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## Internal report

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## Mission Report Mauritania: Consultancy on Implementation of a Shellfish Quality monitoring Programme

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## Summary

Mauritania has several commercially interesting shellfish species, such as *Venus verrucosa*, *Venus rosalina* and *Venerupis dura*, in her coastal waters. In order to comply with the European standards and to export these shellfish to the European market a shellfish monitoring programme for parameters such as marine phycotoxins, toxic phytoplankton, metals, Polycyclic Aromatic Hydrocarbons (PAH), metals, physical parameters, and microbiology should be set up. Therefore a mission to Mauritania took place in order to evaluate the needs and make an inventory of the lacking items with respect to a monitoring programme. IMROP (Institut Mauritanien des Recherches Océanographiques et de Pêche), DVIS (Département de Valorisation et Inspection Sanitaire) was visited for these purposes.

In order to set up an adequate monitoring system legislation should be written, a monitoring programme should be designed, an Internal Quality system should be set up, and various analyses should be implemented. The implementation of these requires the input of expert knowledge and training possibilities. The needs for a successful implementation of a monitoring programme are therefore depicted in the report.

## 1. Introduction

Mauritania has major resources of shellfish in her coastal waters, among which commercially interesting species such as *Venus verrucosa*, *Venus rosalina* and *Venerupis dura* at depths between 5 and 14 meters, which at present are not exploited.

Until now, shellfish exploitation in Mauritania has not developed, due to the lack of exportation possibilities to the EU. The EU so far does not allow imports of shellfish from Mauritania, because the country does not comply with EU quality control standards. These concern the monitoring of a number of parameters such as marine phycotoxins, toxic phytoplankton, metals, Polycyclic Aromatic Hydrocarbons (PAH), metals, physical parameters, and microbiology.

Following a request of IMROP (Institut Mauritanien des Recherches Océanographiques et de Pêche) and Heiploeg Shellfish International a mission was made to Mauritania to identify the material and training that will be necessary for obtaining the approval to export shellfish to the EU.

## 2. Objective and Program

The mission objective was to make an inventory of the needs for the set up of legislation, sampling programmes and analyses for a successful implementation of a sanitary shellfish-monitoring programme at Mauritania. The legislation, sampling procedures and analyses will be used for future fulfilment of the requirements of the EU for exporting bivalve molluscs (live or processed).

IMROP (Nouadhibou, Mauritania) was visited from June 8th to June 11<sup>th</sup> 2004. The first day of the mission was started with an introductory meeting, where heads of department and head of IMROP were present. This meeting was used for introductions and planning of the following days. The first day the requirements on chemical quality assessment of the shellfish were discussed, followed by a laboratory tour, in order to make an inventory of the required materials, apparatus etc. The next day the microbiological, biotoxins and phytoplankton analyses and requirements for a monitoring programme were discussed, followed by a tour in the laboratory in order to make an inventory of the required materials, apparatus etc. The final day was used for visits at the mussel collection sites, which are currently used for chemical, and microbiological analyses.

### **3. IMROP potential on EU markets**

IMROP performs both governmental and industrial research on fish (and shellfish). Moreover the department DVIS (Département de Valorisation et Inspection Sanitaire) performs inspections of fisheries vessels and carries out chemical and microbiological analyses for governmental and industrial aims. The mixed interests (government and industry) cannot guarantee an independent procedure for inspections, licensing, and government control (and consequences). Therefore it is advised to set up the official controls and fulfilment of legislation in such a way that it is operated independently from industrial interests.

In order to fulfil the demands of the European Commission an adequate internal Quality System (e.g. ISO) should be implemented at IMROP. Momentarily the institute is lacking a system as such, which means that samples and results are not traceable within the institution, and thus guaranties about the authenticity of the samples cannot be given. Furthermore managerial outline, adequate laboratory out line and responsibilities etc. are not registered, which may lead to unclear responsibilities and insufficient checks on the running analyses. Therefore an internal Quality system should be set up for creating transparency, and Good Laboratory Practice at IMROP/DVIS. The internal Quality System should be set up in accordance of ISO 17025 and 9001 for standardisation and agreement of IMROP.

## 4. Non materials required for the implementation of a shellfish monitoring programme

This section lists the requirements of non-materials for the implementation of a shellfish-monitoring programme, which were identified during the mission.

### 4.1 Monitoring programme

The requirements for a successful implementation of a monitoring programme are:

- Sampling plans per item (metals, biotoxins etc.)
- Collaboration with Morocco
- Mapping currents, and stratification
- Apply at IOC for training
- Mapping contaminative sources
- Database samples
- Join HANA (Harmful Algae of North Africa)
- Describe sampling procedures
- Join QUASIMEME for proficiency testing

Table 1. Monitoring items

Biotoxins	PSP
Biotoxins	DSP
Biotoxins	ASP
Phytoplankton	Algae
Microbiology	E. coli
Microbiology	Salmonella
Metals	Ag
	As
	Cd
	Cr
	Cu
	Hg
	Ni
	Pb
	Zn
Organic compounds	Halogenated Organic Compounds
	PAHs
	Radio nuclides
Physical parameters	pH
	Temperature
	Kleuring
	Suspended matters
	Salinity
	Oxygen percentage
	Carbohydrates on oily basis
Animal Diseases	Bonamia

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### 4.2 Official Controls

The requirements for implementation of Official Controls are:

- Official government controls of the Industry
- Certification procedures for the Industry
- Procedures Vessel and facility inspections
- Procedures Classification Shellfish Production Areas
- Design shellfish production areas
- Trace ability of shellfish
- Procedures Shellfish Import controls
- Registration documents (fisheries)
- Write hygiene regulations
- System of Information to government or industry

### 4.3 Animal (Shellfish) Diseases

Depending on the production procedure of the shellfish a monitoring is advised to be implemented on shellfish diseases, in order to full fill the demand in EU Directive 91/67/EU.

A monitoring for shellfish diseases is obligatory when shellfish are exported alive. In case shellfish are already processed (boiled, steamed, smoked etc.) in Mauritania, a monitoring for diseases is not mandatory. However, it is recommended to make an inventory of future production plans, so that a shellfish disease-monitoring programme can be implemented when needed.

For implementation of a shellfish disease-monitoring programme it is recommended to design a sampling plan and collect, and prepare samples in Mauritania. Since shellfish disease diagnostics takes time to implement, and learn it is recommended to send the samples abroad for analyses. This will reduce the initial labour duration, costs and efforts. When the contaminant, biotoxins and phytoplankton monitoring is set up and fishing (for processing) is performed, a monitoring for shellfish diseases can be implemented.

### 4.4 Radio nuclides

Equipment for successful analyses of radionuclides can be expensive (up to 100.000 euros for set up). Therefore it is recommended to follow the same procedure as described for Animal Diseases. The samples can be collected and stored till further analysis. The samples can be analysed at RIVO or RIKILT laboratories. This will reduce the financial consequences for purchase of equipment and training during the first year. When samples amounts are high enough, equipment can be purchased when necessary.

## **5. Costs**

### **5.1 Material and operative costs**

The costs for a successful implementation of a monitoring programme at IMROP depend on wages, labour intensity, and the governmental discussion structure. Therefore estimates cannot be given on the operation costs of a monitoring programme. Annex 1 provides an estimate of material costs, and since the exact amount of costs depends on the communication difficulties (for training) and the ability to order materials. Therefore the cost should only be used as an estimate, and should not be considered as binding. The costs for the implementation of a monitoring programme (materials, and chemicals for all analyses) are given in Annex 1. The training possibilities are described in the section below.

### **5.2 Guidance and training**

#### *5.2.1 Guidance*

Implementation of a shellfish quality-monitoring programme needs expert guidance for setting up monitoring programmes, sampling schedules etc. Next to that the implementation of procedures, and analyses require efforts of external experts, since Mauritania has to develop new expertise in shellfish quality items. Therefore expert knowledge is required for after care (ensure analyses run properly, evaluate monitoring programme). The efforts, which need to be offered, depend on the achievements and efforts of IMROP and the Mauritanian government. Therefore the costs of after care and guidance may vary from 40.000-250.000 euros, depending on the demands, progression and skills of the Mauritanian employees and government.

#### *5.2.2 Training*

The analyses can be implemented after appropriate training, in order to get acquainted with the equipment and the analyses, quality controls etc. In table 2 an overview is given on the necessary training and an approximation of the costs.



Table 2. Overview of necessary trainings, and an estimation of the Duration, location and costs of the training. On basis of one person training.

	Duration	Where	Costs IMROP	Costs RIVO
Mouse bioassay	2 weeks	CRL Vigo	4000	0
Phytoplankton analyses	4 weeks	IOC	8000	0
ASP-HPLC	3 week*	RIVO/RIKILT/IMROP	6000	12000
PAHs	3 week*	RIVO/RIKILT/IMROP		
Haloginated Organic Compounds	3 week*	RIVO/RIKILT/IMROP		
Metal Analyses	2 week	RIVO/RIKILT/IMROP	4000	8000
Microbiology	1 week	RIVO/RIKILT/IMROP	2000	4000
Radio nuclides	N.a.			
Shellfish Diseases	N.a.			
ISO accreditation	2 weken (2x 1 week)	RIVO/RIKILT	4000	8000
Total			28.000	48.000

\* Combination of training

## 6. Time-line

Concerning the time-line of a successful implementation of a shellfish-monitoring programme there are two possibilities. The first possibility is to implement ISO, methods of analysis and legislation before starting a shellfish quality surveillance. This guarantees certified procedures and analyses, but has a negative consequence in terms of a 1-1.5 year time lack, since sampling will start after the implementation. Where the time from starting the procedures and producing shellfish will become 2-2.5 years.

The second option is to design a monitoring programme and describe sampling procedures and registration of the samples as soon as possible. The samples can then be stored and analysed when appropriate. In the same time ISO standards can be implemented, and methods of analyses can be set up. After setting up the procedures the samples can be analysed and thus a 1-year time advance is reached.

The time span of the items is approximately as followed (on basis of great efforts):

- 1 year Training, Implementation and validation of methods.
- 1 year Setting up ISO standards

## 7. Relevant Regulations

91/492/EU

Council Directive 91/492/EEC of 15 July 1991 laying down the health conditions for the production and the placing on the market of live bivalve molluscs

2002/225/EC

Commission Decision of 15 March 2002 laying down detailed rules for the implementation of Council Directive 91/492/EEC as regards the maximum levels and the methods of analysis of certain marine biotoxins in bivalve molluscs, echinoderms, tunicates and marine gastropods

2002/226/EC

Commission Decision of 15 March 2002 establishing special health checks for the harvesting and processing of certain bivalve molluscs with a level of amnesic shellfish poison (ASP) exceeding the limit laid down by Council Directive 91/492/EEC

79/923/EC

Council Directive 79/923/EEC of 30 October 1979 on the quality required of shellfish waters

91/67/EC

Council Directive 91/67/EEC of 28 January 1991 concerning the animal health conditions governing the placing on the market of aquaculture animals and products

## 8. Relevant Contacts / Networks

HANA (Harmful Algae North Africa)  
Amany Israel,  
Alexandria University,  
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## Further readings

### Microbiologie

*E. coli* analysis in Shellfish (method in Standardisation Proces)  
T. J. Donovan, S. Gallacher, N. J. Andrews, M. H. Greenwood, J. Graham, J. E. Russell, D. Roberts & R. Lee. 1988. Modification of the standard method used in the United Kingdom for counting *E. coli* in live bivalve molluscs. Communicable Disease and Public Health. 1: 188-196

### Harmful Algae

IOC Taxonomic Reference List of Toxic Plankton Algae  
<http://www.bi.ku.dk/ioc/default.asp>

Manual on Marine Harmful Microalgae (2003) G.M. Hallegraeff, D.M. Anderson and A.D. Cembel. Pp. 794, ISBN: 92-3-103871-0.

### Metals

Heavy metals in Various Molluscs from the Mauritanian Coast.  
M. Roméo, Z. Sidoumou, M. Gnassia-Barelli. Bull. Environ. Contam. Toxicol., 65 : 269-276.



Annex 1. Requirements for Laboratory implementation

		Method	Requirements	Protocol	Training	Cost
Biotoxins	PSP	Mouse bioassay	Animal Housing facilities (cages, work bench, etc.)	Yasumoto, 1984	CRL Vigo	8.000
			Standards, Reference material (NRC, Canada)			1.000
			Ring test, proficiency testing (if available)			500
			Glass + Solvent			1.000
Biotoxins	DSP	Mouse bioassay	Animal Housing facilities (cages, work bench etc.)	Yasumoto	CRL Vigo	
			Ring test, proficiency testing (if available)			
Biotoxins	ASP	HPLC-UV	Integrater for HPLC	CEN	RIVO	1.000
			Collumns (C18)			450
			Standards, Reference materials (NRC, Canada)			1.000
			Centrifuge (50ml size tubes)			5.000
			Glass + solvents			1.000
			Ring test, proficiency testing (QUASIMEME)			500
Phytoplankton	Algae	Inverted light microscopy	Inverted light microscope+chambers	Manual on harmful microalgae	IOC-Vigo	15.000
			Counting chambres	Identification de fyto de Mere		300
			Sample equipment (integrated tube sampler)			400
			Hydrographical/stratificati on maps			x

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Microbiology	E. coli	MPN	Incubator 6)	Donovan,	RIKILT	
Microbiology	Salmonella	Classical	Incubator 6)	ISO XXX	RIKILT	
			Media			2.000
Metals	Ag	AAS/Colorimetric	Reagent	RIVO	RIVO	4.000
	As	AAS/Colorimetric	AAS-Lamp+reagent	RIVO	RIVO	8.000
	Cd	AAS/Colorimetric	AAS-Lamp+reagent	RIVO	RIVO	
	Cr	AAS/Colorimetric	AAS-Lamp+reagent	RIVO	RIVO	
	Cu	AAS/Colorimetric	AAS-Lamp	RIVO	RIVO	
	Hg	AAS/Colorimetrisch	AAS-Lamp+MHS	RIVO	RIVO	Unknown
	Ni	AAS/Colorimetrisch	AAS-Lamp+reagent	RIVO	RIVO	1
	Pb	AAS/Colorimetrisch	AAS-Lamp	RIVO	RIVO	
	Zn	AAS/Colorimetrisch	AAS-Lamp	RIVO	RIVO	
	Radionuclides	Not applicable ***)		RIKILT	N.a.	
	pH	pH-meter		Manufacturer		
	T	Thermometer		Manufacturer		
	Coloration	Membrane filtration+fotometrie (Pt/Co)	Pt/Co colorimeter	D2108-97(2001) Standard Test Method for Color of Halogenated Organic Solvents and Their Admixtures (Platinum-Cobalt Scale)		1.000
	Suspended matters	Membrane filtration or centrifugation	Analytical ballans			
	Salinity	Conductivity measurement	Conductivity meter			
	Oxygen percentage	Electrochemical	Oxygen meter			
	Carbonhydates on oily basis	Visual	Nothing			

	Halogenated Organic Compounds	GC	GC	Standards, Certified Reference material		1.000
				Reperation of GC (either replacement ECD or revision system)	RIVO	10.000
	PAHs	HPLC	Revision of equipment	RIVO	RIVO	5.000
			Pomp			10.000
			Automatic Injector 5)			10.000
			Standards			1.000
Animal Diseases	Bonamia	Not applicable *** 4*)	Staining facilities		CRL Ifremer	
	Marteilia	Not applicable *** 4*)	Staining facilities		CRL Ifremer	
TOTAL						87.150

\* By expert laboratory, \*\* Metal analysis in 2 weeks trainable, \*\*\* Sampling and Program run at DVIS, analyses abroad, 4\*) Only required for live product, 5) Only required with high sample throughput (over 6excl. standards per run), 6) Only required when capacity is too low