

WORLD ORGANISATION FOR ANIMAL HEALTH



REPORT

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REGIONAL SEMINAR

**“OIE international standards, a lever for growth in the fisheries and aquaculture sector in Southern Africa”**

10 – 12 June 2008

Maputo ▼ Mozambique

OIE Sub-Regional Representation for Southern Africa

Gaborone ▲ Botswana

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the European Development Fund  
(European Commission)

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## ACRONYMS

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AAHSC	Aquatic Animal Health Standards Commission [Mozambique]
AASA	Aquaculture Association of Southern Africa
ACIAR	Australian Centre for International Agricultural Research
AFRC	Albion Fisheries Research Center [Mauritius]
AG	Advisory Group [NACA]
ANAF	Aquaculture Network for Africa [NACA]
APEC	Asia-Pacific Economic Cooperation
APHIS	Animal and Plant Health Inspection Service [USA]
ARC	Agricultural Research Council [South Africa]
ASEAN	Association of Southeast Asian Nations
ASWG	Aquaculture Sector Working Group [South Africa]
BNVL	Botswana National Veterinary Laboratory
CBD	Convention on Biological Diversity
CCRF	Code of Conduct for Responsible Fisheries
CITES	Convention on International Trade in Endangered Species
CVL	Central Veterinary Laboratory [Zimbabwe]
DAAP	Directorate Animal and Aquaculture Production [South Africa]
DEAT	Department of Environmental Affairs and Tourism [South Africa]
DfID	Department of International Development [United Kingdom]
DG-SANCO	Health and Consumer Directorate General [EC]
DoA	Department of Agriculture [South Africa]
DST	Department of Science and Technology [South Africa]
DTI	Department of Trade and Industry [South Africa]
DWAF	Department of Water Affairs and Forestry [South Africa]
DNA	National Aquaculture Direction [Angola]
EC	European Commission
EEZ	Exclusive Economic Zone
ELISA	Enzyme Linked Immunosorbent Assay
EU	European Union
EUS	Epizootic Ulcerative Syndrome
FDA	Food and Drug Administration [USA]
FAO	Food and Agriculture Organization [United Nations]
FHS/AFS	Fish Health Section of the Asian Fisheries Society
GDP	Gross Domestic Product
GMO	Genetically Modified Organism
IAC	Inland Aquaculture Centre [Namibia]
IAS	Invasive Alien Species
IMO	International Maritime Organisation
INIP	National Institute for Fisheries Research [Mozambique]
IPA	Institute of Development of Traditional Fisheries and Aquaculture [Angola]
KHV	Koi Herpes Virus
LHWP	Lesotho Highlands Water Project
MOA	Ministry of Agriculture [Zimbabwe]
MET	Ministry of Environment and Tourism [Zimbabwe]
MFMR	Ministry of Fisheries and Marine Resources [Mauritius]
MOALD	Ministry of Agriculture and Livestock Development [Malawi]
MRC	Mekong River Commission
NACA	Network of Aquaculture Centres in Asia-Pacific
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organisation
NOAA	National Oceanographic and Atmospheric Administration [USA]

OIE	World Organisation for Animal Health
OVI	Onderstepoort Veterinary Institute [South Africa]
PCR	Polymerase Chain Reaction
PVS	Performance of Veterinary Services
QAAD	Quarterly Aquatic Animal Diseases [reporting system] [NACA]
RMP	Residue Monitoring Programme
RRC	Regional Resource Centres [NACA]
RRE	Regional Resource Experts [NACA]
RRL	Regional Resource Laboratories [NACA]
SABS	South African Bureau of Standards
SADC	Southern African Development Community
SANAS	South African National Accreditation System
SEAFDEC	Southeast Asian Fisheries Development Centre
SOP	Standard Operating Procedure
SPADA	Special Programme for Aquaculture Development in Africa [FAO]
SPS	[Agreement on the application of] Sanitary and Phytosanitary Standards [WTO]
SVC	Spring Viraemia of Carp
WAHIS	World Animal Health Information System [OIE]
WHS	World Heritage Site [UNESCO]
WTO	World Trade Organisation
TAFIRI	Tanzania Fisheries Research Institute
TG	Technical Guidelines [NACA]
TFDA	Tanzania Food and Drugs Authority
TCP	Technical Cooperation Project [FAO]
USDA	United States Department of Agriculture
VLDR	Veterinary Laboratory Diagnostic Research [Zimbabwe]
ZINQAT	Zimbabwe National Quality Assurance Programme

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Edited by David Huchzermeyer and Patrick Bastiaensen

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## “OIE INTERNATIONAL STANDARDS, A LEVER FOR GROWTH IN THE FISHERIES AND AQUACULTURE SECTOR IN SOUTHERN AFRICA”

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### INTRODUCTION

Since 2006, the *World Organisation for Animal Health* (OIE) is represented in Southern Africa through the establishment of a Sub-regional Representation, based in Gaborone, Botswana. Since late 2007, this office has conducted a series of seminars on capacity building on international standards for veterinary services in the framework of the *SADC - EU Grant Contribution Agreement with the OIE*.

The present seminar, with the title “*OIE international standards, a lever for growth in the fisheries and aquaculture sector in Southern Africa*”, intended to focus on designated OIE subject matter focal points for aquatic animal diseases in the OIE member countries within the SADC region, and was held in Maputo, Mozambique from June 10th to 12th, 2008.

The seminar was attended by 12 national OIE subject matter focal points, and 6 national FAO focal points for the surveillance of *epizootic ulcerative syndrome* (EUS) in the Zambezi-Chobe river basin, as well as representatives from the private sector. The seminar was ably facilitated by several international and regional experts on fisheries, aquaculture and aquatic animal diseases.

The objective of the seminar was to enhance the awareness of those who are entrusted with aquatic animal health within the veterinary services, either directly as part of the veterinary administration or indirectly through a competent authority, e.g. Ministry responsible for Fisheries and Aquaculture. Areas such as disease reporting through WAHIS and disease diagnosis in collaboration with OIE Reference Laboratories were highlighted to emphasize the need for collaboration between both public and private sectors. Reference was made to the recent outbreak (2006) of EUS in the Chobe and Zambezi rivers to illustrate constraints, pathways, concepts and standards.

This document is a compilation of abstracts, based on presentations made by country representatives and invited regional and international experts.



*Participants and guests of honour at the opening ceremony of the OIE seminar © P. Bastiaensen (OIE)*

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## SEMINAR PROGRAMME

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### Tuesday 10 June 2008

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08:30 Registration

09:00 **Opening session:** Chairperson: Dr. Ana-Paula Baloi (Director of Fisheries, Mozambique)

Welcoming address by CVO/OIE Delegate of Mozambique

OIE Sub-Regional Representative for Southern Africa

Representative of FAO

Representative of the European Commission

Representative of the Executive Secretary of SADC

Minister of Fisheries of Mozambique

Group photograph

10:00 Coffee break

#### Session 1: General oversight of the sector

10:30 General introduction on aquaculture and inland fisheries in the world Chadag Mohan (on behalf of FAO)

10:50 Overview of the aquaculture and fisheries sector in Southern Africa Etienne Hinrichsen (AASA Za)

11:30 Overview of the aquaculture and fisheries sector in Mozambique (host country) Filipe Januario (Mz)

11:50 Overview of the OIE's involvement in terms of aquatic animal diseases  
. Eli Katunguka – Rwakishaya (OIE AAHSC)

12:10 Overview on aquatic animal diseases of fresh and brackish water species, with particular reference to Africa  
. David Huchzermeyer (Sterkspruit Vet Clinic Za)

12:40 Overview of current reporting to OIE, tendencies in Africa, main diseases reported Francesco Berlingieri (OIE)

13:00 Lunch

14:30 Country presentations (Angola, Botswana, Dem. Rep. of the Congo, Lesotho, Malawi)  
. National OIE subject matter focal points

16:00 Coffee break

16:30 General discussions

17:30 Closure

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### Wednesday 11 June 2008

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#### Session 2: International standards

08:30 Provisions of the Aquatic Animal Health Code - OIE listed diseases (general introduction)  
. Francesco Berlingieri (OIE)

09:10 Provisions of the Aquatic Animal Health Code - Aquaculture: crustaceans / fish farming / molluscs  
. Chadag V. Mohan (NACA Th)

09:40 Case study: epizootic ulcerative syndrome  
. Somkiat Kanchanakhan (OIE)  
Bernard Mudenda (UZ Zm)

10:10 Zoning and compartmentalisation Francesco Berlingieri (OIE)

10:30 Coffee break

11:00 Certification of products for export David Huchzermeyer (Sterkspruit Vet Clinic Za)  
11:20 Regulatory issues regarding the mandate of the veterinary authority and the competent authority  
Troyamodimo Violet Modungwa (DoA - Za)  
12:00 Needs for capacity building Qurban Rouhani (Rhodes University Za)  
12:20 General discussion  
13:00 Lunch  
14:30 Reporting and notification issues Francesco Berlingieri (OIE)  
15:00 Country presentations (continued) (Mauritius, Namibia, South Africa, Swaziland)  
16:00 Coffee break  
16:30 Country presentations (continued) (Tanzania, Zambia, Zimbabwe)  
17:00 Provisions of the Manual of Diagnostic Tests for Aquatic Animals - Disease of fish & crustaceans  
Somkiat Kanchanakhan (OIE)  
17:30 Closure  
19.00 Reception

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**Thursday 12 June 2008**

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**Session 3: Trade in fisheries products**

08:30 The aquatic bio-security framework for Southern Africa and the  
Network of Aquaculture Centres in Asia and the Pacific (NACA) Chadag V. Mohan (NACA Th)  
09:30 General discussion  
10:15 Coffee break  
10:45 Regional stakeholders in the sector Etienne Hinrichsen (AASA Za)  
11:45 Import requirements for the European Union Pedro Rosado-Martín (DG SANCO Be)  
12:15 Import requirements for the United States Paul Gary Egrie (USDA – APHIS Us)  
12:45 General discussion  
13:00 Lunch

**Closing Session:** Chairperson: Dr. Florência Massango Cipriano (OIE Delegate Mozambique)

14:30 Adoption of the recommendations  
15:00 Closing remarks  
15:30 Closure





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## TABLE OF CONTENTS

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Welcoming address by the OIE Sub-Regional Representative for Southern Africa	page 10
Opening address by the Permanent Secretary of the Ministry of Agriculture	12
<b>General oversight of the sector</b>	
General introduction on aquaculture and inland fisheries in the world	17
Overview of the aquaculture and fisheries sector in Southern Africa	18
Overview of the OIE's involvement in terms of aquatic animal diseases	19
Overview on aquatic animal diseases of fresh and brackish water species, with particular reference to Africa	20
Overview of current reporting to OIE, tendencies in Africa, main diseases reported	23
Overview of the aquaculture and fisheries sector in Angola	24
Botswana	25
Congo (Dem. Rep. of the ~)	26
Lesotho	27
Malawi	28
Mauritius	29
Mozambique (host country)	31
Namibia	32
South Africa	35
Swaziland	37
Tanzania	38
Zambia	39
Zimbabwe	40
<b>International standards</b>	
Provisions of the <i>Aquatic Animal Health Code</i> - OIE listed diseases (general introduction)	42
Provisions of the <i>Aquatic Animal Health Code</i> - Aquaculture (crustaceans / fish farming / molluscs)	44
Provisions of the <i>Manual of Diagnostic Tests for Aquatic Animals</i> - Disease of fish & crustaceans	45
Case study: epizootic ulcerative syndrome (general information)	46
Case study: epizootic ulcerative syndrome (in the Zambezi river basin in Zambia)	47
Zoning and compartmentalisation	48
Certification of products for export	49
Regulatory issues regarding the mandate of the veterinary authority and the competent authority	50
Needs for capacity building	51
Reporting and notification issues	52
<b>Trade in fisheries products</b>	
The aquatic bio-security framework for Southern Africa	54
The Network of Aquaculture Centres in Asia and the Pacific (NACA)	56
Import requirements for the European Union	58
Import requirements for the United States	59
The Aquaculture Association of Southern Africa	61
Closing remarks by the Hon. Minister of Fisheries of Mozambique	62
Recommendations of the seminar	64
List of participants	67

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**WELCOMING ADDRESS BY THE OIE SUB-REGIONAL  
REPRESENTATIVE FOR SOUTHERN AFRICA**

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*Bonaventure J. Mtei*

Guest of honour,  
Representatives of diplomatic missions and international organisations,  
Invited guests,  
Dear participants,  
Ladies and gentlemen

I am honoured on behalf of Dr Bernard Vallat, the Director General of the OIE and on my own behalf to welcome you to this meeting. I would like to join the Chairperson, the Director of Fisheries, Dr Ana Paula Baloi and the OIE Delegate for Mozambique, Dr Florença Cipriano to thank you all for finding the time to come and share with us your experiences on this very important meeting on Aquatic Animal Health in Southern Africa.

Guest of honour,

I also want to thank you and the Government of Republic of Mozambique for agreeing to host this meeting and thank you for the traditional hospitality accorded to us by the Mozambican people since our arrival in this beautiful country. OIE, with the support from the European Union is pleased to have organised this workshop whose subject we believe is critically important in terms of food security and income generation for many inhabitants of SADC. During this meeting, regional and international experts on aquatic animal health will be sharing their experiences with us and equally important we shall be updated on the aquatic animal health situation in most of the SADC Member States and in particular on the situation of *epizootic ulcerative syndrome* in the Zambezi-Chobe basin.

The *World Organisation for Animal Health* (OIE) was established in 1924, well before the creation of the United Nations, with a purpose of controlling the spread of contagious animal diseases prevailing in Europe and other parts of the world at the time. From 28 founder members, OIE membership has now grown to 172 today. In 1994, the *World Trade Organisation* (WTO) mandated the OIE to publish standards aimed at avoiding the introduction of pathogens through international trade in animals and animal products, while at the same time preventing countries from setting up unjustified sanitary barriers. In May 2005, the 4th Strategic Plan of the OIE for the period from 2006-2010 was adopted, confirming broadening of the scope of the OIE's standards and guidelines to include animal welfare and food safety.

The OIE's Terrestrial and Aquatic Animal Health Codes contain standards democratically adopted by the 172 OIE Members Countries. Their companion volumes, the Terrestrial and Aquatic Manuals specify reference methods for diagnosing animal diseases and quality requirements for vaccines where applicable.

OIE standards can be categorized as either horizontal or vertical. Horizontal standards are those dealing with generic aspects, such as ethics in international trade and the quality of national Veterinary Services as conditions for importing countries to trust reliability of health certificates accompanying consignments of animals and products during cross-border trade. These certificates must be issued exclusively by the Veterinary Services under the responsibility of the government of the exporting country. Vertical standards are those dealing directly with recommendations on each of the OIE listed diseases. These include methods to be applied by national Veterinary Services to conduct surveillance for early detection and rapid response to control and contain diseases and eventual application of recognition for disease freedom.

In the specific disease chapters, guidelines are stipulated aimed at avoiding transboundary spread of diseases during export of live animals or animal products. Risks differ according to the commodity in question and, in particular, according to the procedures they undergo to inactivate harmful pathogens they may be carrying.

OIE standards are prepared by leading international experts on the diseases and topics in question and are adopted during the Annual General Session by the OIE Delegates from the 172 member Countries. In the event of a trade dispute between countries over sanitary measures, the OIE may act as a mediator on request, using OIE experts. It is likely that, if a dispute between countries were to be taken to the WTO level, the same experts would be called upon to give their expert opinion. OIE standards are currently prepared on the basis of risk analysis, taking into account the fact that there is no such thing as zero risk. The range of standards published by the OIE has enabled importing countries to reduce the use of arbitrary risk analysis methods, in favour of systematic use of OIE standards, in accordance with the WTO

SPS Agreement. This is a significant step towards safe and open trade, thanks to transparency and obligations by OIE Member countries to use internationally accepted standards. Some chapters on specific diseases currently do not provide sufficiently detailed information on certain products that have undergone processes to render them harmless, regardless of the animal health status of the exporting country. In this respect it is important to take into account evolving industrial and food technologies and the advances they offer in inactivating pathogens potentially present in food products.

The OIE continuously advocates change of attitude on the part of countries that ban all types of imports from a country that has made an official declaration of an epizootic disease. Though this approach may be acceptable for a few days while awaiting more precise information on the animal health situation in the affected country, it should rapidly be replaced by protection measures based on OIE standards and recommendations for each of the relevant commodities concerned. Decisions taken by some countries to impose a total ban on imports of animals and products without referring to the relevant provisions of the Codes are totally unacceptable.

Likewise, the OIE does not favour an approach based solely on systematic inactivation of pathogens in end-products, which could lead countries to relax their surveillance for animal diseases at farm level and their policies to prevent introduction and control potential biological hazards.

The positive impact of animal health policies on wealth creation and public health is in itself ample justification for financing and maintaining surveillance networks and rapid response teams to deal with any recognized animal health threat.

To guarantee effectiveness of surveillance at national, regional and worldwide level, all countries have to also comply with OIE standards on the quality and evaluation of Veterinary Services. In addition to their surveillance mission, Veterinary Services are also responsible for the reliability of veterinary certificates they issue.

These certificates accompany every consignment of animals or animal products transported for domestic or international trade. Compliance with the OIE's standards on the quality of Veterinary Services ensures that these certificates are issued under conditions that guarantee their reliability, so that markets access does not pose a threat to the safety of consumers.

At the moment the Aquatic Animal Health Code does not contain sufficient provisions on the quality and governance of aquatic animal health services and as a result there is growing demand to extend the OIE's evaluation system, known as *Performance of Veterinary Services* (PVS), to other competent authorities responsible for fisheries and aquaculture. In principle the same competencies are required e.g. appropriate legislations and good governance in support to comply with OIE standards. The OIE is already working on an Annex to the OIE PVS Tool proposing appropriate modifications to be adopted when evaluating performance of a relevant competent authority responsible for aquatic animal health. A similar OIE development-oriented initiative is geared towards increasing diagnostic capacity in the developing countries currently grossly under-represented in terms of the OIE Reference Laboratories and Collaborating Centres. The OIE's twinning programme with existing OIE Reference Laboratories and Collaborating Centres is already a success for terrestrial animal diseases, but should be extended to diagnostic capacity for aquatic animal diseases, especially those that affect our region.

Guest of honour

In the course of this meeting, I believe experts will tell us that Fisheries and Aquaculture accounts for a large proportion the world's food and is probably the fastest growing food-producing sector. However, poor sanitation and/or bio security, the focus of our meeting this week, remains a major impediment to the development of the sector here in the SADC Region and world-wide. As an outcome of this meeting, OIE would like to see specific resolves and or recommendations geared towards creating a framework for improved governance and harmonisation among governments and industry stakeholders to improve mechanisms for addressing aquatic animal health and welfare issues in Southern Africa. Experiences gained in South Africa, as well as existing and dynamic regional cooperation mechanisms in South-East Asia, will no doubt serve us as guidance.

OIE through its Sub Regional Representation for Southern Africa will respond accordingly and seek broad support for the implementation of the outcomes of this workshop and we sincerely hope that our partners, such as SADC, FAO, NEPAD and the donor community will join us in support to implement the outcome of this meeting.

Thank you for your attention, muito obrigado.

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**OPENING ADDRESS BY THE PERMANENT SECRETARY OF  
THE MINISTRY OF AGRICULTURE OF MOZAMBIQUE**

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*Daniel Clemente*

Senhor representante da OIE da Sub-região da África Austral,  
Senhora Delegada da OIE em Moçambique,  
Senhora Representante da FAO,  
Senhor representante da Comissão Europeia,  
Senhor representante do Secretário Executivo da SADC,  
Senhores representantes de Missões Diplomáticas e organizações internacionais,  
Senhora representante do Ministério das Pescas,  
Caros convidados,  
Minhas Senhoras e meus senhores,

Antes de mais nada gostaria de, em nome do Governo de Moçambique, desejar Boas Vindas aos ilustres convidados a este seminário regional sobre a saúde dos animais aquáticos organizado pela OIE (*Organização Mundial de Saúde Animal*). Este organismo tem um papel crucial no estabelecimento de padrões e normas importantes no comércio internacional e reconhecidos pela *Organização Mundial do Comércio*.

Foi com bastante orgulho que Moçambique aceitou o convite para ser anfitrião deste importante encontro.

O nosso país, possui uma costa de cerca de 2.780 km e um número significativo de rios, lagos, lagoas e estuários. O seu clima tropical e subtropical, as condições de ambiente livre de poluição, os vastos recursos naturais e a pouca pressão demográfica; resultam em excelentes oportunidades para o aumento da produção a partir de recursos aquáticos.

A importância do sector pesqueiro neste país advem do facto de este representar 4% do PIB e aproximadamente 28% de divisas arrecadadas para a economia nacional, estimando-se que cerca de 50% da proteína de origem animal provenha do pescado e produtos da pesca. O sector das pescas emprega, só na área marinha, quer directa ou indirectamente mais de 300.000 pessoas, cifra que pode aumentar se considerarmos os postos de trabalho da pesca em águas interiores.

Moçambique possui o camarão como o seu principal produto de exportação. Tendo em conta que este recurso, na sua forma selvagem já atingiu níveis máximos de captura, estamos empenhados na diversificação dos nossos produtos de exportação e disponibilização de produtos pesqueiros mais baratos para a população carente.

Face à eminente crise alimentar mundial, urge a necessidade de disponibilizar produtos que representem fonte de proteína barata. Como alternativa à necessidade do aumento da produção do pescado, o Governo de Moçambique tem dado ênfase à promoção da aquicultura com destaque para a piscicultura de pequena escala, devido a sua contribuição para a melhoria das condições de vida das populações rurais, ou seja, o “Alívio à Pobreza Absoluta”.

Caros convidados

Moçambique possui condições favoráveis à cultura de animais aquáticos no meio rural nomeadamente:

- extensas áreas de terreno para a prática da piscicultura;
- sistemas de água apropriados; e
- ocorrência de espécies de pescado indígenas e resistentes a doenças que criam um atractivo para estes novos desenvolvimentos no sector pesqueiro.

Contudo, para o sucesso desta aposta, é necessário assegurar que o ambiente em que esta actividade se desenvolve não constitua veículo para a proliferação e transmissão de doenças. O surgimento de novas doenças em animais aquáticos ao nível mundial e particularmente na região da SADC como o caso do síndrome epizootico ulcerativo (EUS), é constatado com certa preocupação, pelo perigo potencial que pode representar para uma série de metas traçadas pelo sector das pescas. Para acautelar o surgimento e proliferação desta doença está em implementação na albufeira de Cahora Bassa, o plano de monitoria permanente em relação a esta emergência.

Caros convidados

O alastramento deste tipo de epidemias só pode ser evitado com uma abordagem global de alerta e tomada de medidas imediatas. Esta forma de actuação requer uma grande capacidade técnica e organizativa que inclui a formação de pessoal, a capacitação institucional e a potenciação de parcerias com instituições nacionais e internacionais afins como é o caso da OIE. A não observância desta abordagem pode levar à ocorrência de surtos de doença em animais aquáticos que podem ocasionar perdas enormes na produção, possível encerramento de unidades produtivas, consequências ambientais adversas e consequências para a saúde pública.

Certos de que este encontro contribuirá grandemente para o entendimento desta abordagem faremos todos os esforços para que os participantes aqui presentes se sintam em casa, motivados e inspirados para levar a cabo as necessárias discussões e que os resultados sejam de acordo com os objectivos traçados.

Queiram aceitar da parte de Moçambique, como país anfitrião o desejo de bom trabalho e boa estadia em Moçambique.

Posto isto, declaro aberta a Reunião Regional subordinado ao tema: *“Normas internacionais da OIE - Uma alavanca para o desenvolvimento do sector das pescas e da aquacultura na África Austral”*

Muito obrigado.

*Translation:*

*Representative of the OIE for the Sub-region of Southern Africa,  
Mrs. OIE Delegate for Mozambique,  
Mrs. Representative of the FAO,  
Representative of the European Commission,  
Representative of the Executive Secretary of SADC,  
Representatives of Diplomatic Missions and international organisations,  
Mrs. Representative of the Ministry of Fisheries,  
Distinguished guests,  
Ladies and gentlemen,*

*First of all I would like, on behalf of the Government of Mozambique, to wish a warm welcome to the illustrious guests to this regional seminar on aquatic animal health organized by the OIE (World Organisation for Animal Health). This organisation plays a crucial role in the establishment of standards and is important for international trade and agreed standards of the World Trade Organisation. It was therefore with great pride that Mozambique accepted the invitation to be host of this important meeting.*

*Our country boasts a coastline of about 2 780 km and a significant number of rivers, lakes, lagoons and estuaries. Its tropical and subtropical climate, the environmental conditions, free of any pollution, the vast natural resources and little demographic pressure, all result in excellent opportunities for the increase of production from aquatic resources.*

*The importance of the fisheries sector in this country is illustrated by the fact that it represents 4% of the overall GDP and approximately 28% of foreign exchange earned for the national economy. It is estimated that around 50% of animal protein is supplied by fish and fisheries products. The fisheries sector employs, directly or indirectly more than 300 000 people in the marine fisheries sector alone; a number that increases when taking into account jobs in the inland fisheries sector.*

*Mozambique possesses the shrimp as its main export product. Knowing that this resource, in its wild form, has already reached maximum levels of capture, we now promote the diversification of our export products and increased availability of cheaper fisheries products for our poorest populations.*

*Faced with an imminent world-wide food-crisis, we need to rapidly avail products that represent a cheap protein source. As an alternative to the necessity to increase capture fisheries, the Government of Mozambique is now also emphasising the promotion of aquaculture, with special reference to small-scale fish-farming, given the latter's contribution to improved living-conditions of rural populations, that is, "Absolute Poverty Relief".*

*Distinguished guests*

*Mozambique possesses favourable conditions for the culture of aquatic animals in rural areas, in particular:*

- extensive land areas suitable for fish farming practices,;*
- appropriate water systems; and the*
- occurrence of indigenous fish species that are resistant to diseases and create large expectations for these new developments in the fisheries sector.*

*However, for the success of this challenge that lies ahead, it is necessary to ensure that the environment in which this activity is to be developed, does not constitute a vector for the proliferation and transmission of illnesses. The emergence of new diseases in aquatic animals at world level, and particularly in the SADC region, as in the case of epizootic ulcerative syndrome (EUS), is witnessed with great concern, for the potential danger that it can represent for the attainment of a series of agreed goals for the fisheries sector. In order to detect any possible emergence and proliferation of this disease at an early stage, we have implemented a permanent surveillance system on the Cabora Bassa dam.*

*Distinguished guests*

*The spread of these type of epidemics can only be prevented through a global approach to early alerting and immediate response measures. This type of handling requires considerable technical and organisation capacity, including training of staff, institutional strengthening and the involvement of partnerships with similar national and international institutions, as is the case of the OIE. Any disregard for such a broad approach may lead to the emergence of new diseases in aquatic animals, in turn leading to enormous production losses, possible closure of production units, adverse environmental consequences and consequences for public health.*

*I'm certain that this meeting will greatly contribute towards an agreement across the board of such strategy, and we will spare no efforts to ensure that the participants present here today feel at home and are motivated and inspired to address the issues at hand so that the results are in accordance with the objectives set-out. Please accept on behalf of Mozambique, as host country, our best wishes for a productive workshop and an enjoyable stay in Mozambique.*

*This being said, I declare open the regional meeting dedicated to the subject: "OIE international standards, a lever for growth in the fisheries and aquaculture sector in Southern Africa"*

*Thank you very much.*

GENERAL OVERSIGHT  
OF THE SECTOR





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## GENERAL INTRODUCTION ON AQUACULTURE AND INLAND FISHERIES IN THE WORLD

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*Rohana P. Subasinghe and Melba B. Reantaso (FAO), presented by Chadag V. Mohan*

Global aquaculture production has grown rapidly during the past four decades, contributing significant quantities of fish for human consumption. Aquaculture is the fastest growing food producing sector, and now accounts for nearly half (47 %) of the world's food fish<sup>1</sup>, and with its projected growth, aquaculture will in the near future produce more fish for direct human consumption than capture fisheries.

Although aquaculture originated as primarily an Asian freshwater food production system, fish farming has now spread to all continents, encompassing all aquatic environments and utilizing a wide range of aquatic species. From an activity that was principally small-scale, non-commercial and family-based, aquaculture now includes the large-scale commercial production of high-value species that are traded at the national, regional and international levels. Although aquaculture production remains predominantly Asian and is still largely based on small-scale operations, there is a general consensus that aquaculture has the potential to meet the growing global demand for nutritious food fish and to contribute to the growth of national economies, while providing support to sustainable livelihoods of many communities.

Aquaculture plays an important role in global efforts to eliminate hunger and malnutrition through supplying fish and other aquatic products rich in protein, essential fatty acids, vitamins and minerals. Aquaculture also makes significant contributions to development by improving incomes, providing employment opportunities and increasing the returns on resource use. According to FAO figures, aquaculture directly created 12 million full-time employments in Asia in 2004. Aquaculture thus makes a significant contribution to the national GDPs in many developing countries in Asia and Latin America. With appropriate management, the sector appears ready to meet the expected shortfalls in fish supplies for the coming decades and to improve global food security.

Availability of food is a necessary but insufficient condition for food security. Affordability is a major aspect of food access. By providing farmers with revenues obtained through sales of their produce and by creating employment, aquaculture enhances households' disposable incomes and their ability to purchase food. Increasing the availability of aquatic products to domestic markets can lower the price of these products, thereby making them affordable and more accessible to local consumers. Beyond individuals and households, at a macro-economic level, aquaculture can also contribute to countries' economic performance and growth by generating profits and producing tax and export revenues. Good infrastructure and investments in human capital will improve the productivity of labour and increase access to capital, benefiting local businesses and enhancing the development of rural communities.

With existing resources and technological advances, food fish production from aquaculture can be further expanded in a more sustainable manner. However, this is only possible if the sector's socio-economic benefits accrue to a large social spectrum. The main challenge for policy-makers and development agents is thus to create an "enabling environment" for the aquaculture sector to maintain its growth while meeting societal needs and preserving the natural resource base it needs to achieve successful production. This enabling environment is multi-faceted and requires significant political will, sustained policy, public sector support and investment.

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<sup>1</sup> In this document "food fish" or simply "fish" refers to production of aquatic animals (fish, crustaceans, molluscs, echinoderms and amphibians). Aquatic plants are considered separately.

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## OVERVIEW OF THE AQUACULTURE AND FISHERIES SECTOR IN SOUTHERN AFRICA

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*Etienne Hinrichsen<sup>2</sup>*

This paper provides a summary of the aquaculture and fisheries sectors in the *Southern African Development Community* (SADC) region and looks at the most effective means of dealing with the challenges faced by these sectors towards achieving their full potential.

The SADC region comprises 14 member states, has a coastline of approximately 20 000 km with an EEZ of 7 million km<sup>2</sup> and an annual fisheries production of 2.7 million metric tons. Annual seafood exports are worth USD 1.3 billion. The fisheries sector employs in excess of 250 000 people. Yet, total fisheries for the entire African continent contributes to only 5.1% of global fisheries output.

The south-west and west coast regions are dominated by demersal and pelagic fish catches, including hake, orange roughy, horse mackerel, pilchard and toothfish. The small pelagic fish (anchovy, pilchard, round herring and horse mackerel) represent 45% of the total SADC catches. The south-east and eastern coastal regions are dominated by prawn and tuna catches with a high value to mass ratio. Prawn and other crustacean landings add up to approximately 50 000 tonnes per year. Marine capture fisheries contribute to approximately 70% of total capture fisheries (including marine and freshwater landings).

In the inland regions, species such as Nile perch, tilapia, kapenta and catfish are common, with fresh water catches contributing 26.5% of the total SADC catches.

Industrialized marine fisheries are dominated by European and Asian vessels, but more nationalisation is becoming evident. Small scale and artisanal fisheries are very common, but more so on the eastern seaboard and inland water bodies. These catches are mainly geared towards auto-consumption, while post harvest losses are high and accurate production statistics are largely lacking.

Seafood exports from the region are dominated in tonnage by Namibia, with South Africa second. By value the South African exports are however higher than those of Namibia. The primary markets for fisheries exports from the SADC countries are the EU (39%), USA (17%), Japan (18%) with intra-regional trade contributing to approximately 10%.

The primary obstacles in fisheries trade in SADC include:

- A lack of adequate infrastructure (transport, cold storage and distribution networks);
- A lack of foreign exchange services;
- A lack of export credit facilities;
- High taxes and import duties;
- A lack of knowledge about sources of reliable market information; and
- An increasing complexity in import regulations for the main markets.

Obstacles hindering fisheries development in SADC include:

- Corruption;
- Poor fisheries resource management;
- Lack of knowledge;
- Exploitation by developed nations;
- Overfishing and habitat destruction; and
- Limited success with black economic empowerment

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<sup>2</sup> Much of the information in this paper has been provided by the Namibian office of INFOSA

Aquaculture production from the region is dominated by Zambia, Tanzania, South Africa and Madagascar. Some of the main challenges faced by the aquaculture sector include:

- The fact that aquaculture is not a “*cure-all*”. It has real costs and benefits;
- A lack of achieving the right fit between production systems and the environment;
- The high cost of certain aquaculture products and the fact that this hinders the achievement of broad based food security;
- The multi-disciplinary nature and demands of aquaculture as an activity;
- The availability of suitable seed and brood stock;
- The availability of capital and credit;
- The lack of market penetration; and
- The lack of national and regional coordination.



*Submersible marine fish cages – Ferme Marine de Mabebourg – sustainable aquaculture and marine fish farming in Mauritius  
© Graham Benjamin, Ferme Marine de Mabebourg, Mauritius.*

The challenges faced by fisheries and aquaculture in the SADC region can best be addressed by the creation of better “*connectivity*”. These problems and challenges are not unique and have been solved in other regions (both within SADC and globally). This means that an improved flow of information and better cooperation can short-circuit these constraints. This would imply that SADC must become an active member of the global aquaculture and fisheries community and that resource must be matched to markets, to needs, to people and to opportunities. This can be achieved with outcome based and accountable strategic planning and strategies.

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## OVERVIEW OF THE OIE'S INVOLVEMENT IN TERMS OF AQUATIC ANIMAL DISEASES

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*Eli Katunguka – Rwakishaya*

The importance of aquatic animal health continues to increase, not least because of the steady expansion of aquaculture production (mainly the farming of fish, molluscs and crustacean species) throughout the world. The latest figures (FAO, 2007) show that the contribution of aquaculture to global supplies of fish, crustaceans, molluscs and other aquatic animals has increased from 3.9 % of total production by weight in 1970 to 27.1% in 2000 and 32.4% in 2004. Countries in the Asia and the Pacific region accounted for 91.5% of the production quantity and 80.5% of the value in 2004.

Worldwide, aquaculture production continues to grow more rapidly than all other animal food-producing sectors. The aquaculture sector has grown at an average rate of 8.8% per year since 1970, compared with only 1.2 % for capture fisheries and 2.8% for terrestrial farmed meat production systems over the same period. However, diseases continue to impact heavily on aquaculture production, and international trade in aquaculture animals is still causing spread of major infectious diseases. Several new diseases have emerged in recent years and some have spread internationally, particularly in shrimp aquaculture. The OIE international health standards for international trade in aquatic animals are continuously reviewed and updated by the *Aquatic Animal Health Standards Commission* (AAHSC) with the assistance of internationally renowned experts. The current editions of the *Aquatic Animal Health Code* (OIE 2007) and the *Manual of Diagnostic Tests for Aquatic Animals* (OIE 2006) incorporate several important modifications agreed during the 74th General Session in May 2006, including amendments to the listed aquatic animal diseases. It is important that Members are aware of these changes and meet their obligations on reporting the occurrence of the listed (and emerging) aquatic animal disease to the OIE. Work has commenced in new areas such as aquatic animal welfare for which a draft set of guidelines has been prepared, and aquatic animal disease surveillance for which a Code chapter has been drafted for Members' comments. Also, the OIE *International Committee* agreed at the 75<sup>th</sup> General Session in May 2007 that amphibian diseases should be included in the remit of OIE. An ad hoc group of the AAHSC has identified two diseases that meet the OIE criteria for listing, and draft Code chapters for these diseases have been prepared and will be distributed for Members' comments.

There have been continuing efforts to encourage greater involvement of veterinary services in the field of aquatic animal disease and to improve cooperation between veterinary and other authorities with competence for aquatic animal health. In this regard, an OIE Global Conference on Aquatic Animal Health '*Defining Roles and Responsibilities*' was held in Bergen, Norway in October 2006 to provide an opportunity for OIE and its Members to exchange the latest information on developing a science-based approach to the management of aquatic animal health and welfare. This will assist in the evaluation and improvement of the current standards and guidelines for better control of infectious aquatic animal health and countries' capabilities to prepare for, and respond to, aquatic animal disease emergencies, as well as better defining roles and responsibilities. The proceedings of the conference will be published in the near future. In addition, there will be a special multi-author issue of the Scientific and Technical Review Series on '*Changing Trends in Managing Aquatic Animal Disease Emergencies*' due for publication in April 2008. Finally, the AAHSC pages on the OIE website ([www.oie.int/aac/eng/en\\_fdc.htm](http://www.oie.int/aac/eng/en_fdc.htm)) are kept continuously updated to provide easy access to the current OIE standards for aquatic animal health as well as the latest reports of the Commission and its ad hoc groups, and aquatic animal disease occurrence reports submitted by Members.

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## OVERVIEW ON AQUATIC ANIMAL DISEASES OF FRESH AND BRACKISH WATER SPECIES, WITH PARTICULAR REFERENCE TO AFRICA

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*David Huchzermeyer*

Remote from the rapidly expanding aquaculture areas elsewhere in the world, Southern Africa has until recently enjoyed a relatively low disease impact on its aquatic animals.

This is reflected in the disease-free status of farmed salmonids in the region, making them at one time a desired source of eyed ova for northern hemisphere trout farms. Trout ova were first successfully imported into South Africa in the late nineteenth century and from this time on, brown and rainbow trout have been successfully propagated. To this day, only eyed ova have been imported, thereby limiting the introduction of disease. South Africa has a legislative framework governing the importation of certified disease-free trout ova.

To date, none of the OIE notifiable diseases have been diagnosed in South Africa. By contrast, common carp, that were imported as early as 1859, as well as the importation of grass carp and possibly other exotic species including ornamental fish, were held responsible for the introduction of a number of parasitic diseases into southern African waters including *Ichthyophthirius multifiliis*, *Trichodina acuta*, monogenean and digenean trematodes, *Argulus japonicus*, *Lernaea cyprini* and *Bothriocephalus acheilognathi*. These have now become common to the region.



*Bacterial infection in intensively reared rainbow trout in South Africa © David Huchzermeyer*

In South Africa, ambiguities in import legislation have allowed the unrestricted importation of koi, the ornamental variety of carp. The recent emergence of *Koi Herpes Virus* (KHV), a serious disease of carp, which spread rapidly around the world by movement of koi through the ornamental fish trade, made its appearance almost simultaneously on various continents during 1998. Major outbreaks followed in food carp fisheries in many countries. KHV has caused serious losses in South Africa in koi, however the impact on wild carp stocks has not been established. The ease with which KHV has spread has drawn attention to *Spring Viraemia of Carp* (SVC). SVC has not been diagnosed in South Africa and the relatively high water temperatures may preclude expression of this disease in the country.

Numerous bacteria have been implicated in disease outbreaks in farmed fish in South Africa. The majority of these are regarded as opportunistic in multi-factorial aetiologies, e.g. *Streptococcus D* of trout, which has significant economic impact.

*Epizootic ulcerative syndrome* (EUS) was identified in the upper Zambezi and Chobe rivers in 2007, affecting fisheries in Botswana, Namibia and Zambia. The fish diversity of these rivers (approximately 134 indigenous species), supports one of the most significant freshwater fisheries in the region. It has not been established how the causative agent of EUS, *Aphanomyces invadans*, infected this aquatic system, but it appears likely that introduced aquaculture species played a role. To limit the spread of EUS and other diseases into sensitive aquatic ecosystems and aquaculture fisheries, the following essential strategies must be considered: developing regional diagnostic capacity, harmonizing regional legislation, training field personnel and developing a structured and coherent approach by the regional stakeholders.

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**OVERVIEW OF CURRENT REPORTING TO OIE, TENDENCIES IN AFRICA, MAIN DISEASES REPORTED**

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*Francesco Berlingieri*

The OIE *World Animal Health Information System* (WAHIS) allows to collect, analyse and disseminate data on the animal health situation worldwide.

In 2007, out of 23 immediate notifications in the African region received by the OIE only 2 pertained to aquatic diseases and of these 2 one was finally recognised as a misdiagnosis. Therefore in 2007 the OIE received only one immediate notification related to the *epizootic ulcerative syndrome* (EUS). This notification reported on the EUS outbreak of 20 December 2006 in the Chobe and Zambezi rivers in Kasane region (Botswana) where *Aphanomyces invadans* was identified in wild fish. After the implementation of a sampling program the outbreak was declared closed on 03 September 2007 by the authorities of Botswana.

The Chobe and Zambezi rivers pass through Angola, Zambia, Namibia, Botswana, Zimbabwe and Mozambique but only Botswana reported an EUS outbreak in 2006 or 2007. At the 2008 OIE General Session the Delegate of Zambia reported EUS outbreaks in that country.

Table 1 below summarises the reporting activities of the OIE Members in the SADC region for the year 2007. It indicates also if the Members reported only on disease of terrestrial animals (T) or on both terrestrial and aquatic animal diseases (B). The majority of Members are using WAHIS (W) while only 4 Members are still reporting using paper forms (P).

In conclusion there is room for improvement in the data reporting strategies in the African region. In the field of aquatic animal health the information received by the OIE in this region is scarce and fragmented and the national OIE focal points for aquatic animal health have a key role to play in improving this situation.

COUNTRY	1 semester	2 semester	Annual	Type report	Format
ANGOLA					
BOTSWANA	1	1		T	W
CONGO (DEM. REP. OF THE)	1			T	P
LESOTHO	1	1	1	B	W
MADAGASCAR	1	1		B	P
MALAWI		1		B	P
MAURITIUS	1		1	T	W
MOZAMBIQUE	1	1		B	W
NAMIBIA	1	1	1	T	W
SOUTH AFRICA	1	1	1	T	W
SWAZILAND	1	1	1	T	W
TANZANIA	1	1	1	T	W
ZAMBIA	1	1		T	W
ZIMBABWE	1	1		T	P

*Table 1: Reporting activities of the OIE Members in the SADC region for the year 2007; updated in May 2008.*

*1= report submitted; T= Members report only on disease of terrestrial animals; B= Members report on both terrestrial and aquatic animal diseases; W= Members report using WAHIS; P= Members report using paper forms (P).*

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## OVERVIEW OF THE AQUACULTURE AND FISHERIES SECTOR IN ANGOLA

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*Esperanza Justiz Silva and Nelson Samuel*

Angola covers an area of 1 246 700 km<sup>2</sup> with a population of 13.5 million and a coastline of 1 650 km. Of the 2003 GDP of USD 13.2 billion, 3 % originated from fishing and fish processing. The fisheries sector is involved in import, export, production and transformation of fisheries product. Principal species being exported are common cuttlefish, deep-water rose shrimp, caramote prawn, white grouper, long neck croaker and southern meager.

The main international markets for fisheries products from Angola are the European countries. Angola imports marine fisheries and aquaculture products from China, Mozambique, Singapore, India and Thailand.

Several local high value fresh water species have contributed significantly to fish catches from Angolan rivers and smaller lakes. Of more than 255 freshwater species, *Tilapia* spp. is the most important and abundant with commercial and rural level production. *Clarias* species, produced rurally, and freshwater prawns (*Macrobrachium rosenbergii*) have potential for further utilisation.

Within the Ministry of Fisheries, the *National Institute of Fisheries Research* (INIP) is responsible for industrial and semi-industrial marine fisheries. The *Institute of Development of Traditional Fisheries and Aquaculture* (IPA) is accountable for marine and inland rural fisheries. Commercial and rural aquaculture falls under the control of the *National Aquaculture Direction* (DNA) and the *Institute of Development of Traditional Fisheries and Aquaculture* respectively.

Aquaculture in Angola is practiced on a small scale, both community and private sector driven, and no statistical production data are available. There is currently no development of marine aquaculture.

The legislation governing fisheries and aquaculture includes the *Law on Aquatic Biological Resources*, the Fisheries Regulation and the Aquaculture Regulation. Disease control of imports and exports is exercised under the *Law of Animal Health* no. 4/04 and the *Law of Health Regulations* no. 5/87. International memberships include the OIE, WTO (since 1996), WHS and FAO. Aquatic animal health falls under the responsibility of the Fisheries Ministry (INIP and IPA).



*Small-scale aquaculture in Angola:  
Tilapia Piscicultura de Angola, Lda in Luanda  
© Esperanza Justiz Silva, Instituto de  
Desenvolvimento de Pesca Artesanal e Aquacultura  
(IPA), Angola*

Angola currently has no recorded data about fish diseases. None of the public diagnostic, research and private laboratories is accredited for the diagnosis and analysis of epizootic aquatic diseases although recommendations from regional accredited laboratories are implemented. The *Veterinary Research Institute* provides terrestrial animal disease diagnostic services and is responsible for establishing a range of disease diagnostic services but Angola has no specialist expertise in diagnosis and identification of aquatic animal diseases, diseases and pests of aquatic plants and algae and in invasive aquatic plant identification. There is a lack of official surveillance and monitoring and no emergency plan for the diagnosis and eradication of aquatic animal diseases, making it difficult to control such diseases. Inefficient quality assurance programmes further threaten the sector.

Opportunities are there to overcome these constraints and put in place a permanent mechanism by which to respond to disease outbreaks. Angola does have several agro-ecological zones and natural features suitable for aquaculture development. It also has a wide range of potentially suitable endemic freshwater species, readily available raw material leading to low fish feed production costs, a high local demand for aquaculture products and a regulatory support for the industry.



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## OVERVIEW OF THE AQUACULTURE AND FISHERIES SECTOR IN BOTSWANA

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*Neo Mapitse*

Botswana is a landlocked country covering 581 730 km<sup>2</sup> with a population of 1.5 million. Natural fishing with an estimated annual production of 155 metric tons occurs in the Okavango delta, the Chobe and Zambezi rivers and other major rivers of Botswana. Reservoir fishing is seen in the 4 dams located throughout the country offering about 61 km<sup>2</sup> of surface water. Reservoir fisheries production, annually ranges between 2 and 10 metric tons and is augmented by production from 300 smaller dams built by the Ministry of Agriculture for livestock watering.

Aquaculture is still in its infant stages and the government has commissioned a fish hatchery at Mmadinare for demonstration purposes, fingerling supply to potential farmers and stocking of dams. There are two crocodile farms in Botswana that export live crocodiles and skins. Sport fishing, especially in tourist areas, is a growing activity.

Annual fisheries production has remained around 150-200 tonnes from 1997/98 to 2004/05. However import requirements from year 2000 have shown a sharp increase to about 720 tonnes in 2004. This trend of increased demand is expected to grow and shows a potential for investment in the industry.

*Epizootic ulcerative syndrome* (EUS) caused by *Aphanomyces invadans* was diagnosed in fish from the Chobe and Zambezi river system in April 2007 and was reported to the OIE in the same year. Abnormal fish mortalities with red body lesions were first observed on fish during October 2006. Various species including *Serranochromis angusticeps*, *Barbus poechii*, *S. robustus*, *Schilbe intermedius*, *Clarias gariepinus* and *C. ngamensis* were affected. The disease was difficult to control in the natural waters and the outbreak was prolonged. Monitoring and surveillance was continued by the joint efforts of the Departments of Wildlife and National Parks and Veterinary Services. A technical assistance programme funded by FAO was undertaken and experts were brought in to assist following the initial suspicion by regional experts that Botswana was dealing with an EUS outbreak.

During the investigation of the disease, an initially inconclusive outcome resulted in an extended fishing and movement ban being put in place in the affected area. The livelihoods of the local people were significantly affected since they depended on fish and fishing.

The *Botswana National Veterinary Laboratory* (BNVL) is a public diagnostic laboratory with a small research component. BNVL is under the supervision of the Director of Veterinary Services and has some tests accredited by the *South African National Accreditation System* (SANAS). The laboratory has twinning and collaborative arrangements within the region and worldwide. BNVL has capacity to offer general parasitology, bacteriology/mycology, tissue culture, immunoassay (e.g. ELISA), molecular diagnostics (e.g. PCR), histopathology, residue analysis, water quality analysis and food safety control. Private laboratories are limited.

There is no specialist in aquatic animal disease diagnostics at BNVL. However there are two officers trained in fish pathology and introductory fish medicine, but they are not practicing. One officer has undergone training in 2008 and has been identified for further development in aquatic diseases. The *Botswana College of Agriculture* does not offer courses on aquatic animal diseases. The planned developments and potential in aquaculture, provide the opportunity for building capacity in aquatic diseases. Training in this field requires immediate attention.

Botswana has legislation that deals with animal health controls (*Diseases of Animals Act*) and food safety issues (*Food Control Act*). Further legislation deals with protection of fish (*Fish Protection Act*). These laws are supported by regulations, the most recent being the *Fish Protection Regulations* of 2008.

Although there is considerable fragmentation, the role of government institutions provides clearly defined responsibilities. Veterinary Services deal with certification and animal health issues, where as local government authorities and the Ministry of Health cover food safety and inspections. The Ministry of Environment, Wildlife & Tourism's division of fisheries is charged with production and fishing licenses. This overlaps with Water Authorities issuing fishing boat licences.

In conclusion, there is a strong political will to strengthen the fisheries sector as there is a growing demand for fish as alternative protein. The Government sponsored hatchery and the increasing number of dams constructed present new opportunities. The gaps in diagnostic capacity and aquatic disease knowledge need to be addressed for maximum utilisation of existing resources and infrastructure.

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## OVERVIEW OF THE AQUACULTURE AND FISHERIES SECTOR IN THE DEMOCRATIC REPUBLIC OF THE CONGO

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### *Da Sembali Bete*

The DRC is situated in the centre of Africa, trans-sected by the equator, covering an area of 2 345 000 km<sup>2</sup>, and is neighbour to 9 countries. The country has a human population of 60 million inhabitants. Water surfaces cover 86 000 km<sup>2</sup> or 3.6 % of the national territory.

The Congo River has a length of 4 200 km, reaching from its source in Lualaba in Katanga to the Atlantic Ocean at Banana in Lower Congo. The country is well endowed by lakes, all rich in fish resources. In the central basin lie Lake Tumba in the province of Ecuador and Lake Maïndombe in Bandundu province. Lakes Moëro, Tshiangalele, and Muadingusha, as well as the Kamalondo depression lie in the southeast, and in the east are the Great Lakes: Albert, Edward, Kivu, and Tanganyika. These water bodies offer the country an important production potential of up to an estimated 710 000 metric tons of fish per annum. Approximately 400 fish species are encountered in Congolese waters, of which around 100 are of economic importance. Annual fisheries yield for 2005 and 2006 was 150 000 and 236 590 tonnes respectively. The DRC no longer exports fish. Since the national production is insufficient to meet the country's needs, the country is forced to import up to 170 000 tonnes of fish per annum. Per capita fish consumption has steadily declined from 13.5 kg in 1967 to 5 kg per annum in 2001.

More than 90 % of the fisheries production is from small-scale and traditional fisheries with the numbers of amateur fishermen varying from 120 000 to 400 000. Semi-industrial fishing was introduced into Lakes Tanganyika, Edward and Albert in the 1970s. Strong regression and even disappearance of the fisheries occurred because of the wars. Industrial fishing is practised in maritime waters, but the weakness of the marine resources and the narrowness of the *Exclusive Economic Zone* (EEZ) of the country limit this development. Co-operatives created between 1970 and 1990 suffered from operational problems. Emergency relief aid agencies and NGO's have tried to create socio-professional organisations, as a starting point for the distribution of inputs for fishing and fish farming as well as other aid-packages.

Fish farming was introduced in the DRC in the 1950s through experiments with tilapia in Katanga. During the era from 1950 to 1960 the DRC had 120 000 ponds covering 4 000 ha and a production estimated at more than 6 000 tonnes per annum. Current production is estimated at between 700 and 3 000 tonnes of fish per annum, however there is currently no reliable information available.

There are two large veterinary laboratories administered by the Ministry of Agriculture and Rural Development, which are located in Lubumbashi and Kinshasa, and specialize in the field of diagnosis, research and production of viral and bacterial vaccines. A third veterinary laboratory exists in Goma in the province of Northern Kivu at the Catholic University of Graben. Supervision of the veterinary services and the veterinary administration falls under the Ministry of Agriculture and Rural Development (*Ministère de l'Agriculture et du Développement Rural*). The Ministry of Environment (*Ministère de l'Environnement*), the Ministry for Women's Affairs (*Ministère de la Condition Féminine*), the Home Office and Department of Decentralisation (*Ministère de l'Intérieur et Décentralisations*) add to the legislative framework of the country. Legislation in the DRC makes provision for the control of the OIE listed fish virus diseases: viral haemorrhagic septicaemia, infectious haematopoietic necrosis and spring viraemia of carp. In lake waters there is the risk of bio-toxin formation, which has the potential to massively destroy certain aquatic animals including fish.

The sector shows many weaknesses including the chronic shortage of information on aspects of marine and fish farming production systems and absence of strategic orientation and legislative instruments, including regulations. The current *Fisheries Act* is 71 years old and lack of a legal framework restricts development of a safe and enabling environment for fishermen, farmers and investors, in particular in the field of fish farming. The institutional capacities of the technical support services and research structures are poorly developed. Fisheries products are poorly utilised as a result of difficulties experienced in marketing of fresh fish, lack of infrastructure, remoteness of off-loading areas, weak performance of the processing industries and poor product conservation.

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## OVERVIEW OF THE AQUACULTURE AND FISHERIES SECTOR IN LESOTHO

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*Mosa Motsoene*

The mountainous Kingdom of Lesotho covers a land locked area of 30 355 km<sup>2</sup> with a population of 2.1 million. Lesotho's water resources are mainly in the form of rivers forming the headwaters of the Orange River system, the largest system south of the Zambezi. The rivers of Lesotho make up a total river length estimated at 2 160 km. They have a total drainage area of about 3 100 000 ha and an estimated total runoff of 4 400 million cubic meters per year. There are however a few medium-sized reservoirs, the largest, Katse Dam, being 36 km<sup>2</sup>. The current estimate of standing water is 80 km<sup>2</sup>. This follows filling up of a new reservoir, Mohale Dam.

Fishing and fish farming plays a very small role in the current economy of the country. Capture fisheries as well as rural aquaculture is of the subsistence type, mainly for food security. Carp (*Cyprinus carpio*) are primarily farmed in the warmer areas. Results with rainbow trout in cold-water aquaculture, although still at its initial stages, indicate potential for becoming an important foreign exchange earner for the country. Rainbow trout farming is linked to the *Lesotho Highlands Water Project* (LHWP) and a cage culture system (Katse Fish Farms) has been set up for the commercial production of 100 metric tons of produce. Rainbow trout and yellow fish form an important component of sport fishing in mountain streams. Current fisheries production of around 45 metric tons is restricted to limited fish resources. About 2 000 tonnes of fishery product, with a value of USD 2.3 million, are imported annually. 140 tonnes of fishery products, with a value of USD 600 000, are expected to be exported for the first time this year.

The diversity of fish species in Lesotho is very limited, consisting only of 17 species. Nine of these are indigenous while eight are exotic. The indigenous species with potential for development of capture fisheries are: small mouth yellowfish (*Barbus aeneus*), large mouth yellowfish (*Barbus kimberleyensis*), Orange River mudfish (*Labeo capensis*), mud mullet or moggel (*Labeo umbratus*) and sharp tooth catfish (*Clarias gariepinus*).

Lesotho has minimal diagnostic capacity and no nationally accredited laboratories. Use is made of collaborative agreements with South Africa, specifically the *Onderstepoort Veterinary Institute* and other private laboratories. There is no information available on OIE listed diseases. Veterinary and health officials oversee imported fish and fish products as well as the local fish markets. Regulation of fisheries is currently covered under the *Basotoland Fresh Water Fish Proclamation* (1951). Lesotho abides by the OIE and WTO. National fisheries and aquaculture policy and strategy have been formulated in line with the Ministry of Agriculture and Food Security policy of poverty eradication, income generation, employment creation and food security. The policy goal of the fisheries sector is to promote conservation of biodiversity; foster development and management of capture fisheries in rivers, reservoirs and dams and to support sustainable aquaculture development in suitable locations. The policy is implemented primarily through village level institutions. Lack of a suitable legislative framework and minimal usage of the available water resource have limited the role of fish farming and fisheries in the economy. The large available water area and a strong internal and external market potential provide the possibilities for development. Currently the greatest opportunity is presented by the LHWP.

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## OVERVIEW OF THE AQUACULTURE AND FISHERIES SECTOR IN MALAWI

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*Gilson Njunga*

Malawi, with a population of 12 million inhabitants, is land bound covering a total land area of 118 500 km<sup>2</sup> of which 20 % is fresh water. 11 650 km<sup>2</sup> or between 10 –25 % of the total land area is suitable for aquaculture. Fish farming in Malawi began as early as 1906 with the introduction of rainbow trout (*Onchorhynchus mykiss*) for angling. Culture of indigenous species began in 1956/7 with culture of *Oreochromis shiranus* and *Tilapia rendalli*. Pond culture of these species increased with the establishment in 1957 of the Domasi Experimental Fish Farm for breeding and distribution of these species to farmers. In the 1970's and 1980's donor support projects encouraged the sector with support from NGO's encouraging wide adoption of fish farming in the 1990's. Eight NGO's incorporated a fish-farming component in their food security programmes (Action Aid, World Vision International, CARD, COMPASS, OXFAM, Concern Universal, Christian Service Commission and US Peace Corps).

Aquaculture production has shown a growth of 7.36 % between 1980 and 2001 and now accounts for about 2 % of the nations total fish production. In 2003 annual aquaculture production was estimated at 651 tonnes with a value of USD 856 600. By contrast in 2007 the fisheries sector harvested close on 60 000 tonnes of fish down from a harvest of about 88 000 tonnes in 2005. There are currently over 4 050 fish farmers who own 9 500 fish ponds with an annual production of 800 tonnes of fish. Aquaculture production consists primarily of tilapia, *O. shiranus*, *O. karongae* and *T. rendalli* accounting for 93 %, catfish (*Clarias gariepinus*) 5 % and exotic species such as carp, black bass and trout 2 %. Aquaculture is practiced using extensive low input pond culture. Ponds are fertilized with livestock manure and additional feed in the form of maize bran is given. A cage culture farm has been initiated in Lake Malawi by MALDECO in the Mangochi district in the south of the country with a targeted production of 3 000 tonnes of fish. Screening for suitable species and selective breeding for genetic performance is ongoing at the Malawi National Aquaculture Center. A wide array of ubiquitous parasites and bacterial diseases affect fish in Malawi, but are not a major concern currently. There is no information available from Malawi on OIE listed diseases.

Legislative cover is provided by the *Environmental Management Act* (1996), the *Fisheries Conservation and Management Act* (1997), the *Forestry Act* (1997) and the *National Parks and Wildlife Act*. The Conservation and Management Regulations of 2000 and the National Aquaculture Strategic Plan of 2005 which safe guard against exotic species impacting on endemic fish species of Lake Malawi govern institutional arrangements. International treaties such as CITES, RAMSAR and CBD are adhered to. National policy and strategy documents including the National Fisheries and Aquaculture Policy (2001), Agriculture and Livestock Development Policy (MOALD) (1995), National Water Resources Policy (2004) and the National Environmental Policy (2004) provide operational guidelines for aquaculture development. The sector is strengthened by having appropriate legislation in place banning water hyacinth and having management plans and awareness campaigns on the dangers of invasive and alien species. Problems however exist with compliance and enforcement, absence of legal measures to address pathways of intentional or accidental introductions of invasive and alien species and inadequate capacity for risk analysis.

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## OVERVIEW OF THE AQUACULTURE AND FISHERIES SECTOR IN MAURITIUS

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*V. B. Groodyal*

The Indian Ocean island of Mauritius covers a landmass of 1 860 km<sup>2</sup> and has a population of 1.1 million people. The *Albion Fisheries Research Centre* (AFRC), which was involved with seed production of marine fish, supported the marine fisheries in the past. This included sea bream (guele pave) and marine shrimps (giant tiger prawn – *Penaeus monodon*). This project was discontinued in 2006. Inland fisheries consist of red tilapia (*Oreochromis* sp. hybrids imported from Malaysia) and fresh water prawns (*Macrobrachium rosenbergii*) and seed produced to service farms around the country is available with technical support from the AFRC. Local breeding of some freshwater ornamental fish does take place; while seawater aquarium fish are imported from Malaysia and Singapore for re-export. Marine sport fishing forms an important component of the tourism industry on Mauritius.

The *Ferme Marine de Mabebourg*, a sustainable aquaculture and marine fish-farming project, was launched in 1999 and has been in production since 2004. The project has secured land and sea leases and operates a modern hatchery, using recirculated water, with a production capacity of more than 1 million juveniles per year. The marine fish farm, based on modern submersible cages, produced 260 and 500 tonnes in 2004 and 2005 respectively. The existing sites have the capacity to produce over 2 500 tonnes per annum. Both channel bass and gold-lined sea bream are farmed. The processing plant is compliant to EU norms and has a processing capacity of 2 500 tonnes per year.



*Ferme Marine de Mabebourg – sustainable aquaculture and marine fish farming © Graham Benjamin, Ferme Marine de Mabebourg, Mauritius*

Crocodile farming takes place at the *La Vanille Crocodile Park*, an ecotourism venture established in 1984. The Nile crocodile (*Crocodylus niloticus*) breeding centre houses a breeding group of 50 females and 20 males that produce 1 000 eggs per year. Around 400 crocodiles are harvested each year with a yield of 1.2 tonnes of meat for the local restaurant market and skins for the leather trade.

Export of fishery product accounted for 79 707 tonnes in 2006 with a value of MUR 4 265.7 million (approximately USD 130 million), whereas 150 728 tons of fisheries product worth MUR 7 120.4 million (approximately USD 220

million) was imported in the same year. Main trading partners are the EU countries, USA, South Africa and Asian countries.

The Division of Veterinary Services operates under the aegis of the Ministry of Agro-Industry and Fisheries. Since 2006 the Veterinary Services has been empowered by law to act as the Competent Authority for official controls of seafood products intended for exportation to the international market. Since then officers of the Competent Authority have been actively involved in inspections and audits of all stakeholders engaged in the production chain of fishery and aquaculture products in line with the farm to fork approach. The Division of Veterinary Services is currently working on procedures for the registration of aquaculture production systems. The procedures will place emphasis on measures to be implemented for the prevention of aquatic animal diseases in the Mauritian marine ecosystem. Laboratory capacity is severely limited and no OIE listed diseases have been diagnosed. The *Aquaculture Activities Bill of 2008* and the *Fisheries and Marine Resources Act of 1988* (as amended) provide the regulations governing the sector. Mauritius is signatory to a wide range of international and regional treaties, conventions and bilateral agreements relating to the management of marine resources.

The year 2003 saw the implementation of the seafood hub project, a public private venture to develop a Mauritian seafood industry. The project aims at making optimal use of the country's marine resources in an *Economic Exclusive Zone* of around 2 million km<sup>2</sup>. Several fish business operators have taken this opportunity and are currently processing fishery products from capture fisheries for the export market. The European Union is so far the most important trading partner of Mauritius in seafood products. In relation to product safety, a *Residue Monitoring Plan* (RMP) has been implemented for farmed fish. The plan consists of sampling and testing procedures to detect a range of banned veterinary medicinal products and other harmful substances in farmed fish intended for human consumption. The RMP was approved by the European Commission Services in 2006 and is reviewed on a yearly basis.

Together with capture fisheries, aquaculture production is being given a strong impetus by the Authorities. Considering the fact that capture fisheries is expected to go through a tough phase in the future with the decline of natural fish stocks, aquatic animal farming systems will take the lead to meet the demand of fish and fishery products. As countries in the Southern African region further develop their aquaculture production systems to meet the demand of both local and export markets, the Veterinary Services will have to play a vital role in maintaining the sustainability of the aquaculture industry and the safety of its products, thus assisting their respective countries in building a reputation as viable producers of farmed fishery products.

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## OVERVIEW OF THE AQUACULTURE AND FISHERIES SECTOR IN MOZAMBIQUE

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*Filipe Januário*

Mozambique has a population of 19 million inhabitants, covers a coastal area of 800 000 km<sup>2</sup> and has a coastline of 2 700 km. The country has 100 000 km<sup>2</sup> and 13 000 km<sup>2</sup> of marine and fresh water respectively. Current fisheries production is 90 000 tonnes valued at USD 160 million with a potential production of 240 000 tonnes. Fisheries exports make up 13 000 tonnes with an annual value of USD 80 million. The sector makes up 4 % of GDP.

Legislation governing aquaculture and fisheries is included in the *Fishery Law* (Law 3/90 of 26 of September). Maritime fishing, aquaculture, health, commerce, customs and international food safety regulations (Codex, WHO, importing markets, EU, USA and others) have been harmonized under the *Regulation for Inspection and Quality Assurance of Fishery Products* (RIGO) under decree 17/2001 of June 12th .

Aquatic animal disease monitoring falls under the *Competent Authority for Fish Inspection* (INIP). A wide range of crustaceans (shallow- and deep-water shrimps, deep-water lobster, rock lobster, langoustine, deep crabs and mangrove crabs), marine fish (demersal and pelagic finfish and bottom fish), freshwater fish (pelagic kapenta, tilapia and freshwater prawns) and mollusks (bivalves, squids and octopus) make up the main fishery resources of Mozambique.

Trading partners, namely Europe (Spain, Portugal, UK and Italy), Africa (South Africa, Malawi, Zambia, Zimbabwe, DRC) and Asia (Japan, Hong-Kong) account for 63 %, 25 % and 12 % of trade respectively. 79 % of fisheries export revenue is earned from exports to the EU.

In 2007 Mozambique had 85 factory vessels, 17 processing plants, 2 aquaculture plants and farms and one freezer storage facility. The majority of these produced export products for the EU. Of the 8 575.7 tonnes of fishery product exported to the EU, 269.4 tonnes were from aquaculture prawns generating 3.5 % of the fisheries export earnings from the EU, the remainder being made up mainly of wild shrimp (7 532 tonnes), deep-water shrimp (644 tonnes) and fish (92 tonnes). Total fishery exports to the EU were worth USD 50 882 000, compared to 4 674 tonnes worth USD 13 510 000 to non-EU countries.

Aquaculture potential exists in Zambezia (6 100 ha), Sofala (19 200 ha) and Maputo (7 500 ha) provinces. Marine aquaculture species include *Penaeus monodon* and *P. indicus*. Inland water species suitable for aquaculture include *Tilapia rendalli*, *Clarias* spp., *Oreochromis mossambicus*, *O. niloticus* and *Macrobrachium rosenbergii*.

Mozambique has limited expertise in the fisheries sector with availability of only 22 veterinary graduates, 17 medium level veterinary personnel, 4 graduate biologists and 10 graduate chemists.

No OIE listed diseases have so far been reported by Mozambique. The country does not have any accredited laboratories for the analysis of aquatic animal epizootic diseases. Mozambique is a member of the OIE (since 1949), Codex Alimentarius, SPS Agreement and the WTO. Limited technical capacity, absence of laboratory capacity to monitor and trace reportable diseases, limited number of technicians involved as well as a limited budget place constraints on development of the sector. However a peaceful country and the government will to develop the aquaculture sector, particularly for the small scale farmer, add strength to the opportunities offered by the vast areas available for development of both inland and maritime aquaculture.

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## OVERVIEW OF THE AQUACULTURE AND FISHERIES SECTOR IN NAMIBIA

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*Bronwen Currie*

Namibia is a desert country covering 824 290 km<sup>2</sup> with a population of 2 million, and an extensive Atlantic coastline. Several major rivers are shared with its neighbours, Angola, Zambia, Botswana and South Africa. In Namibia, marine fisheries are a major earner of GDP. Aquaculture activities started in earnest in 2003, expanding in both marine (export) and freshwater sectors. Aquaculture is dominated by the marine sector where shellfish provide the main product. Oyster production (Pacific oysters, *Crassostrea gigas* and European oysters, *Ostrea edulis*) has increased rapidly from 247 tonnes in 2003 to 1 638 tonnes in 2007. Namibia has several productive advantages for mariculture including superb pollution free water quality, natural upwelling systems providing non-stop high primary production for filter feeding bivalves, rapid growth (to market size within 8 months), year round suitable water temperatures and an existing infrastructure for seafood processing and packaging. Abalone culture is developing rapidly and successfully and pilot raft culture projects include scallops (*Pecten* spp.) and clams (*Venerupis* spp.). Inland fisheries and freshwater aquaculture are orientated to food security and rural livelihood. Fresh water aquaculture development is supported through fish breeding, production, research and training projects at the *Inland Aquaculture Centre* (IAC) in Omusati region, ECO Fish Farm at Hardap dam (with a local commercial production of 360 tonnes per annum) and the *Kamutjonga Inland Fisheries Institute* in Kavango region.

Trading partners for capture fish are established, to mainly the EU, African countries, and the US. Trading partners for molluscan shellfish aquaculture products are mainly the Eastern countries and South Africa, with monitoring of shellfish carried out according to EU and US/FDA standards, as Namibia is aiming for export of shellfish products to these countries.

So far Namibia has had neither the necessary aquatic animal disease surveillance programmes in place neither reported any aquatic disease outbreaks to the OIE central authority, mainly because there has been no one responsible for aquatic diseases. (The Veterinary department of the Ministry of Agriculture, Water and Forestry is the national contact point.) However, the increasing aquaculture activities require that Namibia becomes active in the field of aquatic diseases, so the Ministry of Fisheries and Marine Resources has been appointed responsible.

Diagnostic laboratories for aquatic diseases do not exist in Namibia. There are limited accredited microbiological laboratories for water quality testing, but no capacity is developed for aquatic disease diagnosis. The national veterinary laboratory caters for terrestrial diseases only. Regionally, there is capacity in South Africa, mostly in the freshwater sector. *Epizootic ulcerative syndrome* (EUS) is the only OIE listed disease reported to have occurred in Namibia.



Whilst the Ministry of Fisheries is the custodian of all fishery and aquaculture activities, this Ministry is neither the Competent Authority for export of fishery and aquaculture products (Ministry of Trade and Industry) nor for reporting of disease (Ministry of Agriculture, Water and Forestry). However legislation under the Ministry of Fisheries (*The Aquaculture Act 2002*, near-final Import and Export regulations) clearly takes on the responsibility of disease control in the aquatic environment.

*Harvesting farmed oysters Crassostrea gigas, Walvis Bay, Namibia © Donald Anderson.*

In addition numerous international agreements and responsibilities including OIE, WTO, SPS Agreement, CITES, *Convention on Biological Diversity* (CBD), *FAO Code of Conduct for Responsible Fisheries* (CCRF), *Convention on the International Maritime Organisation* (IMO) and the SADC Shared Watercourse protocol hold Namibia responsible for disease reporting. In the next years Namibia will look to developing capacity in aquatic disease diagnosis and control.



National legislation, policy and strategy documents falling under the Ministry of Fisheries and Marine Resources includes the *Marine Resources Act* 2000, *Aquaculture Policy* 2001, *Aquaculture Act* 2002, *Aquaculture Strategic Plan* 2004 and the *Shellfish Sanitation Monitoring Programme* 2007.

Currently veterinary officials are responsible for export of ornamental fish while fisheries officials cover local aquaculture products and export of molluscan shellfish. Imported fish products, local aquaculture products and local fish markets also fall under the responsibility of health officials and trade officials have responsibility for imported fish products, export of ornamental fish, export fish processing and export of molluscan shellfish.]

Aquaculture is growing rapidly with a strong political will and international commitment for responsible aquatic disease diagnosis and reporting. Export markets for the lucrative marine sector demand compliance. Lack of diagnostic laboratories for the diagnosis of diseases of both marine and freshwater organisms is cause for concern. Increasing aquaculture requires that Namibia becomes active in the field of aquatic diseases with aquaculture being a priority for the Ministry of Fisheries and Marine Resources.

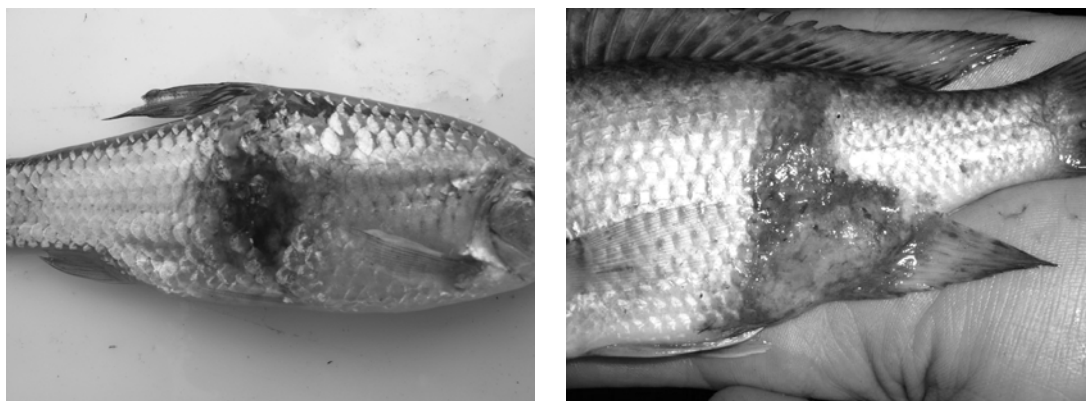
## SPECIFIC INFORMATION ON EPIZOOTIC ULCERATIVE SYNDROME IN NAMIBIA

*Ben C. W. van der Waal, presented by Bronwen Currie*

*Epizootic ulcerative syndrome* (EUS) was not known from Africa before the outbreak that started around October 2006 in the Chobe and Zambezi rivers in the Caprivi region of Namibia. EUS was first reported in farmed freshwater fish in Japan in 1971, then in estuarine fish in eastern Australia in 1972. The disease spread to Papua New Guinea, South-East and South Asia, and recently into West Asia, including India and Pakistan. It may also have already spread to the United States of America.

EUS now occurs in the whole Zambezi/Chobe area in the Caprivi Region of Namibia, affecting so far 22 fish species. No affected fish were found from the Kwando River. The presence of EUS in the Zambezi River was shown from various sources: annual fish biological surveys; two-monthly biological surveys; monitoring of annual angling competitions; and two-weekly monitoring of the fish market at the *Katima Mulilo Open Market*. During biological surveys a total of 70 011 fishes were collected and inspected. 108 fish with sores were identified. The incidence of EUS in natural fish populations after the initial outbreak in Caprivi remains low to date (March 2008).

The freshwater mould *Aphanomyces invadans* penetrates the skin of fish, forms ulcers and penetrates with aseptate hyphae into underlying tissue. EUS occurs mostly during periods of low temperatures [18-22°C] and after heavy rainfall. Control of EUS in natural waters is probably impossible. Outbreaks in farm ponds or in small, closed water-bodies, can be controlled by liming water and improving water quality, together with removal of infected fish.



*Aphanomyces invadans* (EUS) in infected fish from Caprivi, Namibia. Left: straightfin barb, *Barbus paludinosus*, collected 31 May 2007, Lake Liambezi, Caprivi Region. Right: Purpleface largemouth, *Serannochromis macrocephalus*, collected 13 Dec 2007 at Ihaba, Chobe River, Caprivi Region © Ben C. W. van der Waal.

The recommendations developed at the FAO workshop on EUS in Lusaka should be applied, namely that the movement of all live fish in the whole region must be strictly controlled. All movement of live fish [including fish for fish farming] should be subject to a health certificate issued by the relevant Fishery/Veterinary Department. This would imply that fingerlings for fish farming purposes should not be transported from one river system to another but should be bred locally from local fish populations. A fish hatchery is now being set up for the Kwando River area by the *Lead Fish Farmer Programme*. The authorities of all the countries involved, have to consider the possible socio-economic impacts of the rather harsh regulations. Such actions should not be undertaken without in depth consultation with EUS experts about the efficiency of such control measures and an investigation into the socio-economic impacts of such regulations on the fishers and fish traders. Surveillance of the fish population in Caprivi should be continued. The present two-monthly biological surveys as well as the annual survey should be used for this purpose. Staff of the Ministry of Fish and Marine Resources and police officers/game guards of conservancies should be trained to identify sick fish and to collect samples for confirmation of EUS. A leaflet or poster should be distributed to inform government departments and the public in general.

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## OVERVIEW OF THE AQUACULTURE AND FISHERIES SECTOR IN THE REPUBLIC OF SOUTH AFRICA

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*Motseki Hlatshwayo & Tiroyamodimo Violet Modungwa*

South Africa is home to about 47 million people, distributed throughout the nine provinces, with 11 official languages. It lies geographically between 22° to 35° latitude (south) and 17° to 33° longitude (east), and occupies 1 219 090 km<sup>2</sup> on the southern tip of Africa with a coastline stretching for 3 000 km and an average rainfall of 450 mm per annum.

It is a middle income country that accounts for more than half of Africa's total GDP at USD 255.3 billion and a real GDP growth of 5%. Agriculture, fisheries and game contribute around 3% (primary sectors) and 18% (secondary sectors) to the GDP.

South Africa has a well established fishery sector and is currently a net exporter of fishery products. However, most South African fisheries are considered to be fully utilized and high value fisheries such as abalone, prawns and line fish are largely over-exploited. Projected increase in demand for high-end fisheries products provides an opportunity for substantial increases in aquaculture production. South Africa's commercial fishery industry is valued at about R2 billion annually and employs 27 000 people, with the total annual fish production of more than 600 000 tonnes.

Given current market trends, South Africa's environmental potential for aquaculture and the state of development of its industry, production could grow from current levels of 3 543 tonnes (worth ZAR 218 million) [USD 27 million] to over 90 000 tonnes (worth ZAR 2.4 billion) [USD 300 million] over the next 10 years. In 2006 direct employment on farms was 1 817 (3 600 if one considers the services sector, feeds, processing, security, transport, packaging, manufacturing of equipment, research and government services). If production grows to projected a level of 90 000 tonnes per annum, the aquaculture industry will have employment potential of over 44 000 people.

In terms of managing bio-security risks facing the sector in South Africa, there are efforts to build capacities for the State to be able to provide full diagnostic services. The current competencies present within public services lie with the *Onderstepoort Veterinary Institute* (OVI) of the *Agricultural Research Council* (ARC) and the Provincial Veterinary Diagnostic Laboratories.

Apart from the government facilities, public research laboratories also exist at different academic institutions (Universities of the Free State, Johannesburg, Limpopo, Rhodes and Stellenbosch) and have different levels of competencies and expertise. There are other private laboratories throughout the country that are also accredited through the *South African National Accreditation System* (SANAS).

In terms of managing the activities within the aquaculture and fisheries sectors in South Africa, several government departments have different mandates and relations are managed through several institutional arrangements, viz. the *Aquaculture Sector Working Group* (ASWG) and the *Marine Aquaculture Advisory Committee*.

The Department of Agriculture (DoA) is responsible for freshwater aquaculture, veterinary services and farmer support and development, Department of Environmental Affairs and Tourism (DEAT) is responsible for marine aquaculture and licensing for different species, Department of Science and Technology (DST) is responsible for development and adapting of adequate technologies and technology transfer, Department of Trade and Industry (DTI) is responsible for business development through capital investment and business skill development, Department of Water Affairs and Forestry (DWAFF) is responsible for water licensing, Department of Provincial and Local Government (DPLG) is responsible for identification of sites suitable for aquaculture and for local economic development, Department of Health (DoH) together with the *South African Bureau of Standards* (SABS) are responsible for public health, quality and safety of fisheries products, and Provincial Departments of Environmental Affairs are responsible for the environmental impacts assessments.

All these mandates are governed by the existing policy (Freshwater and Marine Aquaculture Policies, Water Use Policy for Aquaculture and the Industrial Policy) and legislative (*Animal Diseases Act*, *Animal Improvement Act*, *Marine Living Resources Act*, *National Environmental Act* and *National Water Act*) environment and adhere to the international conventions and treaties.

The aquaculture sector is currently facing challenges in the form of limited capacities (expertise and aquaculture professionals), lack of technical skills and support (extension services), high feed, equipment and technology costs, limited government support, veterinary services and disease management, lack of species choice and good seed stock, complex resource-based legislation, lack of marketing services and access to finance and climatic variability and seasonality. But there are strengths that the sector possesses which include good natural resources and infrastructure, demand for affordable alternative protein sources, aquaculture being on the government agenda, high potential for

agricultural diversification, potential for export opportunities, linkages with tourism, and growing economy and good economic climate.

The South African government is currently investing in the development of the aquaculture sector through several programmes, viz. revitalisation of state-owned hatcheries, provincial freshwater cage-culture pilots in state-owned waterworks, marine cage-culture pilots, capacity building programme for extension officers, veterinarians, animal health technicians/technologists and inspectors, most of which are partnerships between different government and private stakeholders.

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## OVERVIEW OF THE AQUACULTURE AND FISHERIES SECTOR IN SWAZILAND

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*Freddy Magagula*

Swaziland is a land-locked country and is bordered by the two Republics of Mozambique and South Africa. It has a land surface area of 17 600 km<sup>2</sup> with a population of approximately 1 million people. It is divided into four ecological zones, namely the Highveld, Middleveld, Lowveld and the Lubombo. The country has only smaller rivers and man-made dams.

Swaziland has a limited inland capture fishery that operates at the subsistence level. The main fishery activity lies with aquaculture and aquaculture development. Local people are encouraged to farm fish at homestead or household level. This is largely to improve protein intake by the low-income sector of the populace. At present, there are about 1 760 family fishponds, with an average pond size of 200 square metres, scattered around the country. Potential commercial ventures are highly encouraged.

The major fish species cultured in order of importance are tilapia, catfish and common carp. Rainbow trout play a small role in the Highveld region where temperatures are favourable and sport fishing forms a component of the country's tourism industry. Total fisheries production, which is at a subsistence level, is around 60 tonnes with no export of product. In contrast to the perceived view that Swazi's do not eat fish, import figures indicate a moderate consumption of fish. Fishery products are imported to a value of SZL 4.17 million (approximately USD 400 000). There is a limited importation of ornamental fish. The Kingdom's main trading partners are South Africa and Mozambique.

Imported fish products are monitored by Ministry of Health as well as trade officials. In addition local fish markets are monitored by fisheries officials. The Government plans to include fish production as one of the commodities for enhancing an improved food security in the country. Swaziland has no fish disease diagnostic laboratory and the public *Central Veterinary Laboratory* deals with terrestrial animals only. The country has no fish veterinarians and there is no reported work done on fish diseases and hence no information available on OIE listed diseases. Swaziland has no fish disease legislation and the *Fisheries Act* is limited and out dated. The *Animal Diseases Act* of 1965 is being reviewed and updated. The Kingdom adheres to international treaties and has a permit system governing imports and exports. Capacity for dealing with fish diseases is lagging behind and this needs to be urgently addressed. A fisheries policy is being developed, followed by a fisheries strategy.

Difficulty in sourcing fingerlings and absence of a local fish hatchery requires fingerlings to be imported, placing serious constraints on aquaculture development. Fish play an important role in food security in the country. A fisheries staff is in place, however, lack of fish veterinary capacity and necessary legislation limits potential expansion of the sector.

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## OVERVIEW OF THE AQUACULTURE AND FISHERIES SECTOR IN TANZANIA

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*Ritha Maly*

Tanzania has a land area of 886 037 km<sup>2</sup> that is well endowed with water resources. The country has a population of 37 million inhabitants. Bordering the Indian Ocean, it has a coastline of 1 450 km with an estimated territorial sea area of 64 000 km<sup>2</sup> and an EEZ of 223 000 km<sup>2</sup>. The country shares the great lakes of Africa: Lake Victoria (35 000 km<sup>2</sup> shared with Kenya and Uganda), Lake Tanganyika (13 510 km<sup>2</sup> shared with Zambia, Burundi and DRC), Lake Nyasa (5 040 km<sup>2</sup> shared with Mozambique and Malawi), as well as having several smaller water bodies (Rukwa Mtera and Nyumba ya Mungu dams) as well as rivers of various sizes.

Most water bodies are unpolluted and suitable for aquaculture, which is from a technological aspect, still underdeveloped. An estimated 14 700 earthen ponds are mostly stocked with Nile tilapia in semi-intensive monoculture systems producing 1 400 tonnes per annum. Rainbow trout are cultured commercially on a small scale (8 tonnes). Indigenous African catfish (*Clarias gariepinus*) are under trial and other tilapia species have potential. Supplementary feed consists mainly of single-feed farm byproducts.

Mariculture is dominated by seaweed culture and, after the Philippines and Indonesia, Tanzania is the world's third largest producer of seaweed with an annual production of *Eucheimia denticulatum* and *Kappaphycus alvarezii* of 6 000 and 2 000 tonnes respectively. This has become an important activity with great potential to improve livelihoods of coastal communities.

Other cultured marine products include an annual production of 320 tonnes of marine shrimps (*Peneaus monodon*), 2 tonnes of mangrove crabs and pearls from 100 farms. Annually 15 tons of milkfish are produced mainly for the domestic market. Further potential marine finfish culture includes siganus, mullet, anus, grouper and red snapper, and marine shellfish including oyster, mussels, clams and cockles.

Export of fish and fisheries products reached close to 60 000 tonnes in 2007. Preliminary figures for 2007 indicate a total fisheries catch of 327 845 tonnes valued at TZS 291 764 million (approximately USD 250 million). The country also has a significant export of ornamental fish (22 000 tonnes in 2005).

Tanzania has no system in place for the monitoring of fish diseases but does monitor fish farm management. Diagnostic capacity is limited to the capabilities of a few aquaculturists and fisheries biologists, TAFIRI [*Tanzania Fisheries Research Institute*], University of Dar es Salaam and an accredited laboratory in Mwanza that is capable of doing microbial analyses. The Tanzania Bureau of Standards can perform microbial and fish feed analyses and Chemphar in Uganda is used for heavy metal and residuals analyses. Some private laboratories within the farms have the capacity to do PCR testing and to perform water quality analyses.

The Fisheries Department (Competent Authority) is responsible for monitoring fish farms, capture fisheries and processing plants, inspections, issuing health certificates, licensing and other technical issues as well as providing the mandate, under the *Fisheries Act*, for veterinarians to prescribe medicines. The *Fisheries Act*, No. 22 of 2003, the Fisheries Regulation of 2005, the *Environmental Act*, No. 20 of 2004 and the *TFDA Act* set the legislative framework for the importation of fish under official permit, enforcement of withdrawal periods for medicines in fish products placed on the market, use of GMO's, and control of pollution and illegal fishing.

Insufficient technical personnel, limited research and working tools and insufficient extension services challenge the sector. These challenges must be overcome and fish health needs to be given priority.

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## OVERVIEW OF THE AQUACULTURE AND FISHERIES SECTOR IN ZAMBIA

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*Arthur Mumbolomena*

Zambia is land bound but has a number of water bodies and river systems that support inland fisheries, in particular Lake Kariba which is shared with Zimbabwe. The country covers 753 000 km<sup>2</sup> with a population of 11 million inhabitants. The most important source of fish is still the inland capture fisheries. Kapenta (*Stolothrissa* and *Limnothrissa* spp. accounted for an estimated annual catch of 9 476 tonnes in 2007, while other freshwater fishes accounted for an estimated 73 542 tonnes.

Aquaculture production of *Cyprinus carpio*, *Oreochromis* spp. and *Tilapia rendalli* has increased steadily reaching an estimated production of 5 876 tonnes in 2007.

Ornamental fish, the major source being Lake Tanganyika, represent an important fisheries sector.

Large-scale commercial aquaculture is still very much non-existent and research into fish diseases has not yet been a priority. Recent experiences on the Zambezi River clearly indicate the importance of building fish disease capacity. Of the OIE listed diseases, only *epizootic ulcerative syndrome* (EUS) has so far been reported from Zambia. The disease affected fish on the Zambezi River. These waters are shared by Zambia, Zimbabwe, Botswana, Angola and Namibia. Diagnostic capacity in Zambia is limited to the University of Zambia's *School of Veterinary Medicine* which has the capacity to help in the diagnosis of aquatic diseases. There is liaison with the *Central Veterinary Research Institute*, which is the public laboratory for the *Department of Veterinary and Livestock Development* and which is mandated to do disease reporting, although it is more specialized in dealing with terrestrial animals. There is some collaboration with other regional laboratories.

Institutional arrangements governing legislation and regulations are set out in the *Stock Diseases Act*, *Fisheries Act* and *Public Health Act*. The *Stock Diseases Act* is currently more focused on terrestrial animals, however the proposed *Animal Health Act* also includes aquatic animals. The *Fisheries Act* deals with fish bans and control of introduction of alien fish species as well as general issues concerning fisheries and aquaculture. The *Public Health Act* deals mainly with the wholesomeness of fish and fish products. The Ministry of Health and the Ministry of Local Government enforce the *Public Health Act*.

The main trade partners importing fish from Zambia in order of tonnage exported are DRC, Zimbabwe, South Africa, United Kingdom, Germany, Namibia, USA, Spain, Japan, South Korea, Austria, Denmark, and Poland. Fish imports to Zambia have been predominantly from South Africa, Namibia, Mozambique and Zimbabwe.

Constraints and challenges faced by the sector include a need for capacity building of human resources and research, exchange of information between the Veterinary and Fisheries Departments and an improved capacity and ability to identify and diagnose aquatic diseases. A position for a veterinarian within the Fisheries Department needs to be created and the capacity of public laboratories to deal with aquatic diseases needs to be strengthened. Strengthening the liaison between the Department of Veterinary and Livestock Development, the Department of Fisheries and the University of Zambia, School of Veterinary Medicine is key to disease control and increased production in the fisheries and aquaculture sector.

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## OVERVIEW OF THE AQUACULTURE AND FISHERIES SECTOR IN ZIMBABWE

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*Gilbert Hope Moyo*

Zimbabwe, covering 391 000 km<sup>2</sup> with a population of 13 million, is landlocked with no natural lakes. Fisheries production and consumption is low, the per capita consumption of 3 kg being half of that consumed in other SADC countries (6 kg in 2001). The bulk of fisheries production comes from the Zambezi River and Lake Kariba (540 000 ha), which are shared with Zambia. Capture fisheries production is predominantly from Lake Kariba, providing 13 000 tonnes. Smaller dams like Lake Chivero (2 630 ha) producing 500 tonnes, Lake Mtirikwi (9 105 ha) producing 25 tonnes, Lake Manyame (8 100 ha) producing 300 tonnes and Lake Mazvikadei (2 300 ha) producing 5 tonnes make a further contribution.

The pelagic fishery based on the relatively highly mechanized kapenta industry accounts for over 90 % of the catches from Lake Kariba in Zimbabwe.

An artisanal fishery based on multiple species relies on relatively simple fishing gear, mostly gill nets, and is practiced in Lake Kariba and the other major water bodies. Trends in the 2006 kapenta catch figures on Lake Kariba have indicated an almost 50 % drop from the peak between 1990 and 1994.

Most fish catches are consumed locally with only about 10 % of the kapenta production being exported regionally especially to DRC. These exports are valued at approximately USD 800 000.

Crocodile farming represents the biggest aquaculture sector in Zimbabwe. Zimbabwe is the largest producer of crocodile skins with an annual production of over 100 000 skins and export value of about USD 15 million. Most skins are exported to Europe, USA and Asia. The industry is still expanding but nearing the maximum sustainable limit. Much of the crocodile meat produced as by-product is consumed locally as the export market is unreliable. Of the meat exports, 25 % are to the EU and 75 % to Asia. Eggs and hatchlings are occasionally imported from Mozambique.

Nile tilapia and rainbow trout are the main fish species farmed. Production is not commensurate with local demand and available resources. Of the 4 000 tonnes annual production of Nile tilapia, 80 % is exported. Whole gutted fish exported to African countries amount to 1 000 tonnes with a value of USD 2 million. A further 360 tonnes of exported fillets of which 75 % go to the EU and 25 % to Africa are valued at USD 4 million.

Imports of aquatic products, mostly from the region (South Africa and Mozambique) include carp, tuna, prawns, shrimps and crabs mostly for up market hotels. Mackerel from Namibia and kapenta from Mozambique are consumed by the lower end of the market.

Zimbabwe has a lack of information on OIE listed diseases but *epizootic ulcerative syndrome* (EUS) has been confirmed from the Zambian side of the Zambezi.

The Department of Veterinary Technical Services through its Veterinary Laboratory Diagnostic and Research (VLDR) branch has a network of laboratories, viz the *Central Veterinary Laboratory* (CVL) and 4 provincial laboratories and three research stations. The *Zimbabwe Quality Assurance Programme* (ZINQAT) and the *Standards Association of Zimbabwe* accredit laboratories with some regional accreditation performed by the *South African National Accreditation System* (SANAS) and with scope for widening this. The CVL acts as a SADC referral laboratory.

Zimbabwe is a member of the following treaties: CITES, RAMSAR, SADC Protocol on Fisheries and Aquaculture, NEPAD, CBD and WTO. National policy and strategy documents include the *Parks and Wildlife Management Act* (1975) and Environment Management Authority (2002) which fall under control of the Ministry of Environment and Tourism, and the *Veterinary Act* under control of the Ministry of Agriculture as well as the Fisheries Policy and Crocodile Management Authority.

Zimbabwe has a robust legislation for natural resource management and protection, but legislative arrangements are fragmented, a fisheries act is absent and there is poor control of the informal fisheries (movement of products, illegal activities). This is compounded by poor disease surveillance, monitoring and reporting. The large number of water bodies and varied physical conditions as well as the high demand for aquaculture products however provides opportunities.



# INTERNATIONAL STANDARDS

**PROVISIONS OF THE AQUATIC ANIMAL HEALTH CODE - OIE LISTED DISEASES  
(GENERAL INTRODUCTION)**

*Francesco Berlingieri*

Whenever an important epidemiological event occurs in an OIE Member, the Veterinary Administration must inform the OIE by sending an Immediate Notification. This obligation applies to the OIE list of diseases which is adopted by the OIE International Committee. This list can be modified on an annual basis but changes do not come into force until January of the following year so to ensure that the list of diseases remains the same for any given calendar year. Proposed changes to the list are based on a decision tree contained in Chapter 1.2.2. of the OIE Aquatic Animal Health Code (*the Aquatic Code*). This Chapter allows for two pathways for checking the eligibility of a Disease to the list: *Criteria for Listing an Aquatic Animal Disease* (Article 1.2.2.1.) and *Criteria for Listing an Emerging Aquatic Animal Disease* (Article 1.2.2.2.). Here are reported the two sets of criteria:

A) Criteria for Listing an Aquatic Animal Disease (Article 1.2.2.1.)

No.	Criteria (A-C)	Parameters that support a listing	Explanatory notes
<b>A. Consequences</b>			
1.		The disease has been shown to cause significant production losses at a national or multinational (zonal or regional) level.	There is a general pattern that the disease will lead to losses in susceptible <sup>1</sup> species, and that morbidity or mortality are related primarily to the agent and not management or environmental factors. (Morbidity includes, for example, loss of production due to spawning failure.) The direct economic impact of the disease is linked to its morbidity, mortality and effect on product quality.
2.	Or	The disease has been shown to or scientific evidence indicates that it is likely to negatively affect wild aquatic animal populations that are an asset worth protecting for economic or ecological reasons.	Wild aquatic animal populations can be populations that are commercially harvested (wild fisheries) and hence are an economic asset. However, the asset could be ecological or environmental in nature, for example, if the population consists of an endangered species of aquatic animal or an aquatic animal potentially endangered by the disease.
3.	Or	The agent is of public health concern.	
<b>and</b>			
<b>B. Spread</b>			
4.		Infectious aetiology of the disease is proven.	
5.	Or	An infectious agent is strongly associated with the disease, but the aetiology is not yet known.	Infectious diseases of unknown aetiology can have equally high-risk implications as those diseases where the infectious aetiology is proven. Whilst disease occurrence data are gathered, research should be conducted to elucidate the aetiology of the disease and the results be made available within a reasonable period of time.
6.	And	Potential for international spread, including via live animals, their products or fomites.	International trade in aquatic animal species <u>susceptible</u> to the disease exists or is likely to develop and, under international trading practices, the entry and establishment of the disease is a likely risk.
7.	And	Several countries or countries with <u>zones</u> may be <u>declared free</u> of the disease based on the general surveillance principles outlined in Chapter 1.1.4. of the <u>Aquatic Manual</u> .	<u>Free countries/zones</u> could still be protected. Listing of diseases that are ubiquitous or extremely widespread would render notification unfeasible. However, individual countries that run a control programme on such a disease can propose its listing provided they have undertaken a scientific evaluation to support their request. Examples may be the protection of <u>broodstock</u> from widespread diseases, or the protection of the last remaining <u>free zones</u> from a widespread disease.
<b>and</b>			
<b>C. Diagnosis</b>			
8.		A repeatable and robust means of detection/diagnosis exists.	A diagnostic test should be widely available and preferably has undergone a formal standardisation and validation process using routine field samples (See <u>Aquatic Manual</u> .) or a robust case definition is available to clearly identify cases and allow them to be distinguished from other pathologies.

B) Criteria for Listing an Emerging Aquatic Animal Disease (Article 1.2.2.2.)

No.	Parameters that support a listing	Explanatory notes
1.	Infectious aetiology of the disease is proven.	
Or		
2.	An infectious agent is strongly associated with the disease, but the aetiology is not yet known.	Infectious diseases of unknown aetiology can have equally high-risk implications as those diseases where the infectious aetiology is proven. Whilst disease occurrence data are gathered, research should be conducted to elucidate the aetiology of the disease and the results be made available within a reasonable period of time.
And		
3.	The agent is of public health concern.	
Or		
4.	Significant spread in naive populations of wild or cultured aquatic animals.	The disease has exhibited significant morbidity, mortality or production losses at a <u>zone</u> , <u>compartment</u> or country level. 'Naive' means animals previously unexposed either to a new disease or a new form of a known disease.

The list of diseases for aquatic animals is presented in Chapter 1.2.3. of the Aquatic Code. Here is the list of diseases that will be valid starting from 1<sup>st</sup> January 2009:

**Fish - Article 1.2.3.1.:**

- Epizootic haematopoietic necrosis
- Infectious haematopoietic necrosis
- Spring viraemia of carp
- Viral haemorrhagic septicaemia
- Infectious salmon anaemia
- Epizootic ulcerative syndrome
- Gyrodactylosis (*Gyrodactylus salaris*)
- Red sea bream iridoviral disease
- Koi herpesvirus disease.

**Molluscs - Article 1.2.3.2.:**

- Infection with *Bonamia ostreae*
- Infection with *Bonamia exitiosa*
- Infection with *Marteilia refringens*
- Infection with *Perkinsus marinus*
- Infection with *Perkinsus olseni*
- Infection with *Xenobalotus californiensis*
- Abalone viral mortality.

**Crustaceans - Article 1.2.3.3.:**

- Taura syndrome
- White spot disease
- Yellowhead disease
- Tetrahedral baculovirus (*Baculovirus penaei*)
- Spherical baculovirus (*Penaeus monodon*-type baculovirus)
- Infectious hypodermal and haematopoietic necrosis
- Crayfish plague (*Aphanomyces astaci*)
- Infectious myonecrosis
- White tail disease

**Amphibians - Article 1.2.3.4.:**

- Infection with *Batrachochytrium dendrobatidis*
- Infection with ranavirus.

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## PROVISIONS OF THE AQUATIC ANIMAL HEALTH CODE - CRUSTACEANS / FISH FARMING / MOLLUSCS

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*Chadag V. Mohan*

Globally, capture and culture fisheries contribute significantly towards food security, poverty alleviation, economic development and supporting livelihoods. In 2004, the total global fish production was in excess of 140 million metric tons valued over USD 80 billion. Aquaculture contributes to over 45% of the global fish food consumption and this sector is the fastest growing food producing sector. The annual growth rate for aquaculture is 8-10% compared to 3% for live stock and 1.6% for capture fisheries. Hand in hand, the global trade in fish and fishery products is expanding and is worth over USD 70 billion. Rapidly developing aquaculture and ever expanding global trade, in the era of globalisation and trade liberalisation, presents several challenges. One of the key problems is the emergence and spread of serious aquatic animal pathogens. Intensive aquaculture practices tend to provide a platform for the emergence of pathogens, while global trade in aquatic animals and their products offer avenues for trans-boundary spread of pathogens. The risk of pathogen transfer is generally considered greater for movement of live aquatic animals than for movement of dead product. Irrespective of disease risks involved, aquaculture and global trade will continue to intensify and expand. Considering the serious impacts of trans-boundary aquatic animal diseases, several tools and measures are in place to minimize the risk of aquatic animal disease.

The WTO-SPS Agreement sets out the basic rules for food safety and animal and plant health standards. The basic aim of the SPS Agreement is to maintain the sovereign right of any government to provide the level of health protection it deems appropriate, but to ensure that these sovereign rights are not misused for protectionist purposes and do not result in barriers to international trade. For animal (including aquatic animal) health and zoonoses, the WTO recognises the standards developed by the *World Organisation for Animal Health* (OIE) as a reference within the SPS Agreement. The OIE develops normative documents relating to rules that its Member Countries can use to protect themselves from diseases without setting up unjustified sanitary barriers. The main normative documents produced by the OIE for aquatic animals are the *Aquatic Animal Health Code* (Aquatic Code) and the *Manual of Diagnostic Tests for Aquatic Animals* (Aquatic Manual). The aim of the Aquatic Code is to assure the sanitary safety of international trade in aquatic animals (fish, molluscs and crustaceans) and their products. The code provides details of health measures to be used by the veterinary or other competent authorities of importing and exporting countries so that the transfer of pathogenic agents for animals or humans is minimized but unjustified sanitary barriers are avoided. The Aquatic Code provides general and disease specific provisions that OIE Member Countries can adopt to prevent and control aquatic animal disease.

Culture of crustaceans, especially shrimp, is an important economic activity in many parts of Asia and Latin America. Recognizing the potential economic benefits, shrimp culture is being initiated on a large scale in many of the African countries. International movement of live shrimp for the purpose of aquaculture has been largely responsible for the spread of many serious trans-boundary viral pathogens. More than 20 viruses have been reported to infect cultured shrimp. Nine viral pathogens are currently listed by the OIE in the Aquatic Code and three are under study for listing. As per the WTO-SPS agreement, diseases listed by the OIE should be reported by member countries and are subject to specified health measures that are intended to limit disease spread and assure sanitary safety of international trade in aquatic animals and their products.

This presentation will provide details of general (e.g. notification systems, obligations and ethics in international trade, principles of conducting risk analysis, import/export procedures, contingency plans) and disease specific (e.g. surveillance for declaration of freedom from disease, safe commodities) provisions that OIE Member Countries can adopt to prevent and control crustacean diseases in aquaculture and their spread through international trade.

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## PROVISIONS OF THE MANUAL OF DIAGNOSTIC TESTS FOR AQUATIC ANIMALS

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*Somkiat Kanchanakhan*

The OIE standards are normative documents relating to rules that Members can use to protect themselves from diseases. The OIE standards are the result of consensus among the veterinary authorities of OIE Members. The standards constitute a reference within the SPS Agreement for international standards for animal health and zoonoses. This means that by applying the OIE standards, Members can be assured that their measures do not represent unjustified sanitary barriers, because the OIE normative documents enjoy recognition as ‘international standards’ under the agreements of the WTO.

The purpose of the *Manual of Diagnostic Tests for Aquatic Animals* (or Aquatic Manual) aims to provide a uniform approach to the diagnosis of the diseases listed in the Aquatic Code and of other diseases that may be of importance to international trade. This is achieved through the detailing of pathogen identification methods that are suitable for the diagnosis of isolated cases of disease as part of national aquatic animal health surveillance or control programmes, or as part of a programme to underpin claims of freedom from a specific disease. The Aquatic Manual contains general provisions as well as recommendations applicable to specific diseases and also lists the 27 OIE Reference Laboratories for aquatic animal diseases.

For the diseases listed in the Aquatic Code, clinical signs in fish are not pathognomonic and subclinical infections may occur. Reliable diagnosis of fish diseases depends on the specific identification of pathogens by laboratory methods. These methods, which are suitable for the diagnosis of disease as part of national aquatic animal health surveillance/control programmes, form the main contents of the Aquatic Manual. The diagnostic methods presented in the Aquatic Manual are all direct diagnostic methods. The detection of antibodies to pathogens in fish is not yet accepted as a routine method for assessing the health status of fish populations due to insufficient development of serological methodology. Mollusc and crustacean diseases differ in some ways from fish diseases; for example, diagnostic methods must be direct because these animals do not produce antibodies to pathogens.

General provisions or requirements to achieve standards of aquatic disease diagnosis are (1) quality management in veterinary testing laboratories; (2) principles of validation of diagnostic assays for infectious diseases; (3) validation and quality control of PCR methods used for diagnosis of infectious diseases; (4) requirements for surveillance for declaration of freedom from infection; and (5) methods for disinfection of aquaculture establishments. Lists of aquatic diseases for finfish, molluscs, crustaceans and amphibians will also be discussed.



*Inland Aquaculture Center, Epalela, Omusati region, Namibia © Alusbe Hitula.*

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**CASE STUDY: EPIZOOTIC ULCERATIVE SYNDROME  
(GENERAL INFORMATION)**

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*Somkiat Kanchanakhan*

*Epizootic ulcerative syndrome* (EUS) is a disease of wild and cultured fish in freshwater and estuarine water that affected large geographical areas including Asia, Australia, North American and recently in Africa. EUS is a seasonal epizootic condition that was first reported in farmed freshwater ayu (*Plecoglossus altivelis*) in Japan in 1971. It was later reported in estuarine fish, particularly grey mullet (*Mugil cephalus*) in eastern Australia in 1972. The outbreak has extended its range through Papua New Guinea into South-East Asia, South Asia, and reached Pakistan in West Asia. The outbreaks were also reported in menhaden (*Brevoortia tyrannus*) in the United States of America (USA). EUS recently spread to the Chobe/Zambezi river system on the African continent in October 2006.

EUS usually involves complex aetiological agents including parasites, bacteria, water moulds, viruses and acid sulphate runoff water. The oomycete that causes EUS is known as *Aphanomyces invadans* or *A. piscicida*. The affected fish exhibit necrotising ulcerative lesions typically leading to a granulomatous response. A suspect case of EUS presents as fish with one or more 'red spot' lesions. For confirmation of a case of EUS the current OIE Aquatic Manual should be consulted.

EUS occurs mostly during periods of low temperatures (18 – 22°C) and after periods of heavy rainfall. These conditions favour sporulation of *A. invadans*, and low temperatures have been shown to delay the inflammatory response of fish to oomycete infection. Over 50 species of fish have been confirmed by histological diagnosis to be naturally affected by EUS. The signs of the disease include loss of appetite and affected fish floating near the surface of the water. Fish usually develop red spots or small to large ulcerative lesions on the body. Red spots may be observed on the body surface, head, operculum or caudal peduncle. Large red or grey shallow ulcers, often with a brown necrosis, are observed in the later stages. Large superficial lesions occur on the flank or dorsum. Control of EUS in natural waters is probably impossible. In outbreaks occurring in small, closed water-bodies, liming water and improving water quality, together with removal of infected fish, is often effective in reducing mortalities and controlling the disease.

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**CASE STUDY: EPIZOOTIC ULCERATIVE SYNDROME  
(IN THE ZAMBEZI RIVER BASIN OF ZAMBIA)**

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*Hang'ombe B. Mudenda*

*Epizootic ulcerative syndrome* (EUS) is a serious fungal disease, which often affects stressed and injured fish in the wild. EUS had never been previously reported in Africa. However, in the latter months of the 2006, fish caught in the Chobe and Zambezi Rivers in Botswana, Namibia and Zambia were found with clinical signs of ulcers and focal areas of skin inflammation. The disease was designated a 'mysterious disease' which was finally confirmed as EUS.



*Aphanomyces invadans* (EUS) infected *Clarias gariepinus* from the upper Zambezi river, Zambia  
© Hang'ombe Bernard Mudenda (UNZA)

In Zambia the disease primarily started in Sesheke district of Western Province after which numerous reports of fish dying along the Zambezi River upstream were recorded. A detailed study was then undertaken to determine the extent of the disease in 2007. In all the six districts, fish were being found dead with large red or grey shallow open ulcers on the head, middle of the body and on the dorsal regions. We visited 19 sites along the Zambezi River and its tributaries. A total of 1 113 fishes in 24 catches were examined. Only 58 (5.2%) in 18 catches out of 24 (75%) had lesions. The disease was restricted to certain species of fish, which included *Serranochromis angusticeps*, *Barbus poechii*, *Serranochromis robustus*, *Schilbe intermedius*, *Clarius gariepinus* and *Clarius ngamensis*. Histopathological analysis of the collected fish samples revealed typical mycotic granulomas. The mycotic granulomas were found in the muscles and kidneys. Following the diagnosis and confirmation of the disease as EUS, follow up investigations in Sesheke district where the disease presumably started have revealed some form of enzootic stability, since fish mortalities are no longer heavy. Currently the disease is still progressing upstream in the Zambezi River. To minimize the impact of this disease on the fishing communities, there is need to embark on community sensitisation regarding possible remedial measures.

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## ZONING AND COMPARTMENTALISATION

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*Francesco Berlingieri*

Zoning and compartmentalisation are procedures to define subpopulations of distinct aquatic animal health status for the purpose of disease control or international trade in accordance with provisions of Chapter 1.4.4. of the Aquatic Animal Health Code.

Compartmentalisation applies to a subpopulation when management practices related to biosecurity are the defining factors while zoning applies when a subpopulation is defined on a geographical basis.

These procedures allows a concentration of efforts and resources where there is the greatest chance of success in controlling or eradicating a disease in order to gain or maintain market access for certain commodities or where freedom of the whole country from the disease is not possible or practicable.

While both zoning and compartmentalisation require the approval and involvement of the Competent Authority, compartmentalisation requires also the involvement of the private sector since the implementation of biosecurity measures is under the responsibility of the manager of the compartment.

In aquaculture, the successful application of compartmentalisation is largely dependent on the system of production and the epidemiology of the disease(s) for which the compartment is being defined. Therefore, compartmentalisation may not be universally applicable across all systems and diseases.



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## CERTIFICATION OF PRODUCTS FOR EXPORT

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*David Huchzermeyer*

International awareness of socio-economic and food safety aspects, has had an impact on aquaculture products. Certification is required not only for the importation of live fish, their gametes and fertilized ova for farming, but also of live fish and their products for human consumption.

During the late 1980's South African trout farmers started exporting certified disease-free trout ova to European countries and elsewhere. Exports have exceeded 40 million eyed ova per annum. Each year a significant number of eyed salmonid ova are imported into South Africa from Northern Hemisphere countries with the same level of certification as that provided by South Africa. Currently, South Africa also exports certified disease-free live koi (*Cyprinus carpio*) to the European Union (EU). Large numbers of koi are imported into South Africa from various countries with minimal certification and in many cases, a dubious health status. Rapid expansion of aquaculture into new and unique areas will require adaptation of the traditional legislation, which was based on salmonid, and to a lesser degree, ornamental fish exports. Large numbers of farmed live abalone are now exported to countries in the Far East where certification requirements, in contrast to EU countries, are minimal regarding animal health and focus on providing food safety guarantees.

For regional aquaculture to compete in international markets, exporting countries must be in a position to meet certification requirements as laid down by importing countries. Guarantees guarding against the introduction of unwanted diseases and assurances that aquaculture products are safe for human consumption have become essential. For this purpose, it is imperative for the importing country to recognize the authorized Competent Authority of the exporting country. Designated Competent Authorities must verify compliance with feed and food law, animal health and welfare rules, veterinary drug usage and residue testing of the fish and aquaculture products to be exported. The degree of reciprocity and harmonisation of legislation between countries trading with each other determines the level of guarantees required for exports. Climate and geographic barriers may limit a specific risk associated with export from a country. The most favourable zone is one covering an entire country, whereas the lowest level of zoning would reflect only the status of a farm or facility registered for export.

Both the EU and Australia have clear guidelines that may be adopted by our region if local aquaculture products are to become accepted internationally. The EU has ratified the *World Trade Organisation* (WTO) *Agreement on the Application of Sanitary and Phytosanitary Measures* (SPS Agreement) which refers to the standards of the *World Organisation for Animal Health* (OIE). The relevant certification standards for freedom from disease are based on the *Aquatic Animal Health Code* and the *Manual of Diagnostic Tests for Aquatic Animals* of the OIE. To meet these standards, the regional countries must develop the required legislation to cover fish and public health, farm to fork food safety guarantees as well as develop the required service provision in diagnostic, surveillance and residue testing.

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## REGULATORY ISSUES REGARDING THE MANDATE OF THE VETERINARY AUTHORITY AND THE COMPETENT AUTHORITY

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*Tiroyamodimo Violet Modungwa & Motseki Hlatshwayo*

In South Africa, the competent authority is the Directorate Veterinary Services (DVS), which is technically supported by the Directorate Animal and Aquaculture Production (DAAP). The national department of agriculture has the legislative mandate over the *Veterinary and Para-Veterinary Act*, 1982 (Act No. 19 of 1982) which governs the registration of all professionals such as veterinarians, animal health technicians, veterinary nurses and veterinary technologists; and the *Animal Diseases Act*, 1984 (Act No. 35 of 1984), which provides the National Director of Veterinary Services with the power to authorize all professionals to carry out certain activities or service for official purposes. The definition of an 'animal' in both acts is restricted to vertebrates only, which provides a shortcoming in dealing with veterinary concerns of invertebrate species within the aquaculture and fisheries sector.

According to the *Animal Diseases Act*, diseases are either classified as controlled or notifiable. Controlled diseases are those whose control measures have been prescribed in the act and include all exotic diseases. These are mainly diseases that are highly infectious and as a result spread quickly, and are trade sensitive and therefore have a high economic impact. The state contributes financially towards controlling these diseases, either through vaccination programs or paying for diagnostics, normally conducted by the national laboratory, which in this case is the *Onderstepoort Veterinary Institute (OVI)* of the *Agricultural Research Council (ARC)*. Notifiable diseases on the other hand are those whose control measures are prescribed but not incurred by the state.



*Small scale trout farming with cages in South Africa © Henk Stander, Hands On fish farmers C°, Welgevallen Experimental (Trout) Farm, Stellenbosch.*

Other regulatory mandates lie with the Department of Environmental Affairs and Tourism (DEAT), which administers the *National Environmental Management Act*, 1998 (act No. 107 of 1998), which sets out procedures for co-operative governance with regards to environmental management; the *National Environmental Management: Biodiversity Act*, 2004 (Act No. 10 of 2004), which strives toward holistic protection of biodiversity and regulates movement of live animals.

South Africa has nine provincial authorities with different expertise and capacities on aquatic animal disease management, but the diagnostic capacities still lie with private institutions.

It should be noted that aquaculture and fisheries have never been part of the curriculum for veterinary and para-veterinary professions in the country. Even though government has recently initiated training programs to improve capacities to deal with aquatic animal disease issues, there is a greater need to develop cross-cutting capacity building programs, over and above a need to review the legislation and academic programs to be in a better position to deal with this emerging and fast growing sector.

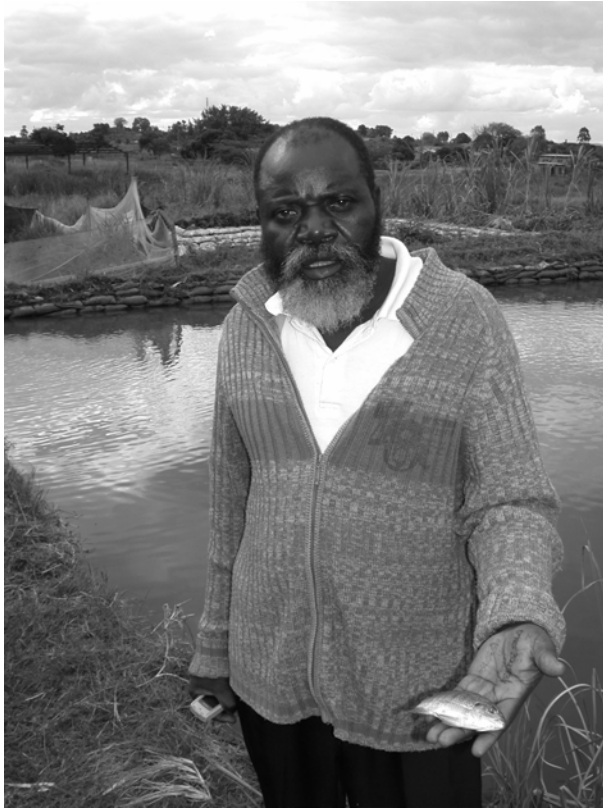
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## NEEDS FOR CAPACITY BUILDING

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*Qurban Roubani & M. Hlatsbwayo*

As fisheries decline, governments are increasingly looking at aquaculture to become a lead source of fish products. Already aquaculture contributes up to half of all fish production, but with the recent increase in food prices and fluidity of the economies of some regions of the world, the urgency for aquaculture to increase production is apparent. To meet these demands for increase in food production, the African continent has recognised its potential and role in aquaculture development (NEPAD *Fisbery and Aquaculture Action Plan*), due to its natural resources, labour and proximity to world markets.



Though Africa has been endowed with the natural resources for aquaculture development, there are still gaps in the technical capacity to develop this sector. One of these is the capacity to provide veterinary support and services to aquaculture. Without this essential service, the commercialisation of aquaculture will be hampered and the ability for fish products to be exported to certain markets would be curtailed. It is envisaged that state veterinarians could play an important role in supporting fish farmers, however as fish health and management is not adequately covered during their training, they are often not in a position to assist farmers. To bridge this gap, Rhodes University and the South African Department of Agriculture have collaborated and developed a course module to train state vets in fish health and management.

*USD 50.00 monthly income from small scale fish farming in rural Limpopo Province, South Africa © Qurban Roubani, Rhodes University.*

Already a group of 20 state vets have been trained and the course has been approved by the South African Veterinary Council. Further courses to broaden the knowledge of state vets are being planned. This collaboration is also being extended to capacitate the para-veterinary profession (animal health and laboratory technicians) to develop the required diagnostic capabilities. This collaboration between Rhodes University and the National Department of Agriculture is being proposed as a model. Furthermore, this training course could be extended to other countries in the region.

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## REPORTING AND NOTIFICATION ISSUES

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*Francesco Berlingieri*

One of the OIE's main missions is to ensure the transparency of the world animal health situation. In this respect the OIE set up the *World Animal Health Information System* (WAHIS) based on the commitment of OIE Member Countries and Territories to notify cases of the main animal diseases detected in their territories, including zoonoses. WAHIS is an internet-based computer system that processes data on animal diseases and then informs the international community, by means of "alert messages", of relevant epidemiological events in OIE Members. Access to this secure site is only available to authorised users, namely the OIE Delegates and their authorised representatives, who use WAHIS to notify the OIE on any relevant animal disease information.

Whenever an important epidemiological event occurs (related to both terrestrial and aquatic animals), the Member must inform the OIE by sending an 'Immediate Notification' which includes the reason for the notification, the name of the disease, the affected species, the geographical area affected, the control measures applied and any laboratory tests carried out or in progress.

To improve the scope and efficiency of the OIE's early warning system, the events related to aquatic animals of epidemiological significance that Members should immediately notify to the OIE Central Bureau are the following:

- the first occurrence or the re-occurrence of an OIE-listed disease in a country or zone/compartiment of the country previously considered to be free of the disease;
- any occurrence of an OIE-listed disease in a new host species;
- any occurrence of an OIE-listed disease caused by a new strain of the pathogen or in a new disease manifestation;
- any occurrence of an OIE-listed disease, if the disease has newly recognised zoonotic potential;
- any occurrence of an emerging disease or pathogenic agent if the event is of epidemiological significance to other countries.

Once they have been received, verified and validated by the OIE, the immediate notifications are published in the OIE's three official working languages (English, French and Spanish) and electronically distributed through an open distribution list. After having informed the OIE of a significant epidemiological event by means of an immediate notification report, the Member must send weekly 'Follow-up Report' so that the event can be monitored as it evolves. In all cases, the country must submit a final report to notify either that the event has been resolved or that the disease has become endemic. In the latter case, the country will continue to submit information in its six-monthly reports if the disease is an OIE listed disease.

Six-monthly reports provide information on the presence or absence of OIE listed diseases and the prevention and control measures applied. For diseases reported as being present in a country during a given six-month period, the country in question must provide quantitative data on the number of outbreaks, susceptible animals, cases, deaths, animals destroyed and animals vaccinated. For diseases that are present and are notifiable in the country, the OIE recommends that countries provide quantitative data by month and by first administrative division.

As a complement to WAHIS, the data and information provided by Members are accessible via the Web interface WAHID (*World Animal Health Information Database*) and can be accessed by the public through the OIE Web site ([www.oie.int/wahid](http://www.oie.int/wahid)).

This unique new application improves the transparency, efficacy and rapidity of the dissemination of animal health information throughout the world, by giving everyone access to all the available information on animal diseases, including zoonoses, presented by country/territory, by region, by month, by six-month period or by year. This interface gives access to a range of other information, including data on animal populations at a national or regional level, epidemiological maps of significant events, world distribution maps of animal diseases and control methods applied by disease, as well as tools to compare the animal health situation between countries. The latter application can help determine potential risks of trade in live animals or in animal products between Members.

TRADE IN  
FISHERIES PRODUCTS

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## THE AQUATIC BIO-SECURITY FRAMEWORK FOR SOUTHERN AFRICA

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*Robana P. Subasinghe, Melba B. Reantaso and Ramesh P. Perera, presented by Chadag V. Mohan*

The confirmation of the occurrence of *epizootic ulcerative syndrome* (EUS) in southern Africa in 2007 revealed serious biosecurity lapses which threaten not only the livelihood and food fish supply of river communities inhabiting the Zambezi River but also aquatic biodiversity and potential aquaculture development in the region. The Zambezi River, with an estimate of 32 million inhabitants, is home to hundreds of endemic fish species and is heavily fished for food. Inadequate or poorly implemented biosecurity measures have led to significant losses due to aquatic animal diseases in many countries around the world.

In response to requests of FAO member governments for technical assistance, a regional Technical Cooperation Project (TCP/RAF/3111 [E]) *Emergency assistance to combat EUS in the Chobe-Zambezi River* was approved for implementation beginning October 2007. This regional project is being participated by seven southern African countries (Angola, Botswana, Malawi, Mozambique, Namibia, Zambia and Zimbabwe). The first major activity, held at the School of Veterinary Medicine, University of Zambia in Lusaka, trained 22 key staff from eight countries (including Mauritius) on basic aquatic animal health management, EUS diagnosis and preparation of an active targeted surveillance design for EUS. The seven participating countries are currently implementing the EUS surveillance, results of which will be presented during the next workshop in early 2009.

As part of FAO's continuing assistance, a project to assess national capacities for managing aquatic biosecurity (i.e. risks associated with exotic or emerging pathogens of aquatic animals and invasive aquatic species) was undertaken beginning 2008 through a questionnaire survey. Nine countries (Angola, Botswana, Kenya, Malawi, Mozambique, Tanzania, Uganda, Zambia and Zimbabwe) participated in the survey covering areas with direct relevance to aquatic biosecurity performance including: (1) international affiliations, (2) trade activity, (3) border control, (4) surveillance/monitoring, (4) incident/emergency response, (5) diagnostic capacity, (6) research/training, (7) expertise (knowledge base), and (8) challenges. Preliminary analysis of the survey revealed that while national legislation, in general, covers most biosecurity needs, aquatic biosecurity capacity is generally very low in the nine participating countries. There is a strong need to augment capacity in order to align with international standards. The focus of capacity building will be on risk assessment, translocation controls, surveillance and diagnostics.

As a continuing part of the above project, a Regional Workshop on Development of an Aquatic Biosecurity Framework for Southern Africa was held in Lilongwe, Malawi from 22 to 24 April 2008 (Lilongwe Workshop). The Lilongwe Workshop, attended by 18 representatives from 9 countries participating in the survey, the *World Animal Health Organisation*, OIE and FAO, discussed the outcomes of the survey, and deliberated on four important themes: risk analysis and translocation controls, extension and enforcement (compliance), diagnostic capacity and technical expertise, and surveillance and emergency response. The Lilongwe Workshop identified a number of key regional capacity-building activities and support mechanisms to address aquatic biosecurity capacity gaps in the southern African region. Foremost is a request to FAO to develop a follow-up project to assist countries in reviewing institutional and legal frameworks to better address current biosecurity issues, particularly addressing aquatic animal health management, trans-boundary movement of live aquatics and maintaining aquatic biodiversity. Additional recommendations from the Lilongwe Workshop included: (i) for countries in the region to work closely in collaboration with FAO and OIE and regional partners to collectively address matters pertaining to aquatic animal health and biosecurity, (ii) recognition of the University of Zambia's School of Veterinary Medicine as a potential regional diagnostic centre and Uganda as a regional coordinating centre; (iii) supporting the development of a regional model/template on import risk assessment for introductions and transfers of live aquatic animals; and (iv) holding of a ministerial level meeting for southern African countries to raise the issue of aquatic animal biosecurity. The Lilongwe Workshop also recommended that the FAO focal points on aquatic animal health participate in the OIE Regional Seminar on "*OIE international standards, a lever for growth in the fisheries and aquaculture sector in Southern Africa*" organized by the OIE Sub-Regional Representation for Southern Africa, June 10-12, 2008, in Maputo, Mozambique.

The aquatic biosecurity framework for southern Africa is being finalized and will contain the broad development needs and a number of prioritized projects with associated timelines to enhance southern Africa's capacity to effectively manage aquatic biosecurity risks.

FAO in partnership with relevant regional and international partner organisations will continue to support capacity building activities to enhance aquatic biosecurity in southern Africa within the framework of its ongoing TCP, other normative projects and the recently launched FAO *Special Programme for Aquaculture Development in Africa* (SPADA). Biosecurity is a medium- to long-term strategy that can assist in coping with risks that threatens animal health, biodiversity, environmental sustainability and food safety.

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## THE NETWORK OF AQUACULTURE CENTRES IN ASIA & THE PACIFIC (NACA)

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*Chadag V. Mohan*

The *Network of Aquaculture Centers in Asia-Pacific* (NACA), an inter-governmental organization of 17 member nations and dedicated to aquaculture development in the region, has been in existence for nearly 20 years. It is the largest such body dedicated to aquaculture development globally, and represents nations that contribute well in excess of 80% to global cultured seafood supplies. Its primary mandate is to ensure sustainability of the sector with special emphasis on improving the livelihoods of small scale farmers, and contributing to poverty alleviation and food security in the region. NACA works on the principle of technical cooperation, through which it shares regional resources amongst network members, which includes governments, institutions and individuals, to support sustainable aquaculture development and aquatic resources management. NACA implements programs developed with governments and various partner institutions. They are then translated into projects that are executed in close partnership with international and regional organisations such as FAO of the United Nations, the *World Organisation for Animal Health* (OIE), the *Asia-Pacific Economic Cooperation* (APEC), the *Association of Southeast Asian Nations* (ASEAN), the *Australian Centre for International Agricultural Research* (ACIAR), the *Department for International Development* (DfID), the AusAid, the *Mekong River Commission* (MRC), the *Southeast Asian Fisheries Development Center* (SEAFDEC) and the Fish Health Section of the *Asian Fisheries Society* (FHS/AFS).

Development and adoption of the FAO/NACA's Asia regional *Technical Guidelines* (TG) for responsible movement of live aquatic animals by 21 Asia-Pacific governments is one of the important outcomes of networking and communication facilitated by NACA, between the years 1999-2001. Since then, supporting the implementation of the key elements of the TG has remained the focus of NACA's regional aquatic animal health programme. The 10 member Asia Regional *Advisory Group* (AG), constituted by NACA, in cooperation with OIE and FAO, meets on an annual basis to review the Asian disease situation, consider regional and international developments and provide advice to NACA and Asian governments on aquatic animal health management. A network of 21 National Coordinators guide the process of national aquatic animal health strategy development and implementation and also contribute to the regional surveillance and *Quarterly Aquatic Animal Disease* (QAAD) reporting system. Efforts of NACA are also aimed at supporting member countries to better comply with OIE's disease reporting and immediate notification requirements. A three tier regional resource base comprising of *Regional Resource Experts* (RRE), *Regional Resource Centres* (RRC) and *Regional Reference Laboratories* (RRL) offer technical and diagnostic service to stakeholders in NACA member countries.

Specific projects that deal with common and often serious problems are facilitated and usually coordinated by NACA. As such the projects – rather than being one-off and piecemeal -- have contributed immensely to the strengthening of the regional health program through (a) capacity building (e.g. diagnostics, epidemiology, sampling, surveillance, risk analysis, contingency planning); (b) development of resource material (e.g. technical guidelines, manuals, diagnostic guides, field identification guides, disease cards, extension brochures, etc); (c) provision of technical assistance to individual countries (e.g. technical missions to assist in the development of national strategies); (d) development of standard operating procedures (e.g. SOPs for responsible movement of live food finfish within ASEAN); (e) harmonisation (e.g. PCR inter-calibration exercise in India, Indonesia, Vietnam); (f) development of diagnostics (e.g. shrimp molecular epidemiology regional project); and (g) promoting adoption of better aquatic animal health management practices (e.g. shrimp projects in India, Vietnam, Thailand and Indonesia).

Networking, communication and project implementation coordinated by NACA in collaboration with member governments, partner organisations and donor agencies has been instrumental in facilitating flow of science and provision of technical assistance to relevant stakeholders in member countries, thereby contributing to strengthening of aquatic animal health capacity and bio-security in the Asia-Pacific region.



Networking facilitates the free flow of knowledge and ideas. Recognizing the importance of networking and knowledge sharing, NACA wishes to explore opportunities to network with Southern African states with the intention of building partnerships between Asia and Africa and supporting the development of a regional bio-security framework for southern Africa.

Finally, in connection with the formation of the *Aquaculture Network for Africa* (ANAF), probably another small lesson from NACA is that ANAF could incorporate a regional health management program into its regional strategy and plan.

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## IMPORT REQUIREMENTS FOR THE EUROPEAN UNION

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*Pedro Rosado – Martin*

Detailed European Union (EU) legislation in the aquaculture sector lays down the animal health conditions that apply to the imports of live aquaculture animals and products thereof from third countries. The responsibility for this area lies within the domain of the *Health & Consumers Directorate-General* (DG SANCO) of the European Commission. The legislation of the EU in this field is fully harmonised and it comprises:

- Council Directive 2006/88/EC on animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals;
- Commission Regulation implementing Directive 2006/88/EC as regards conditions and certification requirements for the placing on the market and the import into the Community of aquaculture animals and products thereof and laying down a list of vector species (it shall apply from 1 August 2008); and
- Commission Regulation amending Regulation (EC) No 2074/2005 as regards certification requirements for import of fishery products, live bivalve molluscs, echinoderms, tunicates and marine gastropods intended for human consumption.

The EU takes particular care to ensure that this legislation is fully compliant with its international obligations and in particular the requirements of the *Sanitary and Phytosanitary Agreement* of the *World Trade Organisation* based on OIE standards.

This legislation imposes a series of animal health and supervisory requirements designed to ensure that imported aquaculture animals and products thereof meet standards at least equivalent to those required for production in, and trade between EU Member States.

DG SANCO organises training for Third Countries focused on food law, feed law, animal health rules, animal welfare rules and plant health rules with the aim to raise the awareness of the EU rules and thus, increase the access to the EU market for Third Countries.

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## IMPORT REQUIREMENTS FOR THE UNITED STATES

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*Paul Gary Egrie*

Just as the types of aquatic animal products intended for export to the United States can vary from live animals and fertilized eggs to fresh frozen and value added products, there is a wide range of U.S. Federal and State government agencies with regulatory oversight and requirements pertaining to those animals and products. While the *United States Department of Agriculture* (USDA), *Animal and Plant Health Inspection Service* (APHIS) does have some regulations pertaining to the importation of live aquatic animals and value added products such as breaded fillets that contain egg products, other agencies including, but not limited to, the *Food and Drug Administration* (FDA) and the *National Oceanographic and Atmospheric Administration* (NOAA) have regulations pertaining to human health and legal fisheries, respectively. The overarching summary from this presentation is that exporters are highly advised to fully research applicable regulations prior to shipment because once the animals or products reach U.S. borders and enter the customs process the survivability of the shipment may be in jeopardy if appropriate requirements have not been met. Numerous names and contact emails were provided in the presentation; however as people within agencies and regulations can change frequently without notice the onus is on the exporter to make the appropriate contacts and learn the regulations prior to shipment. The U.S. Federal and State agencies are very willing to assist in expediting commerce, but it is always best to request assistance prior to shipment rather than after the fact once an issue is discovered at the ports.



*Port of entry inspection by United States Department of Agriculture officials  
© Louis Volpe, USDA-APHIS Smuggling Interdiction and Trade  
Compliance Supervisor for Southern Florida (US).*



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## THE AQUACULTURE ASSOCIATION OF SOUTHERN AFRICA

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*Etienne Hinrichsen*

The *Aquaculture Association of Southern Africa* (AASA) was established in 1981 in order to represent the interest of the then fledgling aquaculture industry in Southern Africa. The Association has since developed into a structure with representation from the various subsectors that make up the aquaculture industry of the region. A decision was taken in 2006, which allowed AASA to operate independently as a sector representative in the 'free market' environment, which led to the establishment of a permanent office for the organisation in South Africa.

The association is managed by a Management Committee, constituted at a Biennial Conference. This committee consists of a Chairman, a Vice-Chairman, Treasurer and various sector representatives, most of which represent certain species or activity subsectors.

The Biennial Conference is the highlight on the AASA calendar; providing an opportunity for scientists, students and sector participants to present their findings, research and products. The conference also attracts a large number of international delegates and well known speakers.

The association offers Membership opportunities to a wide interest group ranging from small scale farmers to corporate institutions. AASA offers the following to its members:

- Effective representation of interests on national and international forums.
- The creation of a platform that can be used by any individual or corporates to interact with government and regional authorities.
- Access to discussion groups.
- Access to an Aquaculture Services Directory.
- Discounted rates for the AASA Conference.
- Access to a website – [www.aasa-aqua.co.za](http://www.aasa-aqua.co.za)
- Access to the bi-monthly newsletter.
- Email and other notices on relevant issues.

AASA strives to serve the aquaculture industry as a representative producer's organisation.

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**CLOSING REMARKS BY THE HON. MINISTER OF FISHERIES OF  
MOZAMBIQUE**

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*Cadmiel Mutemba*

Dear OIE Sub-Regional Representative for Southern Africa

Dear Representative of the Executive Secretary of SADC

Dear Representative of FAO

Dear Representative of the European Commission

Dear OIE Delegate of Mozambique

Dear Representatives of International Organisations

Dear Representative of institutions and invited Ministries

Ladies and Gentlemen

First of all I would like, in the name of the Government of Mozambique, to thank the OIE sub-regional office for choosing Mozambique to host this important seminar on the health of aquatic animals.

I hope that the accommodation and working conditions offered allowed to have 3 fruitful days of seminar.

Dear participants

This meeting comes in a very important time for the world and for Mozambique in particular as, due to the eminent food crises, it is urgent to make available products that represent a cheap source of protein. Fish production gives this opportunity. This makes the increase of the production of fishing products a priority. The Government has been emphasizing, as a strategy, the promotion of aquaculture, mainly small scale fish culture. Having this in mind, the Council of Ministers approved in 2007 the “*Strategic Plan for Development of Aquaculture*” and this week the same Council of Ministers approved the creation of the “*National Institute for Aquaculture Development*” to increase dynamism and catapult the actions for promotion of aquaculture.

In its role on monitoring aquatic animal health and fishing products for human consumption as well as improving services to the industry, the Ministry of Fisheries created the *National Fish Inspection Institute* (INIP) and appointed it as the Competent Authority to control exports and imports of fishing and aquaculture products. The activities of this institute are based on risk analysis as well as residues control, which creates a good environment for the access of our fishing and aquaculture products to several international markets, including the European Union.

Dear SADC country representatives,

In the countries of our region, poverty is a reality. In most of them, wild resources do not allow for increasing the production of fishing products. For this reason our attention should be focused now on the development of aquaculture. Nevertheless, from the experience heard from countries where this activity is well established we are aware that this requires more effort regarding managing and monitoring of the environment and occurrence of diseases.

Taking into account that this activity is relatively new in our region, it is necessary to develop technical and infrastructural capacities related to it. I am referring to the training of technical staff that will have the capability to quickly diagnose relevant aquatic diseases. This objective can be reached either by inclusion of issues related to fish diseases in the curricula of veterinary training courses at the Universities in our countries or by creating short term courses to be made available to the region.

As I referred previously, we are developing countries and thus with limited resources to face the demands of international markets in respect to the control of animal diseases. This means that the collaboration between countries and sharing of the few laboratory facilities available in the region, or outside it, for identification and confirmation of diseases is crucial and should be considered.

Dear participants,

A specific issue of concern in our region at the moment is the EUS. The proliferation of this disease can have very negative impact in the production of fishing products both from the wild and from aquaculture as it does not affect only a specific species. To stop the proliferation of EUS there is a need of rapid notification of occurrence of the disease to avoid import of infected fishing products to the non affected regions.

The OIE gives us a big opportunity and framework to develop cooperation between countries and technical assistance for the control of the dissemination of diseases. To make better uses of this opportunity which is made available for us, it is necessary that each of our countries indicates a focal point for aquatic animal diseases and that this focal point has the needed resources to undertake his mandate according to its Terms of Reference. This will facilitate and speed up the communication with the relevant Departments of OIE and at the end of the day will benefit ourselves.

Dear guests

Hopping that this meeting represents not the end but only the beginning of a fruitful and long collaboration between Competent Authorities for aquatic animal health and the Veterinarian Services in our countries and also a better regional coordination in issues related of aquatic animal health I declare closed this regional meeting on *“OIE international standards, a lever for growth in the fisheries and aquaculture sector in Southern Africa”*.

For those who are travelling I wish you a good journey back to your countries.

Thank you very much

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## RECOMMENDATIONS

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Considering

- OIE's mandate and responsibilities to promote aquatic animal health; and
- the international resolve and numerous instruments on fisheries and aquaculture in relation to food security, trade, environmental concerns, income generation and achievement of the Millennium Development Goals; and
- the potential benefits from sustainable fisheries and aquaculture and the opportunities to meet increasing demand for food from fish and other aquatic animals, as well as the enhancement of natural resources; and
- the need to improve skills, knowledge and information exchange on aquatic animal diseases in the OIE Members in the SADC region; and
- the crucial role played by veterinary and other aquatic animal health professionals in the development and sustainability of the fisheries and aquaculture sector in the OIE Members in the SADC region; and
- the need for harmonised development of the fisheries and aquaculture sector across the SADC region, both at private and public levels; and
- the international obligations of the countries in the region as Members of both the OIE and the World Trade Organisation (WTO); and
- the recent *epizootic ulcerative syndrome* (EUS) outbreak in the Chobe-Zambezi river catchment and the questions it raises with regard to preparedness and disease intelligence at national and regional levels;

the OIE seminar on International Standards: *a lever for growth in the fisheries and aquaculture sector in Southern Africa*, recommends:

- To the OIE Members in southern Africa:
  1. To ensure that OIE Delegates appoint the aquatic animal health focal points and that these appointees be officially communicated and regularly updated to the OIE Central Bureau.
  2. To provide national focal points with adequate resources in order to fulfil their terms of reference.
  3. To ensure that the OIE Delegates provide the nominated national OIE focal points with the reports from the Aquatic Animal Health Standards Commission and that the focal points coordinate the in-country consultation to provide a consolidated national response for submission to the OIE through the OIE Delegate and hence take an active part in the OIE standard setting process.
  4. To ensure that national OIE focal points assist the OIE Delegate so as to comply with reporting requirements to the OIE through the WAHIS reporting system.
  5. To encourage twinning between national diagnostic laboratories and with OIE Reference Laboratories. To encourage similar agreements with OIE Collaborating Centers.
  6. To encourage the inclusion of aquatic animal health issues into the veterinary, fisheries and aquaculture curricula and provide opportunities for continuous education.
  7. To promote dialogue between veterinary authorities or other relevant competent authorities, as well as the private sector, to identify their respective roles and responsibilities in aquatic animal health matters.
  8. To review the national legislative framework for allowing the development of the fisheries and aquaculture sector.
  9. To prioritise aquatic animal diseases of concern and fast track implementation of surveillance programmes in line with art. 13.9 of the SADC Protocol on Fisheries (2001) and OIE guidelines. To enhance cross-border cooperation between competent authorities to control aquatic animal diseases.



- To the OIE Central Bureau and the Sub-Regional Representation for Southern Africa:
  10. To facilitate OIE Members in the surveillance and notification of aquatic animal diseases by supporting training on the use of WAHIS.
  11. To coordinate and support the establishment of a regional aquatic animal health network for fisheries and aquaculture in southern Africa in close collaboration with relevant bodies at national, regional and international level.
  12. To promote the inclusion of aquatic animal health training into the ongoing process of harmonisation of the veterinary curriculum.

Endorsed by all participants on June 12th, 2008 in Maputo, Mozambique



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