Food and Agriculture Organization of the United Nations

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Centre for Environment Fisheries & Aquaculture Science

World Class Science for the Marine and Freshwater Environment

FAO Reference Centre for Bivalve Mollusc Sanitation

Joint Cefas - FAO Training Workshop on Risk Profiling and Sanitation of Bivalve Molluscs for Senegal

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Report of the Training Workshop on Risk Profiling and Sanitation of Bivalve Molluscs for Senegal

The FAO Reference Centre for Bivalve Mollusc Sanitation is funded by the United Kingdom Department of Food, Environment and Rural Affairs (Defra) and the United Kingdom Food Standards Agency.

Cefas Document Control

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Contents

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World Class Science for the Marine and Freshwater Environment

Foreword

This document summarises relevant information from a technical training event hosted by the FAO Regional Office for Africa in Somone, Senegal on 21st – 23rd February 2023. Cefas as the FAO Reference Centre for Bivalve Mollusc Sanitation provided trainers and training material for the event. This formed part of agreed support from the FAO Reference Centre for FAO project PG/STDF/672 [Strengthening the shellfish sector in Senegal by bringing it up to Sanitary and Phytosanitary (SPS) standards to promote the safety of shellfish and their access to regional and international markets.]

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Delegate List

Delegate	Affiliation
Salif Diouf	Mayor of Somone
Babacar Banda Diop	DITP (Direction des Industries de Transformation de la Pêche)
Mame Ibrahima Mbacke	DITP
Ibrahima Gaye	DPM (Direction des Pêches Maritimes)
Cheikhou Oumar Sow	DPM
Khadidiatou Diatta	DPM
Mamadou Mbacké Diop	DPM
Mariama Faye	ANA (Agence National de l'Aquaculture)
Moussa Diedhiou	ANA
Mika Ndiaye	DEEC (Direction de l'Environnement et des Etablissements Classés)
Hamidou Gaye	DEEC
Mbeugué Gaye Fall	DPC (Direction de la Pêche continentale)
Laye Diouf	IUPA (Institut Universitaire de Pêche et de l'Aquaculture)
Saliou Mbodji	AMP (Aire Marine Protégée) Somone
Ousmane Diamdis Diedhiou	AMP Somone
Cherif Hatab Diop	AMP Somone
Awa Keita	AMP Somone
Mariama Badji	Justice et Développement (NGO)
Yacine Kane Mbaye	Producer - Saint Louis
Racky Diop	Producer - Louga
Abdoulaye Diouf	Producer - Dakar
Khadim Tine	Producer - Somone
Ousmane Fall	Producer - Somone
Bintou Sonko	Producer - Joal Fadhiouth
Banna Diouf	Producer - Fatick
Seynabou Diatta	Producer - Fatick
Gnima Dieng	Producer - Fatick
Dieynabou Diop	Producer - Nioro
Marthe Sambou	Producer - Ziguinchor
Mariama Sonko	Producer - Ziguinchor

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Makhfousse Sarr	FAO in Senegal
Amy Collé Gaye	FAO in Senegal
Yacine Cisse	FAO in Senegal
Secondine Sagna	FAO in Senegal
Rachel Hartnell	FAO Reference Centre for Bivalve Mollusc Sanitation (Cefas)
Andrew Younger	FAO Reference Centre
Gregory Ngarachu	FAO Reference Centre
James Lowther	FAO Reference Centre
Louise Stockley	FAO Reference Centre
Michelle Price-Hayward	FAO Reference Centre

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World Class Science for the Marine and Freshwater Environment

FAO Reference Centre for Bivalve Mollusc Sanitation Training Workshop on Risk Profiling and Sanitation of Bivalve Molluscs for Senegal

Agenda

Dates: 21-23 February 2023

Venue: Royal Horizon Baobab Hotel, Bp 81, Somone, 23000, Senegal

Timings: Start time 21 February 10:00 – End time 23 February 17:00

Language: English/ French

Cefas Team: Michelle Price Hayward, Rachel Hartnell, Andrew Younger, Louise Stockley, James Lowther and Gregory Ngarachu.

Hands on training programme

Day 1 - 21st February 2023 (10:00 – 17:30)

1. Workshop official ceremony: opening address
    a. Project overall presentation
    b. Welcome remarks from Cefas delegation representative
    c. Welcome remarks from FAO representative
    d. Speech from the Director of DITP
    e. Speech from the Mayor of SOMONE

Coffee Break including TV interviews with Cefas/FAO/Government representatives (10:40 - 11: 10)

2. Relevant Codex, FAO and WHO instruments: overview of the Technical Guidance and background (Dr Blaise Ouattara)
3. Introduction to Cefas and the FAO Refence Centre for Bivalve Mollusc Sanitation
4. Overview of the shellfish sector in Senegal (Representative of ANA)
5. 2023 Senegal questionnaire – data summary
6. Aim of the workshop
7. Potential hazards associated with bivalve shellfish
8. Meeting photo

Lunch (13:00 - 14:30)

9. Growing Area Risk Profile
10. Practical Exercise 1 – Identifying potential hazards, assessing risks and control methods

Coffee Break (16:00-1615)

11. Feedback from the 5 groups
12. Depuration and other treatment types

CLOSE DAY ONE

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Day 2 - 22nd February 2023 (9:30 – 18:00)

13. Growing Area Assessment
14. Practical Exercise 2– Growing Area Assessment – First steps in undertaking a growing area assessment based on Somone lagoon

Coffee Break (11:30 - 11:45)

15. Feedback from the 5 groups
16. Planning a shoreline survey

Lunch (13:00 - 14:30)

17. Practical Exercise 3 – A shoreline survey in part of Somone lagoon

CLOSE DAY TWO

Day 3 - 23rd February 2023 (10:00 – 17:00)

18. Observations and questions from the shoreline survey including feedback from the 5 groups
19. Summary and findings from the shoreline survey, developing survey outputs and integration with additional information

Coffee Break (11:30-11:45)

20. Microbiological data – importance of sample transport, sample receipting, methods, and quality of results
21. Monitoring, classification and data interpretation

Lunch (13:00-14:30)

22. Practical Exercise 4 - Interpretation of classification data including feedback from the 5 groups and summary findings

Coffee Break (15:30-15:45)

23. Additional support from the FAO Reference Centre and access to training and resources
24. Meeting close

CLOSE DAY THREE

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Introduction

The workshop consisted of a mixture of introductory presentations from representatives of the FAO and relevant Senegalese government departments, technical presentations from the FAO Reference Centre, and four practical exercises. Presentations are available on the website of the FAO Reference Centre Presentations - Cefas (Centre for Environment, Fisheries and Aquaculture Science) while summaries of the four practical exercises are included in the following sections of this report.

Practical Exercise 1 – Identifying potential hazards, assessing risks and control methods

Delegates were each assigned into 5 colour-coded groups. Each group was provided with 10 hazard cards, 6 intervention cards, and a hazard scoring poster (Figure 1), and asked to study each of the 10 hazards included in the hazard cards, namely *Vibrio parahaemolyticus*, *V. vulnificus*, *V. cholerae*, *Salmonella enterica*, *Schistosoma* spp., norovirus, hepatitis A virus, heavy metals, Persistent Organic Pollutants and algal biotoxins, and to determine severity and likelihood scores for each hazard (in the absence of any interventions) based on the scoring system shown in Tables 1 and 2[1].

Table 1. Practical Exercise 1 severity scores

Severity
1. Negligible – zero or negligible negative impact on the ability to harvest, process or trade live animals or seafood products, or the health or survival of human consumers
2. Very low – minimal and transitory negative impact on the ability to harvest, process or trade live animals or seafood products, or the health or survival of human consumers
3. Low - Low but noticeable, short-lived negative impact on the ability to harvest, process or trade live animals or seafood products, or the health or survival of human consumers
4. Medium - Noticeable and moderately sustained negative impact on the ability to harvest, process or trade live animals or seafood products, or the health or survival of human consumers
5. High - Very significant and long term or persistent negative impact on the ability to harvest, process or trade live animals or seafood products, or the health or survival of human consumers
6. Very High - Catastrophic impact on the ability to harvest, process or trade live animals or seafood products, or the health or survival of human consumers

[1] This exercise was adapted from Stentiford, G.D., Peeler, E.J., Tyler, C.R. *et al.* A seafood risk tool for assessing and mitigating chemical and pathogen hazards in the aquaculture supply chain. *Nat Food* **3**, 169–178 (2022). https://doi.org/10.1038/s43016-022-00465-3

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Table 2. Practical exercise 1 likelihood scores

Likelihood
1. Negligible - No empirical evidence for occurrence of hazard resulting in harm
2. Very low - Isolated empirical cases of hazard occurrence resulting in harm
3. Low - Low numbers of spatially and temporally discrete empirical cases of hazard occurrence asserting harm
4. Medium - Numerous spatially and temporally separated empirical cases of hazard occurrence resulting in harm
5. High - Many spatially and temporally separated empirical cases of hazard occurrence resulting in harm
6. Very high - Extensive spatial and temporal empirical cases of hazard occurrence resulting in harm

Figure 1. Delegates undertaking practical exercise 1 in their groups

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By multiplying severity and likelihood scores each group determined an overall impact score for each hazard. The groups were then asked to consider which of six different interventions (shown in Figure 2) was most appropriate for dealing with the risk from each hazard, and furthermore, to reassess likelihood and impact scores in the presence of these interventions.

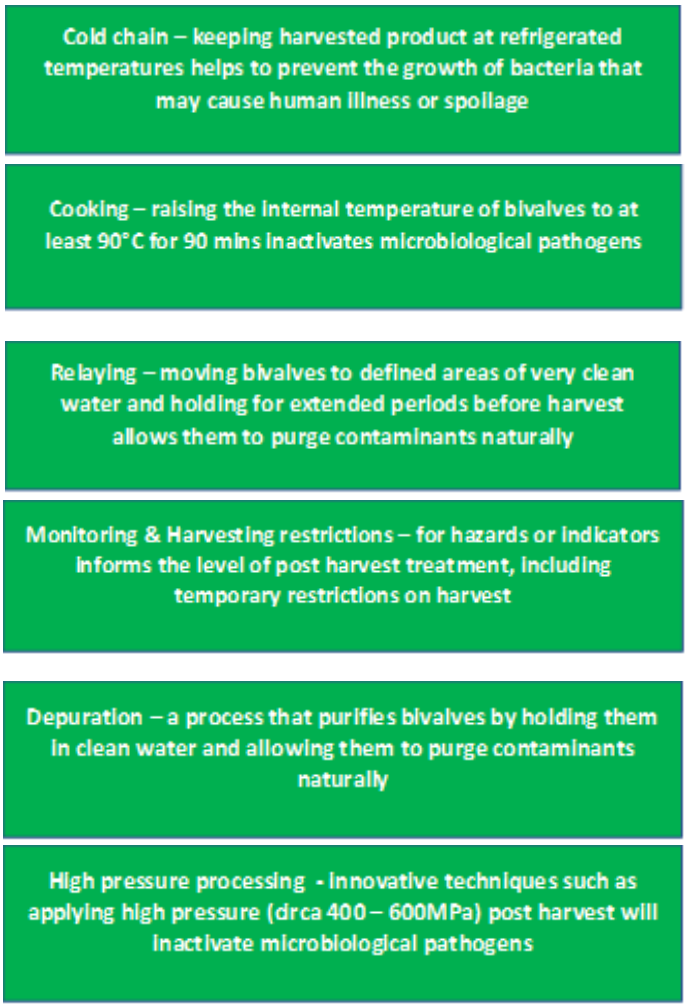

Figure 2. Practical exercise 1 – list of Interventions

Data from all the 5 groups were finally collated, averaged, and displayed in a summary session demonstrating the predicted difference between controlled and uncontrolled risks posed by the 10 hazards (Figure 3) and the relative predicted impact of those risks and their source before and after controls were applied (Figure 4). The objective of the exercise was to facilitate discussion amongst delegates and trainers on the potential human health risks caused by contamination of bivalve mollusc growing areas with naturally occurring or anthropogenically derived hazards. The exercise also enabled delegates to consider the types of interventions that would be appropriate to control the predicted risks.

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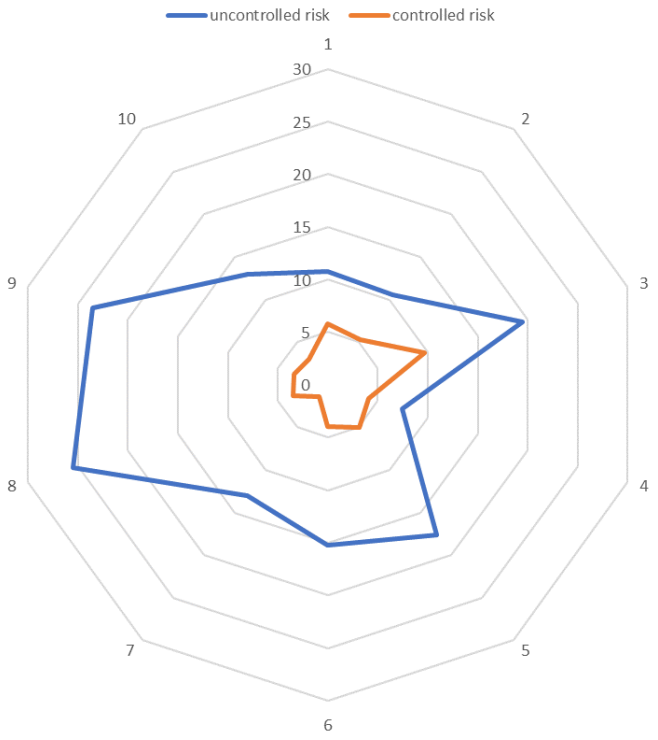

1. *Vibrio parahaemolyticus*, 2. *Vibrio vulnificus*, 3. *Vibrio cholerae*, 4. *Schistosoma* spp., 5. Algal biotoxins, 6. Norovirus, 7. Hepatitis A virus, 8. *Salmonella enterica*, 9. Heavy metals, 10. Persistent organic pollutants

Figure 3. Overall assessment by groups of impact (severity x likelihood) of hazards, Practical exercise 1 output radar chart. Each of the 10 spokes represents the impact scores determined by a group for a particular hazard (highest score = highest potential risk), both without (uncontrolled; blue line) and with intervention (controlled; orange line).

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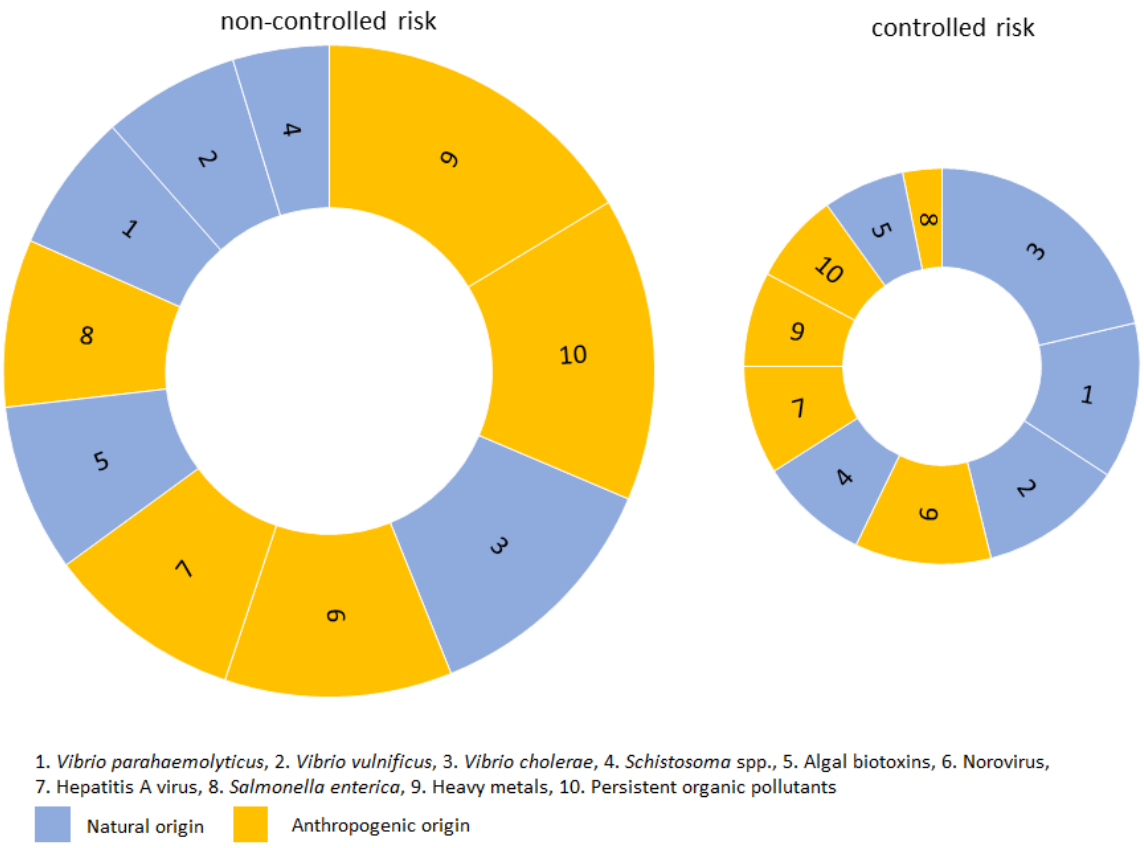

Figure 4. Relative predicted impact and source of each potential hazard determined by the groups, Practical exercise 1 output sunburst charts. These show the consolidated predicted impact scores determined by all groups for the 10 naturally occurring (blue) or anthropogenic hazards (orange), both without (uncontrolled risk) and with intervention (controlled risk).

<u>Learning outcome – exercise 1</u>

The learning outcome for this exercise was – delegates understand the source, impact, and likelihood of individual and cumulative hazards on bivalve production and can assess the predicted efficacy of available interventions

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Practical Exercise 2– Growing Area Assessment

After theoretical training on Growing Area Risk Profile (GARP) and Growing Area Assessment (GAA) processes (Figure 5), in practical exercise 2 the delegates were provided with a dossier of information relevant to the potential human health hazards and risks posed to oyster production in Somone lagoon. Working in their groups, they were asked to assess this information, plus any additional information they could find on the internet, and (using the Annex 2 Growing Area Assessment template from the FAO technical guidance[2]), identify sources of information which could be used to complete the GAA, as well as any information gaps that existed.

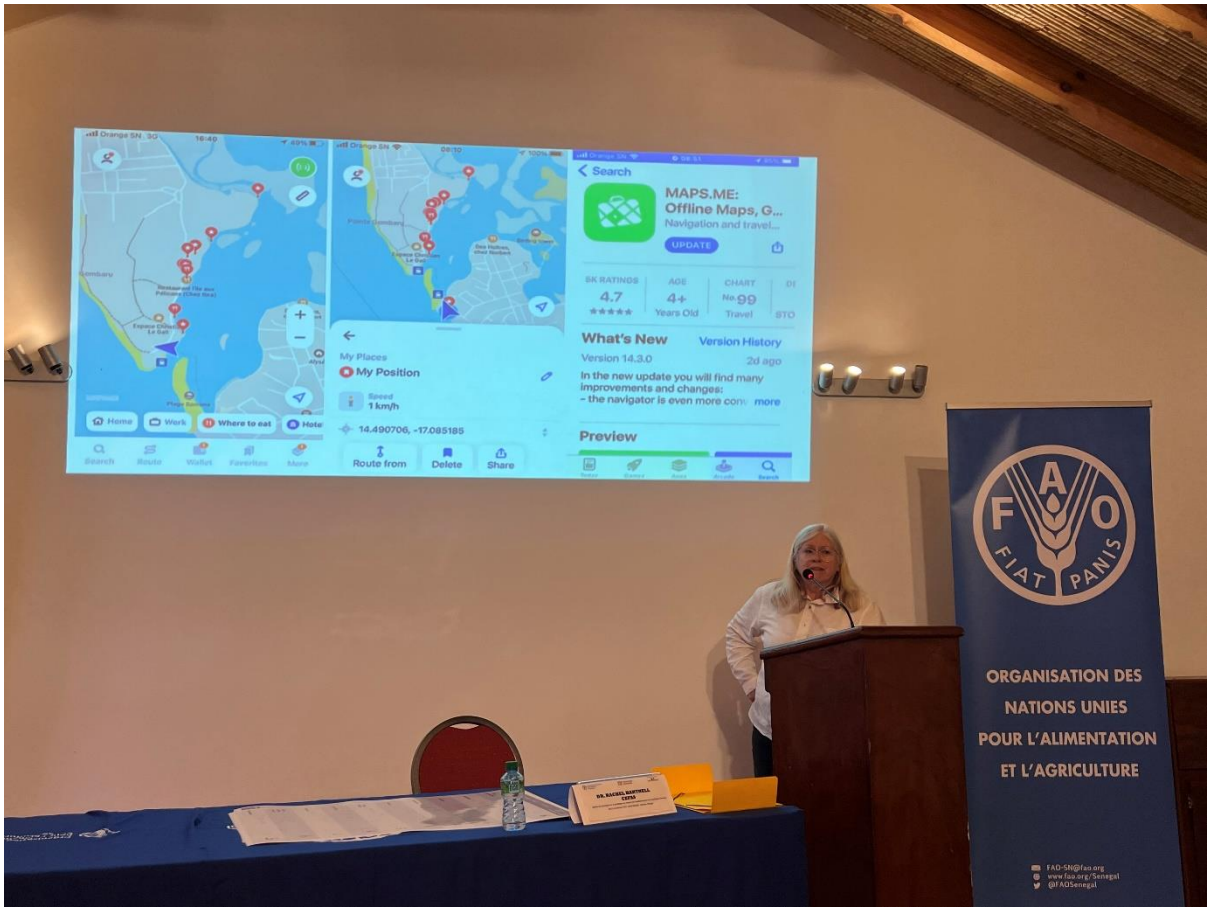

Figure 5. FAO Reference Centre presentation on the Growing Area Assessment

Furthermore, the delegates were asked to consider whether a hazard/indicator survey would be required to better characterise the risks, and if so which hazards or indicator

[2] Food Safety and Quality Series No. 5. Technical guidance for the development of the growing area aspects of bivalve mollusc sanitation programmes, 2nd edition (who.int) 970-89-2-4003021-3

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organism should be included in the testing. Finally, the delegates considered which features should be prioritised in the shoreline survey (practical exercise 3).

Learning outcome – exercise 2

The learning outcome for this exercise was – delegates were provided with the tools needed to carry out initial desk-based assessments of a bivalve production area, to gather data from diverse sources, to identify data gaps and to plan laboratory-based testing and shoreline survey elements.

Practical Exercise 3 – shoreline survey in Somone lagoon

The FAO Reference Centre team together with delegates carried out a guided shoreline survey along the Somone lagoon (Figures 6 and 7). This enabled delegates to put into operation practical elements of the previous exercise, particularly with respect to verifying desk-based information in the field. Delegates were shown how to examine the shoreline adjacent to the growing area for possible human or environmental impacts on the harvesting site. In addition, the local oyster producers gave delegates a practical demonstration of their culture methods.

Figure 6. Delegates visiting the oyster harvesting area in Somone lagoon

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Figure 7. Delegates carrying out the shoreline survey

After the survey was complete the summary findings were discussed in the classroom. This exercise gave delegates the opportunity to share knowledge and ask questions with the FAO Reference Centre team as they gathered additional data to support what they had found during practical exercise 2.

Learning outcome – exercise 3

The learning outcome for this exercise was – delegates gained practical experience of conducting a shoreline survey, including identifying and recording hazards in the field, to supplement or confirm information gathered in the desk-based assessment. The delegates furthermore gained experience of the important logistical and safety considerations in carrying out a shoreline survey.

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Practical Exercise 4 - Interpretation of classification data

After theoretical training on monitoring, classification and data interpretation, in practical exercise 4 delegates were given example classification datasets from 2 different sites. Working in their groups (Figure 8), they were then asked to decide on the appropriate classification level for each site according to the criteria set out in EU Regulation 2019/627. They were also asked to justify reasons for their choice of classification.

Figure 8. Delegates undertaking practical exercise 4 in their groups

Learning outcome – exercise 4

The learning outcome for this exercise was – delegates gained experience of the way in which growing areas are classified according to the degree of faecal contamination in the

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European Union and United Kingdom. They also learnt how considerations around long-term and incomplete datasets can affect classification decisions.

Summary and next steps

This technical training event successfully brought together industry, local officials, and government entities to discuss benefits and opportunities for further development of the Senegalese bivalve industry by ensuring production of a safe product. This event formed part of Cefas' FAO Reference Centre for Bivalve Mollusc Sanitation programme of support for the overarching FAO project PG/STDF/672 aimed at strengthening the shellfish sector in Senegal by bringing it up to sanitary and phytosanitary (SPS) standards to promote the safety of shellfish and their access to regional and international markets. The FAO Reference Centre will continue to work with FAO colleagues in Rome, Italy and across Africa to design an additional programme of targeted assistance to support the aims of the overarching FAO project.

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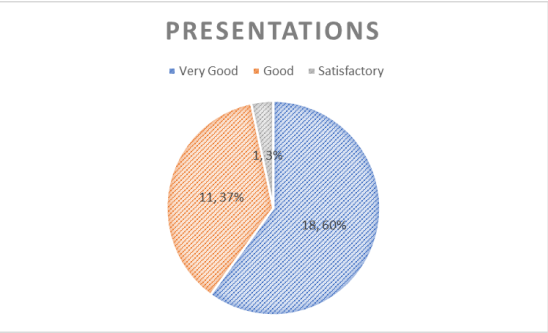
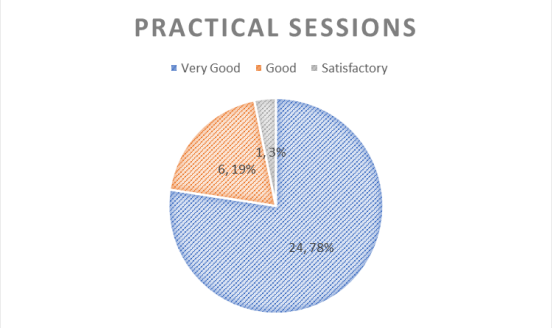
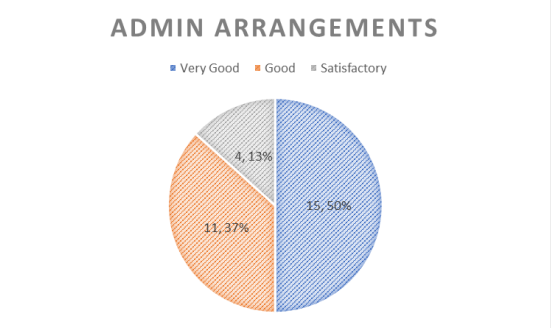
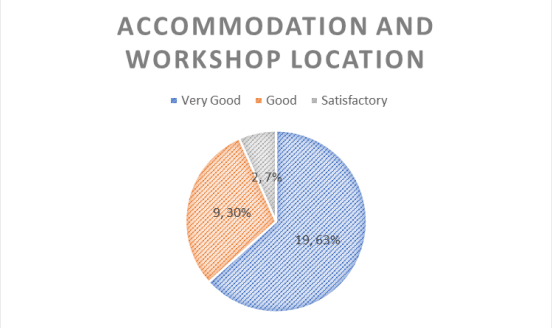
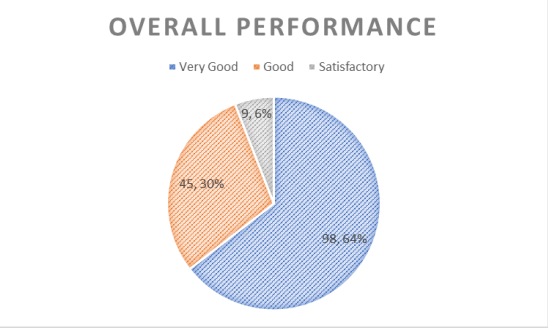
Confidential Participant Feedback Results











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Comments received alongside feedback scores;

- If there were more practical sessions, we would be takers. Thank you.
- This workshop is of key importance and provides a real opportunity for staff from the Competent Authorities to identify risks and establish sanitation plans for bivalve shellfish. Cefas, thanks to their brilliant training in this area, helped participants to understand the issues faced by shellfish production areas, listing all parameters of microbiological, chemical, environmental and human origin to protect shellfish areas and enable the production and sale of bivalve shellfish of good quality.
- I am extremely pleased to have attended this workshop which helped me to better understand the risks associated with bivalve shellfish sanitation, with support from the FAO Reference centre.
- Very informative workshop. The delivery team performed very well and overall the workshop organisation was very good.
- Very informative workshop for our stakeholders, which will prove very beneficial to the development of a modern oyster production in Senegal.
- Very important workshop for our oyster stakeholders.

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Workshop photo

Report of the Training Workshop on Risk Profiling and Sanitation of Bivalve Molluscs for Senegal

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- industries across a range of sectors including offshore renewable energy, oil and gas emergency response, marine surveying, fishing and aquaculture.
- other scientists from research councils, universities and EU research programmes.
- NGOs interested in marine and freshwater.
- local communities and voluntary groups, active in protecting the coastal, marine and freshwater environments.

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