate methodology such as individual work, pairs, or small groups, trainees will read the statement provided on **task 14** in the trainees' manual and perform the task stipulating **to carefully identify and record any sick or injured fish.** Ensure that all instructions are clear and understood by the trainees and encourage active participation among all students. This activity requires students to work independently with limited support from the trainer.
2. Provide necessary materials for the task to be completed effectively.
3. Let the trainees Identify suitable workplaces for them or identify workplaces for them, which may include:

    ✓ Locations within the school compound
    ✓ Local farms

4. Encourage trainees to actively observe technicians as they perform their tasks.
5. Allow trainees to participate in hands-on activities whenever possible to gain practical experience.
6. Encourage trainees to ask as many questions as possible regarding:

    ✓ The tasks being performed

- ✓ Tools and equipment in use
- ✓ Best practices and safety measures

7. After the visit, have each trainee write a report that includes:
    - ✓ An overview of the workplace
    - ✓ Key observations and experiences
    - ✓ Answers to questions raised during the visit
8. Organize a session for trainees to present their reports to the class.
9. Facilitate discussion to encourage sharing of insights and foster collaborative learning.

Topic 2.2: Isolation of sick and injured fish

Objectives:

By the end of the topic, trainees will be able to:

a. Clarify properly the purpose of isolation of sick and injured fish in fish farm

b. Explain properly the steps of isolation of sick and injured fish in fish farm

c. Isolate properly the sick and injured fish in fish farm

Time Required: 5 hours.

Learning Methodology:

Case studies, group discussions, field visit, visual aids, problem solving exercises, demonstration, practical work, brainstorming, group work, presentation, think-pair-square-share, pair work, individual work, observation, role-play, field visit

Materials, Tools and Equipment Needed:

Thermometer, salinity meter, check list and temperate, signage, cameras, recording software/form, reference guides, hammer, stakes, microscope, water testing kits, fish health assessment kits, netting or fencing materials, scare devices, alcohol or disinfectant, PPE, sample bottles, calibration solutions, cleaning supplies, footbaths, baits, traps, zip ties, isolation tanks

Preparation:

- ❑ Read and understand the scenario before giving it to the students
- ❑ Gather in advance tools, materials, and equipment needed to deliver the session.
- ❑ Arrange a conducive learning environment

Cross Cutting Issues:

- ✓ **Gender balance:** Mix girls and boys to promote cross-gender interaction. Encourage both genders to take on roles of leadership.
- ✓ **Inclusive education:** Ensure inclusivity while allocating tasks to students and provide facilities/environment that enable/allows participation of all

Prerequisites:

- Establish Fish Farming facilities
- Manage water quality
- Feed fish
- Monitor fish stocking and growth activities

Activity 1: Problem-Solving

Task 15

1. Using various methodologies like pair-share, or small group discussions, Instruct the trainees to join their respective groups and read the following **scenario (Isolation of sick and injured fish)**

You are a fish health technician working at a fish farm. During your morning inspection, you noticed that several fish in pond have the following abnormalities: Some fish are swimming in circles, others are floating near the surface gasping for air, other ones have a red sore near the dorsal fin while others have Some fish have frayed fins and white patches. You are requested to isolate these fish by showing abnormalities and special behaviors.

2. **Tell them to discuss and answer the following questions:**

    1. What is isolation?
    2. What is the importance of isolation of sick and injured fish?
    3. What are steps of isolating sick and injured fish
    4. How to manage isolated sick and injured fish?

- ✓ Allow 5 minutes for discussion.
- ✓ Move around the classroom to check progress and provide clarification if any.
- ✓ Nominate or tell the group to nominate one speaker to share the findings of the group
- ✓ Give 2-3 minutes per group

3. After presentations of all groups, thank them and then provide the correct responses:

Answers of the questions

1) Isolation of sick and injured fish is the process of separating affected fish from the healthy population in a fish farm to prevent disease spread, reduce stress, and allow proper treatment and recovery.

2) The importance of isolation of sick and injured fish

- **Prevent Disease Transmission:** Sick fish may carry pathogens (bacteria, viruses, parasites) that can infect healthy fish.
- **Facilitate Treatment:** Medications or special care can be applied more effectively in a separate environment**.**
- **Monitor Recovery:** Isolated fish can be closely observed for improvement or deterioration.
- **Reduce Stress:** Injured or ill fish are less likely to be bullied or outcompeted by healthy fish.
- What are steps of isolating sick and injured fish

3) Steps of isolating sick and injured fish

- **Identify affected fish:** Observe for abnormal behavior, discoloration, lesions, frayed fins, loss of appetite, or unusual swimming patterns.
- **Prepare an isolation (quarantine) tank or container:** use a clean, separate tank or basin with fresh, treated water and match temperature and Ph to the main pond
- **Use a clean net to transfer the fish:** gently catch the sick or injured fish to reduce stress and avoid using the same net across different tanks.
- **Treatment:** Apply medications, adjust diet, or perform water therapy as needed.
- **Observe the isolated fish daily:** check for changes in symptoms and record feeding, behavior, and appearance.

- **Provide gentle aeration:** to ensure enough oxygen without strong water movement
- **Disinfect equipment after use:** Always clean nets, buckets, and gloves after handling sick fish

4) Management of isolated sick and injured fish

- **Prepare a Proper Isolation (Quarantine) Tank**
  - Use clean, well oxygenated water same as for the main pond (in temperature and pH)
  - Ensure the tank is shaded or semi-covered to reduce stress, small enough for close observation and quipped with gentle aeration (no strong currents)
- **Maintain High Water Quality**
  - Change 20–50% of the water daily or every 2 days
  - Test and maintain temperature, pH and dissolved oxygen
  - Remove uneaten food and waste to avoid ammonia build-up
- **Apply Treatment as needed**
- **Daily monitoring and record-keeping**
- **Feed Carefully**
  - Provide high-protein, easily digestible food
  - Avoid overfeeding; remove uneaten food to prevent fouling
- **Decide on return or removal**: Return the fish to the main pond only when symptoms are gone, is eating and swimming normally, no signs of reinfection
- If the fish dies: **dispose**

4. Wrap up by Highlighting key points related to the scenario:

- Identification of common fish predators
- Predation methods
- Tool and material to be used while identifying common fish predators

5. After the sharing session, let trainees to the **Key facts 2.2.** provided in the sharing session and answer any questions they have.

Activity 2: Guided Practice

Task 16

1. Using an appropriate methodology such as individual work, pair-share, small group work, guide trainees to carry out the activities provided under **task 16** in their Trainee's Manuals. Make sure instructions are understood, all the trainees are actively participating, and necessary materials/tools are provided and being used.
2. During the task, trainees should be given a degree of independence to apply the knowledge and skills acquired in activity. Attend to each group, individual and provide support where necessary. Your role is to guide them by using probing questions such as Why? What? How? to enable them to come to informed responses.
3. While trainees are still performing the task, use this opportunity to discuss or address cross-cutting issues that may arise such as gender, inclusivity, financial education among others, even during group formation. Also attitudes and behavior changes should be handled during this activity.
4. Using an appropriate methodology such as question and answer in a large group, pair presentations or small group presentations, guide trainees to share their answers to the class. Write their responses for reference. Encourage all trainees to give their views.
5. After the sharing session, refer trainees to apply **isolation of sick and injured fish** and discuss them together while harmonizing their responses provided in the sharing session and answer any questions they have.
6. Use the observation/performance checklist below while assessing isolation of sick and injured fish in fish farm

Indicator (Elements to be checked)	Observation		Marks allocation
	Yes	No	
✓ Affected fish are identified			
✓ Isolation (quarantine) tank or container is prepared			

✓ Clean nets to transfer the fish are used			
✓ Water quality is maintained			
✓ Isolated fish are observed/monitored			
✓ Daily records are taken			
✓ Gentle aeration is provided			
✓ Equipment is cleaned after use			
✓ Sick and injured fish are treated			
✓ Feeds are distributed			
✓ Return or Removal is done			
✓ Best Practices are performed			

Activity 3: Application

Task 17

1. Using an appropriate methodology such as individual work, pairs, or small groups, trainees will read the statement provided on **task 17** in the trainees' manual and perform the task stipulating **to isolate sick and injured fish.** Ensure that all instructions are clear and understood by the trainees and encourage active participation among all students. This activity requires students to work independently with limited support from the trainer.
2. Provide necessary materials for the task to be completed effectively.
3. Let the trainees Identify suitable workplaces for them or identify workplaces for them, which may include:
    - ✓ Locations within the school compound
    - ✓ Local farms
4. Encourage trainees to actively observe technicians as they perform their tasks.
5. Allow trainees to participate in hands-on activities whenever possible to gain practical experience.

6. Encourage trainees to ask as many questions as possible regarding:

   - ✓ The tasks being performed
   - ✓ Tools and equipment in use
   - ✓ Best practices and safety measures

7. After the visit, have each trainee write a report that includes:

   - ✓ An overview of the workplace
   - ✓ Key observations and experiences
   - ✓ Answers to questions raised during the visit

8. Organize a session for trainees to present their reports to the class.
9. Facilitate discussion to encourage sharing of insights and foster collaborative learning.

Topic 2.3: Providing first aid to sick or injured fish

Objectives:

By the end of the topic, trainees will be able to:

a. Explain properly the steps for providing first aid to of sick and injured fish in fish farm
b. Identify properly the considerations when providing first aid to sick or injured fish in fish farm
c. Provide properly first aid to sick and injured fish in fish farm

Time Required: 5 hours.

Learning Methodology:

Case studies, group discussions, field visit, visual aids, problem solving exercises, demonstration, practical work, brainstorming, group work, presentation, think-pair-square-share, pair work, individual work, observation, role-play, field visit

Materials, Tools and Equipment Needed:

Aerators, filtration systems, isolation tanks, nets, disinfectant, antibiotics, antifungals, anti-parasites, probiotics, salt, feeds, supplements, cotton swabs, gloves, masks, aprons, thermometer, syringes, sprayers, water quality kits and meters, weighing scale

Preparation:

- ❑ Read and understand the scenario before giving it to the students
- ❑ Gather in advance tools, materials, and equipment needed to deliver the session.
- ❑ Arrange a conducive learning environment

Cross Cutting Issues:

- ✓ **Gender balance:** Mix girls and boys to promote cross-gender interaction. Encourage both genders to take on roles of leadership.
- ✓ **Inclusive education:** Ensure inclusivity while allocating tasks to students and provide facilities/environment that enable/allows participation of all

Prerequisites:

- Establish Fish Farming facilities
- Manage water quality
- Feed fish
- Monitor fish stocking and growth activities

Activity 1: Problem-Solving

Task 18

1. Using various methodologies like pair-share, or small group discussions, Instruct the trainees to join their respective groups and read the following **scenario**

   You are hired to give technical support to the fish farm owned by Mr. NKESHIMANA. One morning, the man powers of the farmer reported to the owner that several fish have shown the following unusual behavior. One fish was floating sideways but still alive, another has injuries, third fish have cloudy eyes and refused to eat. A dead fish is also found near the inlet. The farm owner asks you to quickly provide first aid and write a report on what was done.

2. Tell **them to discuss and answer the following questions:**
   1) What is first aid in fish farming?
   2) What are steps you will follow to provide first aid to sick and injured fish?
   3) What to consider when performing first aid

- ✓ Allow 5 minutes for discussion.
- ✓ Move around the classroom to check progress and provide clarification if any.
- ✓ Nominate or tell the group to nominate one speaker to share the findings of the group
- ✓ Give 2-3 minutes per group

3. After presentations of all groups, thank them and then provide the correct responses:

Answers of the questions

1) Providing first aid to sick or injured fish is about immediate intervention to stabilize their condition, prevent further deterioration, and buy time for a proper diagnosis and long-term treatment if necessary. It's often the crucial first step to saving a fish's life. Providing first aid to sick or injured fish is crucial for their survival and to prevent the spread of disease to other fish in the system.

2) Steps to follow to provide first aid to sick and injured fish

- ✓ **Step 1: Immediate observation and assessment:** identify the problem, behavioral changes, physical signs, single fish or multiple? is it just one individual, a few, or a significant portion of the stock?
- ✓ **Step 2:** Isolate the affected fish (quarantine tank)
- ✓ **Step 3:** Optimize the quarantine environment (water quality is paramount): Perform water tests, add non-iodized salt (optional but often beneficial)
- ✓ **Step 4: Symptom-based immediate actions (beyond water quality**): for external parasites, for fungal infections (white, cottony growths), for bacterial infections, for injuries (cuts, scrapes, torn fins, for general stress/shock, for bloating/digestive issues
- ✓ **Step 5:** Medication (use with caution and knowledge**)**
- ✓ **Step 6:** Continuous observation and follow-up
- ✓ **Step 7:** Seek professional help
- ✓ **Step 8: Prevention is the best medicine**

3) What to consider when performing first aid

- ✓ Immediate Isolation
- ✓ General supportive measures: add non-iodized salt (for freshwater fish), consider temperature adjustment, addressing specific issues (if identified), avoid feeding for 24 hours, monitoring and record keeping
- ✓ Species-specific needs
- ✓ Tolerance levels

- ✓ Behavioral norms
- ✓ Accurate diagnosis (or best guess):
- ✓ Quarantine/Hospital tank setup
- ✓ Stress Reduction
- ✓ Medication use (if necessary
- ✓ Biosecurity and Hygiene
- ✓ Patience and persistence

4. Wrap up by Highlighting key points related to the scenario:

- Identification of common fish predators
- Predation methods
- Tool and material to be used while identifying common fish predators

5. After the sharing session, let trainees to the **Key facts 2.3** for further enhancement and answer any questions they have.

Activity 2: Guided Practice

Task 19

1. Using an appropriate methodology such as individual work, pair-share, small group work, guide trainees to carry out the activities provided under **task 19** in their Trainee's Manuals. Make sure instructions are understood, all the trainees are actively participating, and necessary materials/tools are provided and being used.
2. During the task, trainees should be given a degree of independence to apply the knowledge and skills acquired in activity. Attend to each group, individual and provide support where necessary. Your role is to guide them by using probing questions such as Why? What? How? to enable them to come to informed responses.
3. While trainees are still performing the task, use this opportunity to discuss or address cross-cutting issues that may arise such as gender, inclusivity, financial education among others, even during group formation. Also attitudes and behavior changes should be handled during this activity.

4. Using an appropriate methodology such as question and answer in a large group, pair presentations or small group presentations, guide trainees to share their answers to the class. Write their responses for reference. Encourage all trainees to give their views.
5. After the sharing session, refer trainees to provide first aid to sick or injured fish and discuss them together while harmonizing their responses provided in the sharing session and answer any questions they have.
6. Use the observation/performance checklist below while providing first aid of sick or injured fish

Indicator (Elements to be checked)	Observation		Marks allocation
	Yes	No	
✓ Sick or Injured fish are identified			
✓ Affected fish are isolated			
✓ Quarantine environment is optimized			
✓ Symptom-based immediate (external parasites, for fungal infections, for bacterial infections, for injuries) are identified			
✓ Medication is performed			
✓ Continuous observations/follow-up are performed			
✓ Seek professional help is provided			
✓ Prevention is performed			

Activity 3: Application

Task 20

1. Using an appropriate methodology such as individual work, pairs, or small groups, trainees will read the statement provided on **task 20** in the trainees' manual and perform the task stipulating **providing first aid of sick and injured fish**. Ensure that all instructions are clear

and understood by the trainees and encourage active participation among all students. This activity requires students to work independently with limited support from the trainer.

2. Provide necessary materials for the task to be completed effectively.
3. Let the trainees Identify suitable workplaces for them or identify workplaces for them, which may include:

    - ✓ Locations within the school compound
    - ✓ Local farms

4. Encourage trainees to actively observe technicians as they perform their tasks.
5. Allow trainees to participate in hands-on activities whenever possible to gain practical experience.
6. Encourage trainees to ask as many questions as possible regarding:

    - ✓ The tasks being performed
    - ✓ Tools and equipment in use
    - ✓ Best practices and safety measures

7. After the visit, have each trainee write a report that includes:
    - ✓ An overview of the workplace
    - ✓ Key observations and experiences
    - ✓ Answers to questions raised during the visit
8. Organize a session for trainees to present their reports to the class.
9. Facilitate discussion to encourage sharing of insights and foster collaborative learning.

Topic 2.4: Monitoring health status of fish stock and documentation of findings

Objectives:

By the end of the topic, trainees will be able to:

a. Describe correctly the purpose of monitoring health status of fish stock in fish farm

b. Explain properly the steps for monitoring fish health in fish farm

c. Monitor appropriately the fish health in fish farm

d. Prepare correctly the documentation of fish health using log in fish farm

Time Required: 5 hours.

Learning Methodology:

Case studies, group discussions, field visit, visual aids, problem solving exercises, demonstration, practical work, brainstorming, group work, presentation, think-pair-square-share, pair work, individual work, observation, role-play, field visit

Materials, Tools and Equipment Needed:

Aerators, filtration systems, isolation tanks, nets, disinfectant, antibiotics, antifungals, anti-parasites, probiotics, salt, feeds, supplements, cotton swabs, gloves, masks, aprons, thermometer, syringes, sprayers, water quality kits and meters, weighing scale

Preparation:

- ❑ Read and understand the scenario before giving it to the students
- ❑ Gather in advance tools, materials, and equipment needed to deliver the session.
- ❑ Arrange a conducive learning environment

Cross Cutting Issues:

✓ **Gender balance:** Mix girls and boys to promote cross-gender interaction. Encourage both genders to take on roles of leadership.

✓ **Inclusive education:** Ensure inclusivity while allocating tasks to students and provide facilities/environment that enable/allows participation of all

Prerequisites:

- Establish Fish Farming facilities
- Manage water quality
- Feed fish
- Monitor fish stocking and growth activities

Activity 1: Problem-Solving

Task 21

1. Using various methodologies like pair-share, or small group discussions, Instruct the trainees to join their respective groups and read the following **scenario** NYIRABUKEYE is a fish farmer who has 10 fishponds at Rugende. They always have problems with fish diseases and injuries. As a technician in animal health, especially in fish health, you are hired to be responsible for monitoring the health status of fish in Pond
2. Tell **them to discuss and answer the following questions:**
    1) Explain what is monitoring of fish health
    2) What are steps will you follow when monitoring fish health
    3) What information should be recorded in the daily fish health log?
    4) How to document?

✓ Allow 5 minutes for discussion.
✓ Move around the classroom to check progress and provide clarification if any.
✓ Nominate or tell the group to nominate one speaker to share the findings of the group
✓ Give 2-3 minutes per group

3. After presentations of all groups, thank them and then provide the correct responses:

Answers of the questions

1) **Monitoring health status of fish stock and documentation of findings** is the systematic process of observing and assessing the condition of fish to detect

disease, stress, or injury, and recording these observations for management, decision-making, and future reference.

Monitoring the health status of your fish stock and diligently documenting findings are fundamental pillars of successful aquaculture and aquarium management. This proactive approach allows for early detection of issues, prevention of widespread disease, and informed decision-making to maintain optimal fish welfare and productivity.

2) **Steps for monitoring fish health**
   - ✓ Sampling
   - ✓ Monitor health parameters
   - ✓ Document changes
   - ✓ Create a Health Log template
3) **Information should be recorded in the daily fish health log**
   - ✓ Date and time
   - ✓ Tank/pond/system id
   - ✓ Observer's name/initials
   - ✓ Fish species & stock size
   - ✓ Water quality parameters
   - ✓ Fish behavior observations
   - ✓ Physical symptoms
   - ✓ Mortality
   - ✓ Feed consumption
   - ✓ Actions taken
   - ✓ Fish response to actions
   - ✓ Photos/videos: capture images
4) **How to document?**
   - ✓ Standardized log sheets/forms
   - ✓ Digital records
   - ✓ Clear and concise language
   - ✓ Regularity
   - ✓ Accessibility

4. Wrap up by Highlighting key points related to the scenario:
   - Identification of common fish predators
   - Predation methods

- Tool and material to be used while identifying common fish predators

5. After the sharing session, let trainees to the **Key facts 2.4** for the further enhancewmewnt and answer any questions they have.

Activity 2: Guided Practice

Task 22

1. Using an appropriate methodology such as individual work, pair-share, small group work, guide trainees to carry out the activities provided under **task 22** in their Trainee's Manuals. Make sure instructions are understood, all the trainees are actively participating, and necessary materials/tools are provided and being used.
2. During the task, trainees should be given a degree of independence to apply the knowledge and skills acquired in activity. Attend to each group, individual and provide support where necessary. Your role is to guide them by using probing questions such as Why? What? How? to enable them to come to informed responses.
3. While trainees are still performing the task, use this opportunity to discuss or address cross-cutting issues that may arise such as gender, inclusivity, financial education among others, even during group formation. Also attitudes and behavior changes should be handled during this activity.
4. Using an appropriate methodology such as question and answer in a large group, pair presentations or small group presentations, guide trainees to share their answers to the class. Write their responses for reference. Encourage all trainees to give their views.
5. After the sharing session, refer trainees to **provide first aid to sick or injured fish** and discuss them together while harmonizing their responses provided in the sharing session and answer any questions they have.
6. Use the observation/performance checklist below while monitoring health status of fish stock and documentation of findings

Indicator (Elements to be checked)	Observation		Marks allocation
	Yes	No	

✓ Fish behavior is identified			
✓ Swimming patterns is observed			
✓ Schooling behaviour is observed			
✓ Feeding response is observed			
✓ Respiration is observed			
✓ Skin & scales are observed			
✓ Fins are observed			
✓ torn, rotten, haemorrhages are identified			
✓ Eyes are observed			
✓ Gills are observed			
✓ Abdomen is observed			
✓ Mouth is observed			
✓ Faeces are observed			
✓ Mortality is measured			
✓ Temperature is measured			
✓ pH is measured			
✓ Ammonia (nh3/nh4+) is measured			
✓ Nitrite (no2−) is measured			
✓ Chlorine/chloramines is measured			
✓ Nitrate (no3−) is measured			
✓ Dissolved oxygen (do) is measured			
✓ Alkalinity/hardness is measured			
✓ Salinity is measured			
✓ Observations parameters are recorded			

Activity 3: Application

Task 23

1. Using an appropriate methodology such as individual work, pairs, or small groups, trainees will read the statement provided on **task 22** in the trainees' manual and perform the task stipulating **to monitor their health status and document the findings**. Ensure that all instructions are clear and understood by the trainees and encourage active participation among all students. This activity requires students to work independently with limited support from the trainer.
2. Provide necessary materials for the task to be completed effectively.
3. Let the trainees Identify suitable workplaces for them or identify workplaces for them, which may include:

    - ✓ Locations within the school compound
    - ✓ Local farms

4. Encourage trainees to actively observe technicians as they perform their tasks.
5. Allow trainees to participate in hands-on activities whenever possible to gain practical experience.
6. Encourage trainees to ask as many questions as possible regarding:

    - ✓ The tasks being performed
    - ✓ Tools and equipment in use
    - ✓ Best practices and safety measures

7. After the visit, have each trainee write a report that includes:

    - ✓ An overview of the workplace
    - ✓ Key observations and experiences

8. Answers to questions raised during the visit
9. Organize a session for trainees to present their reports to the class.
10. Facilitate discussion to encourage sharing of insights and foster collaborative learning.

Formative Assessment

I. Multiple choice questions: Choose the correct answer

1. What is one early sign of a sick fish?

   A. Rapid growth

   B. Active schooling

   C. Gasping at the surface

   D. Clear eyes

2. What is the purpose of isolating sick fish?

   A. To increase feeding

   B. To prevent disease spread

   C. To reduce oxygen usage

   D. To encourage schooling

3. A good indicator of healthy fish behavior is:

   A. Floating on the side

   B. Poor appetite

   C. Fast and steady swimming

   D. Staying motionless all day

4. Which of the following is not a cause of fish disease?

   A. Poor water quality

   B. Clean equipment

   C. Overcrowding

   D. Unbalanced feeding

5. The best tool to measure dissolved oxygen is:

   A. Thermometer

   B. Water net

   C. DO meter

   D. Ruler

II. Open ended questions

1. List three signs that show a fish may be injured or sick.

- ✓ Red sores, ulcers, or wounds
- ✓ Frayed fins or damaged gills
- ✓ White spots, cotton-like growths
- ✓ Abnormal swimming (spiraling, floating sideways, lethargy)
- ✓ Loss of appetite
- ✓ Gasping at the surface

2. **Explain two reasons why isolation of sick fish is important in a fish farm.**
    - ✓ Prevents spread of contagious diseases to healthy fish.
    - ✓ Makes treatment easier and more effective.
    - ✓ Reduces stress on the healthy stock.
    - ✓ Allows close monitoring of affected fish.
3. **What actions should you take if you observe several fish showing red sores on their bodies?**
    - ✓ Immediately isolate the sick fish.
    - ✓ Check water quality (DO, pH, ammonia, nitrites).
    - ✓ Improve water conditions (aeration, partial water change).
    - ✓ Consult a veterinarian for diagnosis and treatment (e.g., antibacterial treatment).
    - ✓ Disinfect equipment used in the affected tank/pond.
4. **Describe how you would monitor the health of fish stock daily.**
    - ✓ Observe fish behavior (swimming, feeding response, schooling).
    - ✓ Inspect fish physically for signs of disease or injury.
    - ✓ Test water quality parameters (DO, temperature, pH, ammonia).
    - ✓ Check mortality and record any deaths.
    - ✓ Ensure equipment (aerators, pumps, nets) are functioning properly.
5. **You have just completed your daily fish health check for all tanks. List at least five (5) distinct pieces of information that you should always record in a comprehensive fish health log.**
    - ✓ Date and time of check.
    - ✓ Water quality readings (DO, temperature, pH, ammonia).
    - ✓ Feeding activity and feed amounts given.

- ✓ Abnormal behavior observed.
- ✓ Any visible injuries or disease signs.
- ✓ Number of mortalities.
- ✓ Actions taken (treatments, water changes, repairs).
- ✓

6. **Explain why accurate and consistent documentation of fish health is crucial for a successful fish farm. Provide at least two reasons.**
    - ✓ Help in early detection of recurring problems.
    - ✓ Provides data for decision-making and management.
    - ✓ Ensures traceability for biosecurity and certification.
    - ✓ Supports communication among farm staff.
    - ✓ Improves long-term productivity and reduces losses.
7. **Name two (2) biosecurity measures that can help prevent disease from entering or spreading within a fish farm.**
    - ✓ Quarantine new or sick stock
    - ✓ Regular disinfection of equipment and tanks.
    - ✓ Controlling farm access (restricting visitors, using footbaths).
    - ✓ Proper disposal of dead fish.
    - ✓ Using clean water sources.
    - ✓ Avoiding overcrowding.
8. **Describe one example of how observing historical data from your fish health logs could help to prevent a future health problem in your fish stock.**
    - ✓ Identifies seasonal trends (e.g., outbreaks after rainfall).
    - ✓ Highlights recurring water quality issues.
    - ✓ Shows effectiveness of past treatments.
    - ✓ Helps predict and prevent common diseases before they become severe.
    - ✓ Guides to improvements in farm management.

Self-Reflection

1. Ask learners to re-take the self-assessment at the beginning of the unit. They should then fill in the table in their Trainee's Manual to Identify their areas of strength, areas for improvement and actions to take to improve.
2. Discuss trainees' results with them. Identify any areas that are giving many trainees difficulties and plan to give additional support as needed (ex. use class time before you begin the next learning outcome to go through commonly identified difficult concepts).

Points to Remember

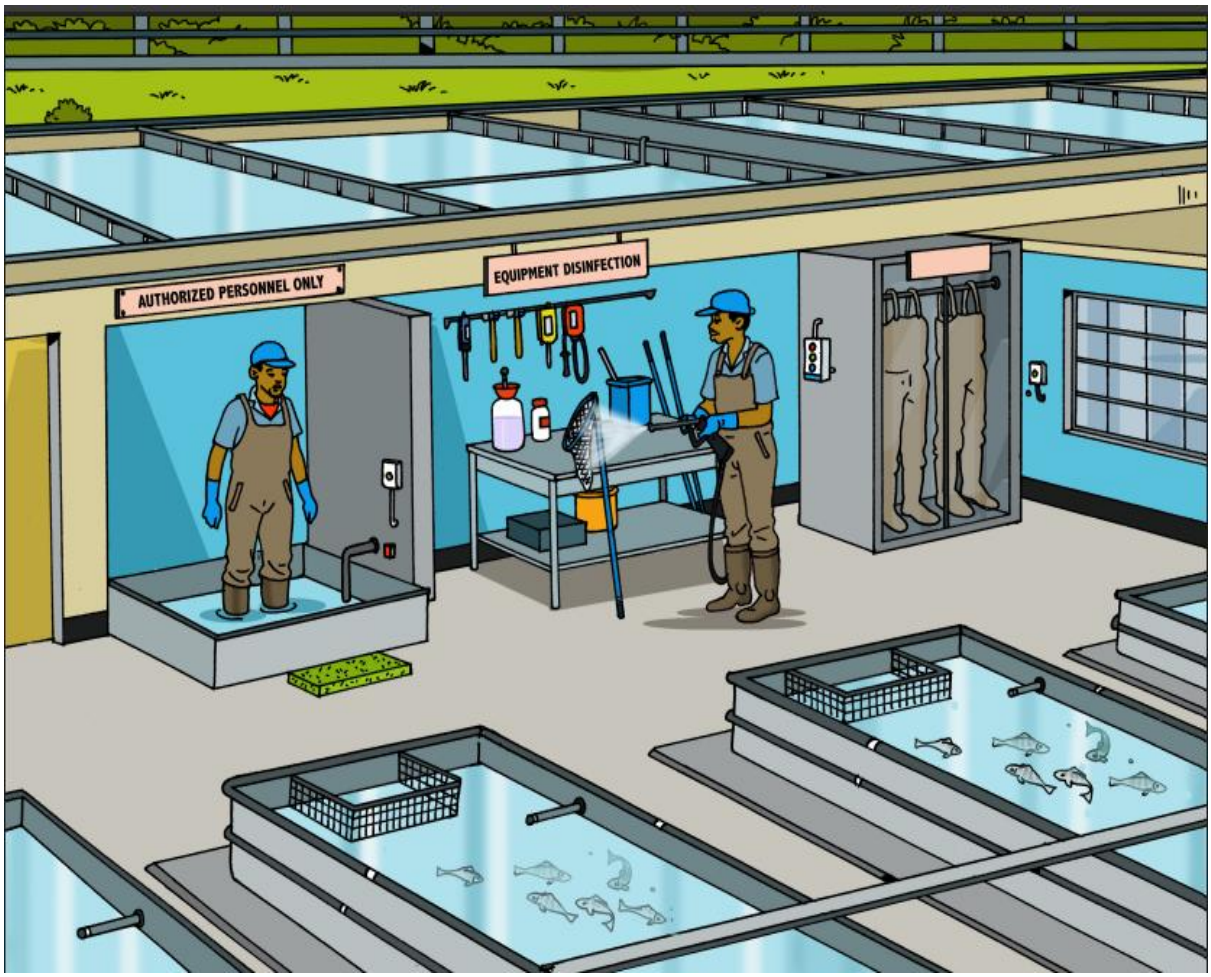
- **Maintain Good Water Quality:** Ensure optimal temperature, pH, dissolved oxygen, and cleanliness.
- **Provide Balanced and Clean Feed:** Feed fish appropriate, uncontaminated diets in correct amounts.
- **Observe Fish Behavior Daily:** Watch for abnormal swimming, feeding, or signs of stress. **Follow Regular Health Monitoring:** Conduct systematic checks to detect and respond to problems early.
- **Ensure Hygiene and Biosecurity:** Keep ponds, equipment, and personnel clean to prevent disease.
- **Prevent and Control Diseases:** Apply vaccinations, treatments, or management practices as needed.
- **Keep Accurate Records:** Document feeding, growth, health observations, and treatments.

Further Information for the Trainer

Make further research about tourism market, market needs, updated tourism information as well as tourism market trends.

1. Francis-Floyd, R. (n.d.). Introduction to fish health management. UF/IFAS Extension. University of Florida. Retrieved from EDIS IFAS.
2. Wright, G. M. (2023). Disease prevention and mitigation in US finfish aquaculture: A review of current approaches and new strategies. Reviews in Aquaculture
3. FAO. (n.d.). Management for freshwater fish culture (Section 15: Fish disease prevention and treatment). Food and Agriculture Organization of the United Nations.
4. Fish Vigyan. (n.d.). Hygiene practices for disease-free fish farms: A comprehensive guide
5. Fish Vigyan. (n.d.). Preventing disease outbreaks in aquaculture: A comprehensive guide to disease management.
6. Assefa, A., et al. (2018). Maintenance of fish health in aquaculture: Review of epidemiological approaches for prevention and control of infectious disease of fish. Veterinary Medicine International.
7. OIE. (2019). Aquatic Animal Health Code (21st ed.). World Organisation for Animal Health (OIE)

LEARNING OUTCOME 3: IMPLEMENT HYGIENE AND BIOSECURITY MEASURES



Learning outcome 3: Self-Assessment

1. Ask trainees to look at the unit illustration in their Trainee's Manuals and together discuss:
    a. What does the illustration show?
    b. What do you think will be topics to be covered under this unit based on the illustration?
2. After the discussion, inform students that this unit is intended to provide them with the knowledge, skills and attitudes to implement Hygiene and Biosecurity Measures. They will cover the skills required to apply hygienic measures, monitor access to fish farm and use of disinfectants and PPE and to implement disinfection and use of PPE
3. Ask trainees to fill out the self-assessment at the beginning of the unit in their Trainee's Manuals. Explain that:
    a. The purpose of the self-assessment is to become familiar with the topics in the unit and for them to see what they know or do not know at the beginning.
    b. There are no right or wrong ways to answer this assessment. It is for their own reference and self-reflection on the knowledge, skills and attitudes acquisition during the learning process.
    c. They should think about themselves: do they think they have the knowledge, skills or attitudes to do this? How well?
    d. They read the statements across the top and put a check in column that best represents their level of knowledge, skills or attitudes.
    e. At the end of the unit, they will do a self-reflection, which includes re-taking the self-assessment and identifying their strengths, areas of improvement and actions to be taken.

Key Competencies:

Knowledge	Skills	Attitudes
1. Knowledge of Biosecurity and hygienic measures activities	1. Apply biosecurity and hygienic measures	1. Pay attention when applying biosecurity and hygienic measures
2. Identify equipment, tools and materials used in applying biosecurity and hygienic measures	2. Use biosecurity and hygienic measures equipment, tools and materials	2. Be focused when using tools and materials used in applying biosecurity and hygienic measures
3. Understand the key consideration in monitoring access to fish farm	3. Monitor access to fish farm	3. Being vigilant and responsibility
4. Identify disinfectants and PPE	4. Use disinfection and of PPE	4. Be attentive while using PPE and disinfectants
5. Identify essential biosecurity measures	5. Monitor the adherence of staff and visitors	5. Being vigilant when using foot bath

Steps:

Discovery activity

Task 24

1. Using an appropriate methodology such as pair-share, large group discussion and presentation, the objective is to foster engagement and knowledge exchange among students.
2. Take students through the following steps:
   a) Firstly, organize trainees into pairs or small groups and guide them through a structured discussion about questions on **task 24** in trainee's manual. Ensure active participation and understanding of instructions.
   b) Secondly, bring the trainees back together as a large group for presentations. Each pair or group should summarize their discussions, sharing insights and learnings with the class. Encourage all trainees to contribute their own experiences and reflections.
   c) Conclude the activity with feedback and reflection. Emphasize that the purpose was not to find right answers but to provide a look into trainees' scheduling of laundry roaster.
3. Introduce Topic 3.1**:** Application of hygienic measures

Topic 3.1: Application of hygienic measures

Objectives:

By the end of the topic, trainees will be able to:

a. Explain properly the essential biosecurity measures in a Fish Farm
b. Identify correctly the key hygienic measure in a fish farm
c. Apply properly hygiene and disinfection in fish the farm

Time Required: 10 hours.

Learning Methodology:

Case studies, group discussions, field visit, visual aids, problem solving exercises, demonstration, practical work, brainstorming, group work, presentation, think-pair-square-share, pair work, individual work, observation, role-play, field visit

Materials, Tools and Equipment Needed:

Aerators, filtration systems, isolation tanks, nets, disinfectant, antibiotics, antifungals, anti-parasites, probiotics, salt, feeds, supplements, cotton swabs, gloves, masks, aprons, thermometer, syringes, sprayers, water quality kits and meters, weighing scale

Preparation:

- ❑ Read and understand the scenario before giving it to the students
- ❑ Gather in advance tools, materials, and equipment needed to deliver the session.
- ❑ Arrange a conducive learning environment

Cross Cutting Issues:

- ✓ **Gender balance:** Mix girls and boys to promote cross-gender interaction. Encourage both genders to take on roles of leadership.
- ✓ **Inclusive education:** Ensure inclusivity while allocating tasks to students and provide facilities/environment that enable/allows participation of all

Prerequisites:

- Establish Fish Farming facilities
- Manage water quality
- Feed fish

- Monitor fish stocking and growth activities

Activity 1: Problem-Solving

Task 25

1. Using various methodologies like pair-share, or small group discussions, Instruct the trainees to join their respective groups and read the following scenario**: "**Hope Springs Fish Farm, located in your rural area, operates several earthen ponds for Tilapia and a small concrete tank system for juvenile Catfish with multiple production units (ponds and tanks). The farm has been running for 5 years and generally has a good reputation. Recently, one of the ponds has experienced a disease outbreak, and there is concern that it may spread to other units. As a trainee, you are assigned to develop and apply hygiene and biosecurity solutions to stop the spread and prevent future outbreaks".
2. Tell them to discuss and answer the following questions:
    1) Differentiate hygiene and biosecurity.
    2) Propose at least 5 actions you will implement immediately to stop the spread and prevent future outbreaks

✓ Allow 5 minutes for discussion.
✓ Move around the classroom to check progress and provide clarification if any.
✓ Nominate or tell the group to nominate one speaker to share the findings of the group
✓ Give 2-3 minutes per group

3. After presentations of all groups, thank them and then provide the correct responses

Answers of the questions

1) Biosecurity focuses on preventing disease agents from entering the farm (external biosecurity) and controlling their spread once inside (internal biosecurity). It's about risk management at a farm-wide level while Hygiene refers to practices and conditions that promote health and prevent disease through cleanliness. It's the practical application of cleanliness protocols at all levels of operation. Hygiene is a critical component of biosecurity.
2) **Actions you will implement immediately to stop the spread and prevent future outbreaks**
    - ✓ Apply essential biosecurity measures in a fish farm

- ✓ Apply quarantine protocols for new stock
- ✓ Manage water sources
- ✓ Manage fish health
- ✓ Apply hygienic measures
- ✓ Use biosecurity and hygiene checklist log

4. Wrap up by Highlighting key points related to the scenario:
    - Identification of common fish predators
    - Predation methods
    - Tool and material to be used while identifying common fish predators

5. After the sharing session, let trainees to the **Key facts 3.1** for further enhancement and answer any questions they have.

Activity 2: Guided Practice

Task 26

1. Using an appropriate methodology such as individual work, pair-share, small group work, guide trainees to carry out the activities provided under **task 26** in their Trainee's Manuals. Make sure instructions are understood, all the trainees are actively participating, and necessary materials/tools are provided and being used.
2. During the task, trainees should be given a degree of independence to apply the knowledge and skills acquired in activity. Attend to each group, individual and provide support where necessary. Your role is to guide them by using probing questions such as Why? What? How? to enable them to come to informed responses.
3. While trainees are still performing the task, use this opportunity to discuss or address cross-cutting issues that may arise such as gender, inclusivity, financial education among others, even during group formation. Also attitudes and behavior changes should be handled during this activity.
4. Using an appropriate methodology such as question and answer in a large group, pair presentations or small group presentations, guide trainees to share their

answers to the class. Write their responses for reference. Encourage all trainees to give their views.

5. After the sharing session, refer trainees to apply hygienic measures and discuss them together while harmonizing their responses provided in the sharing session and answer any questions they have.
6. Use the observation/performance checklist below while applying hygienic measures in the fish farm

Indicator (Elements to be checked)	Observation		Marks allocation
	Yes	No	
✓ Feeding trays are cleaned			
✓ Feeding trays are disinfected			
✓ Nets and tools are cleaned			
✓ Nets and tools are disinfected			
✓ Debris from the ponds are removed			
✓ Proper disposal of waste is insured			
✓ Overall farm cleanliness is maintained			
✓ Nets/tools before & after use are disinfected			
✓ Footbaths at entry points are verified			
✓ PPE are used			
✓ Sick/injured fish are isolated			
✓ Dead fish are removed & disposed			

Activity 3: Application

Task 27

1. Using an appropriate methodology such as individual work, pairs, or small groups, trainees will read the statement provided on **task 27** in the trainees' manual and perform the task stipulating to clean and disinfect nets, trays, and other equipment,

remove debris and leftover feed from ponds, properly dispose of waste and dead fish, ensure the surrounding farm area is clean and free of contamination. Inspect the ponds and surrounding area to identify possible fish predators that may be attacking our stock. Ensure that all instructions are clear and understood by the trainees and encourage active participation among all students. This activity requires students to work independently with limited support from the trainer.

2. Provide necessary materials for the task to be completed effectively.
3. Let the trainees Identify suitable workplaces for them or identify workplaces for them, which may include:
   - ✓ Locations within the school compound
   - ✓ Local farms
4. Encourage trainees to actively observe technicians as they perform their tasks.
5. Allow trainees to participate in hands-on activities whenever possible to gain practical experience.
6. Encourage trainees to ask as many questions as possible regarding:
   - ✓ The tasks being performed
   - ✓ Tools and equipment in use
   - ✓ Best practices and safety measures
7. After the visit, have each trainee write a report that includes:
   - ✓ An overview of the workplace
   - ✓ Key observations and experiences
   - ✓ Answers to questions raised during the visit
8. Organize a session for trainees to present their reports to the class.
9. Facilitate discussion to encourage sharing of insights and foster collaborative learning.

Topic 3.2: Monitoring of access to fish farms and use of disinfectants and PPE

Objectives:

By the end of the topic, trainees will be able to:

a. Monitor properly the access to the fish farm

b. Use properly disinfectants in the fish farm

c. Use properly the PPE in the fish farm

Time Required: 10 hours.

Learning Methodology:

Case studies, group discussions, field visit, visual aids, problem solving exercises, demonstration, practical work, brainstorming, group work, presentation, think-pair-square-share, pair work, individual work, observation, role-play, field visit

Materials, Tools and Equipment Needed:

Aerators, filtration systems, isolation tanks, nets, disinfectant, antibiotics, antifungals, anti-parasites, probiotics, salt, feeds, supplements, cotton swabs, gloves, masks, aprons, thermometer, syringes, sprayers, water quality kits and meters, weighing scale, foot bath

Preparation:

- ❑ Read and understand the scenario before giving it to the students
- ❑ Gather in advance tools, materials, and equipment needed to deliver the session.
- ❑ Arrange a conducive learning environment

Cross Cutting Issues:

✓ **Gender balance:** Mix girls and boys to promote cross-gender interaction. Encourage both genders to take on roles of leadership.

✓ **Inclusive education:** Ensure inclusivity while allocating tasks to students and provide facilities/environment that enable/allows participation of all

Prerequisites:

- Establish Fish Farming facilities
- Manage water quality
- Feed fish
- Monitor fish stocking and growth activities

Activity 1: Problem-Solving

Task 28

1. Using various methodologies like pair-share, or small group discussions, Instruct the trainees to join their respective groups and read the following **scenario (Monitoring of access to fish farms and use of disinfectants and PPE) "**MUKANKURANGA is a fish farmer who has a medium-sized enterprise located in Huye District of Tilapia and catfish production in ponds and a small RAS (recirculating aquaculture system) for fingerlings. The farm employs 5 full-time staff and occasionally hires casual laborers from the nearby village for harvesting or pond maintenance. Recently, the farm has been struggling with disease outbreaks. As a technician in fish farming, you are hired to perform monitoring of access to fish farms and use of disinfectants and PPE".

2. **Tell them to discuss and answer the following questions:**
    1) How to monitor access to fish farms?
    2) What are application areas of disinfectants in fish farms?
    3) Give types of PPE in fish farming.

✓ Allow 5 minutes for discussion.
✓ Move around the classroom to check progress and provide clarification if any.

- ✓ Nominate or tell the group to nominate one speaker to share the findings of the group
- ✓ Give 2-3 minutes per group

3. After presentations of all groups, thank them and then provide the correct responses

<u>Answers of the questions</u>

1) How to monitor access to fish farms?

- ✓ Keep a **visitor logbook** (record names, time, purpose of visit).
- ✓ Install **gates/fences** to limit unauthorized entry.
- ✓ Use **signboards** with rules on hygiene and access restrictions.
- ✓ Require all visitors and workers to **disinfect footwear** (footbaths) before entering.
- ✓ Provide **protective clothing** (PPE) for staff and visitors.
- ✓ Restrict entry to **essential personnel only** in sensitive areas (hatchery, broodstock tanks).
- ✓ Use **CCTV cameras or security staff** for larger farms.

2) Application areas of disinfectants in fish farms

- ✓ Water systems: disinfect incoming water to reduce pathogens.
- ✓ Tanks, ponds, and raceways: cleaning before stocking new fish.
- ✓ Nets, cages, and equipment: regular disinfection to prevent disease spread.
- ✓ Hatcheries: disinfect eggs, trays, and tools.
- ✓ Surfaces and working areas: cleaning floors, worktables, and storage areas.
- ✓ Footbaths and handwashing stations: for staff and visitors.
- ✓ Vehicles and containers: used for transporting fish or feed.

3) Types of PPE (Personal Protective Equipment) in fish farming

- ✓ Protective clothing: overalls, waterproof aprons, lab coats.
- ✓ Gloves: rubber or disposable gloves for handling fish, chemicals, or diseased stock.
- ✓ Boots: waterproof boots for working in wet environments.
- ✓ Face masks: when handling chemicals or powdered feeds.
- ✓ Goggles: for protection when using disinfectants or during processing.
- ✓ Headgear/caps: to maintain hygiene in hatcheries or processing areas.
- ✓ Ear protection: in areas with noisy machinery (aerators, pumps).

4. Wrap up by Highlighting key points related to the scenario:

- Monitoring of fish farm
- Perform disinfection
- Use PPE

5. After the sharing session, let trainees to the **Key facts 3.1** provided in the sharing session and answer any questions they have.

Activity 2: Guided Practice

Task: 29

1. Using an appropriate methodology such as individual work, pair-share, small group work, guide trainees to carry out the activities provided under **task 26** in their Trainee's Manuals. Make sure instructions are understood, all the trainees are actively participating, and necessary materials/tools are provided and being used.
2. During the task, trainees should be given a degree of independence to apply the knowledge and skills acquired in activity. Attend to each group, individual and provide support where necessary. Your role is to guide them by using probing questions such as Why? What? How? to enable them to come to informed responses.
3. While trainees are still performing the task, use this opportunity to discuss or address cross-cutting issues that may arise such as gender, inclusivity, financial education among others, even during group formation. Also attitudes and behavior changes should be handled during this activity.
4. Using an appropriate methodology such as question and answer in a large group, pair presentations or small group presentations, guide trainees to share their answers to the class. Write their responses for reference. Encourage all trainees to give their views.
5. After the sharing session, refer trainees to measures against fish predators and discuss them together while harmonizing the responses provided in the sharing session and answer any questions they have.
6. Use the observation/performance checklist below while assessing identification of any possible predators that could attack the fish stock, monitoring of their access to fish farms and use of disinfectants and PPE

Indicator (Elements to be checked)	Observation		Marks allocation
	Yes	No	

✓ Farm Perimeter is verified			
✓ Single Entry/Exit Point is verified			
✓ Visitor Log is controlled			
✓ Limited Access is verified			
✓ Staff ID/Badges are verified			
✓ Staff Training are checked			
✓ Dedicated Parking Is verified			
✓ Disinfection is verified			
✓ Controlled Movement is verified			
✓ Access and biosecurity monitoring log is filled			
✓ PPE is well used and managed			

Activity 3: Application

Task: 30

1. Using an appropriate methodology such as individual work, pairs, or small groups, trainees will read the statement provided on **task 30** in the trainees' manual and perform the task stipulating to clean and disinfect nets, trays, and other equipment, remove debris and leftover feed from ponds, properly dispose of waste and dead fish, ensure the surrounding farm area is clean and free of contamination.
2. inspect the ponds and surrounding area to identify possible fish predators that may be attacking our stock. Ensure that all instructions are clear and understood by the trainees and encourage active participation among all students. This activity requires students to work independently with limited support from the trainer.
3. Provide necessary materials for the task to be completed effectively.
4. Let the trainees Identify suitable workplaces for them or identify workplaces for them, which may include:
   - ✓ Locations within the school compound

- ✓ Local farms

5. Encourage trainees to actively observe technicians as they perform their tasks.
6. Allow trainees to participate in hands-on activities whenever possible to gain practical experience.
7. Encourage trainees to ask as many questions as possible regarding:
   - ✓ The tasks being performed
   - ✓ Tools and equipment in use
   - ✓ Best practices and safety measures
8. After the visit, have each trainee write a report that includes:
   - ✓ An overview of the workplace
   - ✓ Key observations and experiences
   - ✓ Answers to questions raised during the visit
9. Organize a session for trainees to present their reports to the class.
10. Facilitate discussion to encourage sharing of insights and foster collaborative learning.

Topic 3.3: Implementation of disinfection and use of PPE

Objectives:

By the end of the topic, trainees will be able to:

a. Identify properly the types of PPE in fish farm
b. Use correctly the PPE in the fish farm
c. Implement correctly disinfection in the fish farm
d. Apply properly disinfection methods and areas in the fish farm

Time Required: 10 hours.

Learning Methodology:

Case studies, group discussions, field visit, visual aids, problem solving exercises, demonstration, practical work, brainstorming, group work, presentation, think-pair-square-share, pair work, individual work, observation, role-play, field visit

Materials, Tools and Equipment Needed:

Aerators, filtration systems, isolation tanks, nets, disinfectant, antibiotics, antifungals, anti-parasites, probiotics, salt, feeds, supplements, cotton swabs, gloves, masks, aprons, thermometer, syringes, sprayers, water quality kits and meters, weighing scale, foot bath

Preparation:

- ❑ Read and understand the scenario before giving it to the students
- ❑ Gather in advance tools, materials, and equipment needed to deliver the session.
- ❑ Arrange a conducive learning environment

Cross Cutting Issues:

- ✓ **Gender balance:** Mix girls and boys to promote cross-gender interaction. Encourage both genders to take on roles of leadership.
- ✓ **Inclusive education:** Ensure inclusivity while allocating tasks to students and provide facilities/environment that enable/allows participation of all

Prerequisites:

- ▸ Establish Fish Farming facilities
- ▸ Manage water quality
- ▸ Feed fish
- ▸ Monitor fish stocking and growth activities

Activity 1: Problem-Solving

Task 31

1. Using various methodologies like pair-share, or small group discussions, Instruct the trainees to join their respective groups and read the following scenario**: "**You are hired to give technical support to the fish farm owned by Mr. NKESHIMANA. One morning, the man powers of the farmer reported to the owner that several fish have shown the following unusual behavior. One fish was floating sideways but still alive, another has injuries, third fish had cloudy eyes and refused to eat. A dead fish is also found near the inlet".

2. **Tell them to discuss and answer the following questions:**
    1) What are steps of implementation of disinfection protocols?
    2) Give types of Personal Protective Equipment (PPE).
    3) What are PPE Management and Protocols?
    4) What to evaluate during evaluation of disinfection and PPE usage?

✓ Allow 5 minutes for discussion.

✓ Move around the classroom to check progress and provide clarification if any.

✓ Nominate or tell the group to nominate one speaker to share the findings of the group

✓ Give 2-3 minutes per group

3. After presentations of all groups, thank them and then provide the correct responses

Answers of the questions

1. **Steps of Implementation of Disinfection Protocols in Fish Farms**
    - Assessment & Planning: identify risk areas (ponds, tanks, equipment, vehicles).
    - Selection of disinfectants: choose suitable, effective, and safe chemicals (e.g., chlorine, iodine, quaternary ammonium).
    - Preparation of disinfectant solution: mix correct concentration following manufacturer's guidelines.
    - Cleaning before disinfection: remove dirt, organic matter, and debris (disinfection only works on clean surfaces).

- Application of disinfectants: apply to tanks, nets, equipment, surfaces, footbaths, and vehicles.
- Contact time: allow disinfectant to act for recommended duration.
- Rinsing/drying: rinse (if required) to avoid chemical residues harmful to fish.
- Record keeping log date, area disinfected, disinfectant used, and staff responsible.
- Monitoring & review: evaluate effectiveness and adjust protocols if needed.

2. **Types of Personal Protective Equipment (PPE) in Fish Farms**
    - Protective clothing: overalls, aprons, waterproof coats.
    - Gloves: rubber or disposable gloves.
    - Boots: waterproof, slip resistant.
    - Face masks/respirators: when handling chemicals or dusty feed.
    - Goggles/face shields: protection from splashes during chemical use.
    - Headgear/caps: especially in hatcheries and processing units.
    - Ear protection: around loud aerators or pumps.
3. **PPE Management and Protocols in Fish Farms**
    - Provision of adequate PPE: ensure availability for all workers.
    - Proper use training: educate staff on when and how to use PPE.
    - Maintenance: regular cleaning, inspection, and replacement of worn-out PPE.
    - Storage: keep PPE in a clean, dry, and designated area.
    - Access control: require PPE before entering sensitive areas (hatchery, broodstock tanks).
    - Disposal: safe disposal of single-use PPE to avoid contamination.
    - Compliance monitoring: supervisors check that workers wear PPE correctly.
4. **What to Evaluate During Evaluation of Disinfection and PPE Usage in Fish Farms**
    - Disinfection evaluation:
        - ✓ Correct disinfectant type and concentration used.
        - ✓ Proper cleaning before application.
        - ✓ Coverage of all critical areas (ponds, tanks, nets, vehicles, surfaces).
        - ✓ Adequate contact time.
        - ✓ Record-keeping accuracy.
    - **PPE evaluation:**
        - ✓ Availability and accessibility of PPE.
        - ✓ Correct use by all workers and visitors.
        - ✓ Condition of PPE (clean, not damaged).
        - ✓ Proper cleaning, storage, and disposal practices.
        - ✓ Worker compliance with PPE protocols.

4. Wrap up by Highlighting key points related to the scenario:
    - Implementation of disinfection and use of PPE

- Evaluation of Disinfection Implementation
- Improvement Strategies for Disinfection Implementation
- Evaluation of PPE Implementation
- Improvement Strategies for PPE Implementation

5. After the sharing session, let trainees to Key **facts 3.3** for further enhancement and answer any questions they have.

Activity 2: Guided Practice

Task: 32

1. Using an appropriate methodology such as individual work, pair-share, small group work, guide trainees to carry out the activities provided under **task 32** in their Trainee's Manuals. Make sure instructions are understood, all the trainees are actively participating, and necessary materials/tools are provided and being used.
2. During the task, trainees should be given a degree of independence to apply the knowledge and skills acquired in activity. Attend to each group, individual and provide support where necessary. Your role is to guide them by using probing questions such as Why? What? How? to enable them to come to informed responses.
3. While trainees are still performing the task, use this opportunity to discuss or address cross-cutting issues that may arise such as gender, inclusivity, financial education among others, even during group formation. Also attitudes and behavior changes should be handled during this activity.
4. Using an appropriate methodology such as question and answer in a large group, pair presentations or small group presentations, guide trainees to share their answers to the class. Write their responses for reference. Encourage all trainees to give their views.
5. After the sharing session, refer trainees to measures against fish predators and discuss them together while harmonizing their responses provided in the sharing session and answer any questions they have.
6. Use the observation/performance checklist below while Implementing disinfection and use of PPE in fish farm.

Indicator (Elements to be checked)	Observation		Marks allocation
	Yes	No	
✓ Disinfectants are selected			
✓ Disinfectant Solutions are prepared			
✓ Hand sanitization is done			
✓ Set up a footbath with disinfectant is done			
✓ Tools are cleaned			
✓ PPE (boots, gloves, and protective coats) are used while working near the ponds.			

Activity 3: Application

Task: 33

1. Using an appropriate methodology such as individual work, pairs, or small groups, trainees will read the statement provided on **task 33** in the trainees' manual and perform the task stipulating to prepare disinfectant footbaths at entry points, clean equipment before use, and ensure all workers wear boots, gloves, and protective clothing to prevent the spread of diseases.
2. Provide necessary materials for the task to be completed effectively.
3. Let the trainees Identify suitable workplaces for them or identify workplaces for them, which may include:
    - ✓ Locations within the school compound
    - ✓ Local farms
4. Encourage trainees to actively observe technicians as they perform their tasks.
5. Allow trainees to participate in hands-on activities whenever possible to gain practical experience.

6. Encourage trainees to ask as many questions as possible regarding:

    - ✓ The tasks being performed
    - ✓ Tools and equipment in use
    - ✓ Best practices and safety measures

7. After the visit, have each trainee write a report that includes:

    - ✓ An overview of the workplace
    - ✓ Key observations and experiences
    - ✓ Answers to questions raised during the visit

8. Organize a session for trainees to present their reports to the class.
9. Facilitate discussion to encourage sharing of insights and foster collaborative learning.

Formative Assessment

I. Multiple choice questions: Choose the letter corresponding to the correct answer.

1. Why is it important to disinfect tools and boots before entering a fish farm?

a) To clean them from dirt

b) To protect workers from injuries

c) **To prevent the spread of diseases**

d) To make the fish farm look neat

2. Which of the following PPE items is MOST important when handling chemicals for disinfection?

a) Sunglasses

b) **Gloves**

c) Raincoat

d) Headlamp

II. Provide your answer to the following questions:

3. How can you choose the right disinfectant?

Select based on effectiveness against target pathogens, safety for fish, ease of application, environmental impact, and manufacturer's recommendations.

4. What are application methods/areas of disinfectants?

- ✓ Areas: ponds, tanks, nets, hatcheries, equipment, vehicles, surfaces, footbaths.
- ✓ Methods: spraying, dipping, soaking, fogging, or adding to water.

5. Differentiate hygiene and biosecurity.

- ✓ Hygiene = daily practices to maintain cleanliness (washing, disinfecting tools, PPE use).
- ✓ Biosecurity = wider strategy to prevent disease introduction and spread (access control, quarantine, record-keeping, hygiene as part).

6. Propose at least 5 actions you will implement immediately to stop the spread and prevent future outbreaks.

- ✓ Disinfect equipment and footwear.
- ✓ Restrict access to essential personnel.
- ✓ Isolate and remove diseased fish.
- ✓ Use proper PPE.
- ✓ Improve water quality and change water regularly.

- ✓ Keep detailed health and treatment records.

7. What disinfectants are commonly used in aquaculture, and how are they applied safely?

- ✓ Chlorine, iodine, formalin, quaternary ammonium compounds, lime.
- ✓ Safe use: follow dosage, avoid direct contact with fish (unless approved), wear PPE, rinse equipment after treatment, store chemicals securely.

8. What are steps of implementation of disinfection protocols?

- ✓ Assessment and planning
- ✓ choose disinfectant
- ✓ prepare correct solution
- ✓ clean surfaces
- ✓ apply disinfectant
- ✓ allow contact time
- ✓ rinse/dry if needed
- ✓ record keeping
- ✓ monitoring.

9. Give types of Personal Protective Equipment (PPE).

Overalls, gloves, boots, face masks/respirators, goggles, headgear, ear protection.

10. What are the main hygienic measures applied in a fish farm?

- ✓ Regular cleaning/disinfection of tanks and equipment.
- ✓ Hand and footwear disinfection.
- ✓ Safe handling of dead/diseased fish.
- ✓ Proper feed and water management.
- ✓ Waste disposal and sanitation.

11. Why is it important to monitor access to fish farms?

To prevent introduction of diseases, ensure biosecurity, and track who enters sensitive areas.

12.What is the role of disinfectants in fish farm biosecurity?

Kill or reduce pathogens on equipment, water, and surfaces → breaking the disease transmission cycle.

13. Which PPE should be used when entering a fish farm?

Clean boots, gloves, protective clothing (overall/apron), face mask if required, and headgear in hatcheries.

Self-Reflection

1. Ask learners to re-take the self-assessment at the beginning of the unit. They should then fill in the table in their Trainee's Manual to Identify their areas of strength, areas for improvement and actions to take to improve.
2. Discuss trainees' results with them. Identify any areas that are giving many trainees difficulties and plan to give additional support as needed (ex. use class time before you begin the next learning outcome to go through commonly identified difficult concepts).

Points to Remember

- Always disinfect before and after entering critical areas. Disinfection isn't one-time, it's a daily habit.
- PPE must be clean, intact, and correctly used. Adjust PPE and disinfection practices after any outbreak or audit
- Monitoring and recordkeeping are essential for accountability and disease prevention.
- Review of biosecurity protocols monthly
- By rigorously evaluating these two pillars (disinfection and PPE) and proactively implementing improvements, a fish farm can significantly strengthen its biosecurity posture, reduce disease risks, and ensure a safer working environment.

Further Information for the Trainer

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Integrated/Summative assessment

Integrated situation

KWIHAZA COOPERATIVE is a fish farm located in NYANZA District which has recently experienced an outbreak of a common fish disease, along with increased predator activity threatening the stock. The farm manager has reported increased mortality rates among fish, particularly due to a disease outbreak. Simultaneously, local herons and raccoons have been spotted near the ponds, putting the fish at risk. Fish are showing signs of distress, and some have visible **skin lesions**. Additionally, reports suggest that an unknown predator has been attacking fish at night. The cooperative manager calls you as a technician in fish farming to develop and implement strategies to prevent further disease spread and manage predators effectively. You are requested to perform the following tasks in 3hours:

1. Identify the disease affecting the fish
2. Assess water quality to identify environmental stressors
3. Create biosecurity measures to prevent disease spread
4. Develop a plan to reduce predator impact on the fish population

All materials, tools and equipment are available

Resources

Tools	Thermometer, Salinity meter, Check list and temperate, Signage, Cameras, Recording software/form, Reference guides, Hammer, Stakes
Equipment	Microscope, Water testing kits, Fish health assessment kits, Netting or fencing materials, Scare devices

Materials/ Consumables	Alcohol or disinfectant, PPE, Sample bottles, Calibration solutions, Cleaning supplies, Footbaths, Baits, Traps, Zip ties

1.1 Common predators that threaten fish stocks, including birds, mammals, and other fish, are identified to prevent the attacks..	**Assessment indicator 1:** Identification of fish predators is done			4
1.2.Effective measures against predators, such as physical barriers, traps, and deterrents, are established to maintain fish stocks.	**Assessment indicator 1:** Establishment of physical barriers is done			4
	Assessment indicator 2: Establishment of traps is done			4
1.3 Implemented measures are monitored regularly to assess their effectiveness and make necessary adjustments.	**Assessment indicator 1:** Monitoring of implemented measures is done			4
2.1 Hygiene measures are applied in fish farming operations to prevent disease transmission, including regular cleaning of equipment and facilities.	**Assessment indicator 1:** Applying access control is done			3
	Assessment indicator 2: Applying sanitation protocols is done			3
	Assessment indicator 3:			3

	Applying quarantine procedures is done			
	Assessment indicator 4: Applying water management is done			3
	Assessment indicator 5: Applying health monitoring is done			3
	Assessment indicator 6: Applying waste management is done			3
	Assessment indicator 7: Applying predator control is done			3
	Assessment indicator 8: Disinfectants are used			3
2.2. Access to fish farms is controlled and use of disinfectants and PPE is implemented to prevent cross- contamination.	**Assessment indicator 1:** Visitor policies are established			3
	Assessment indicator 2: Pre- visit communication is done			3
	Assessment indicator 3: Designed entrances is placed			3
	Assessment indicator 4: Visitor passes are placed			3

	Assessment indicator 5: Patrols is done			3
	Assessment indicator 6: Cleaning protocols is established			3
	Assessment indicator 7: Footbath is placed			3
	Assessment indicator 8: Disinfectants approved to use in aquaculture are available			3
	Assessment indicator 9: Equipment cleaning stations are placed			3
2.3 The adherence of staff and visitors to biosecurity protocols is monitored to ensure compliance and safety throughout the operation.	**Assessment indicator 10:** Monitoring of Routine checks is done			3
	Assessment indicator 11: Monitoring of Visitor logs is done			3
	Assessment indicator 12: Monitoring of Signage and reminders are is done			3
3.1 Sick and injured fish are identified for further evaluation to prevent the spread of diseases within the population.	**Assessment indicator 1:** Selection of sick fish is done			3
	Assessment indicator 2:			3

	Selection of injured fish is done			
3.2 Sick and injured fish are isolated in designated areas to prevent cross-contamination with healthy fish.	**Assessment indicator 1:** Isolation of sick fish is done			3
	Assessment indicator 2: Isolation of injured fish is done			3
3.3 First aid is provided to sick or injured fish using appropriate techniques and treatments to promote recovery.	**Assessment indicator 1:** Provision of first aid to sick or injured fish is done			3
	Assessment indicator 2: Appropriate techniques to provide first aid to sick or injured fish are used			3
3.4 The health status of fish stocks is regularly monitored, and any findings are documented for future reference.	**Assessment indicator 1:** Monitoring health status of fish stock is done			3
	Assessment indicator 2: Record keeping of health status of fish stock is done			3
Total marks		……/100		
Percentage Weightage		100%		
Minimum Passing line % (Aggregate): 70%				

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August, 2025