Aquatic Veterinary Workforce for Southern Africa:

Needs, Examples & the Way Forward

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Faculty of Veterinary Science

Aquatic Veterinary Associates International
A Subsidiary of OVA-CAP VCS
Est. 1986

World Aquatic Veterinary Medical Association

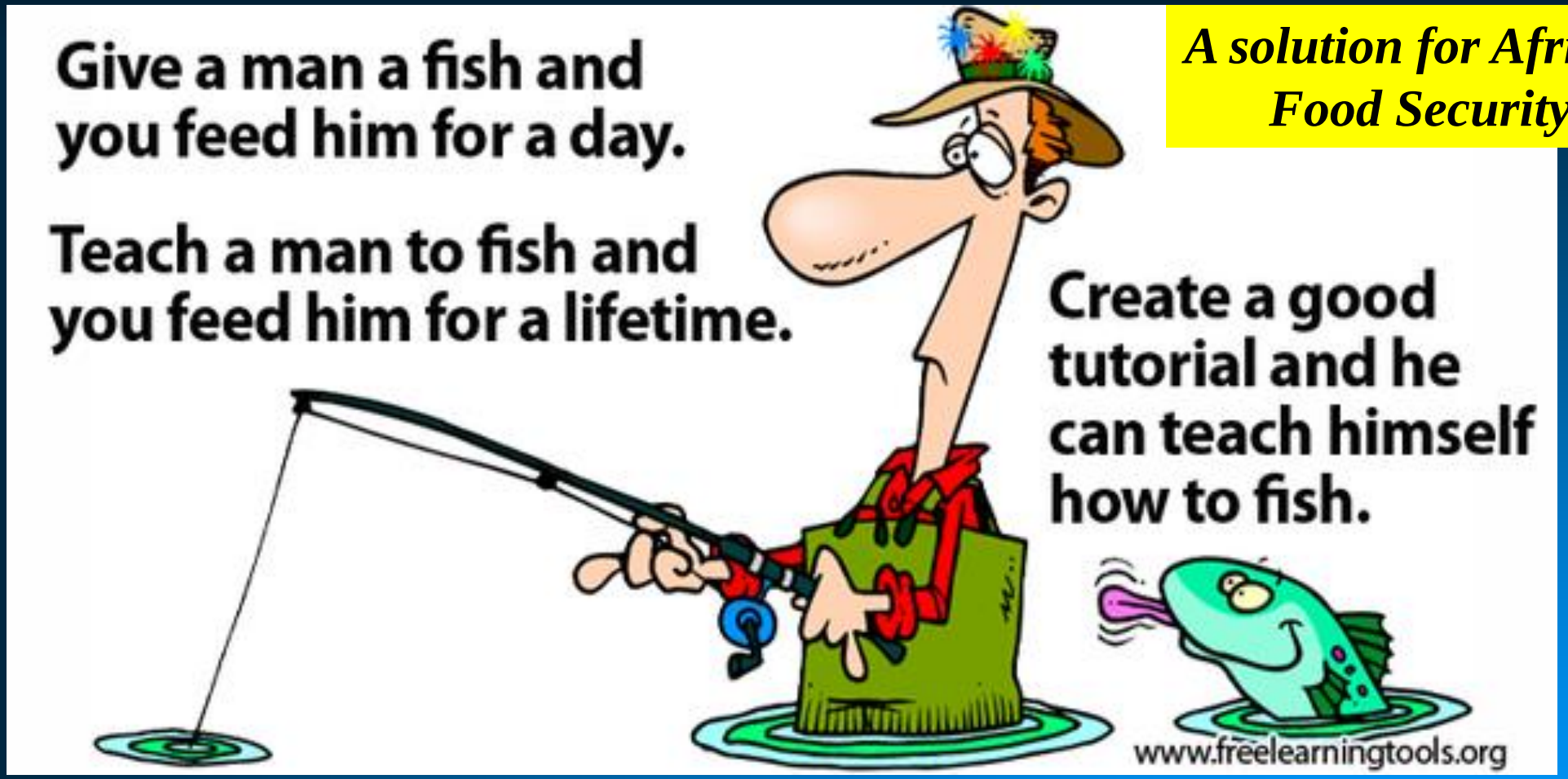
International Aquatic Veterinary Biosecurity Consortium

Objectives

Primary Focus – *developing a well-trained veterinary workforce to address and assist with aquatic animal health & improve biosecurity (disease prevention, control & eradication)*

1. **Why is this imperative for future development?**
2. **The primary needs**
3. **What educational opportunities currently exists**
4. **Examples useful for Africa**
5. **Future programs**

A solution for African Food Security



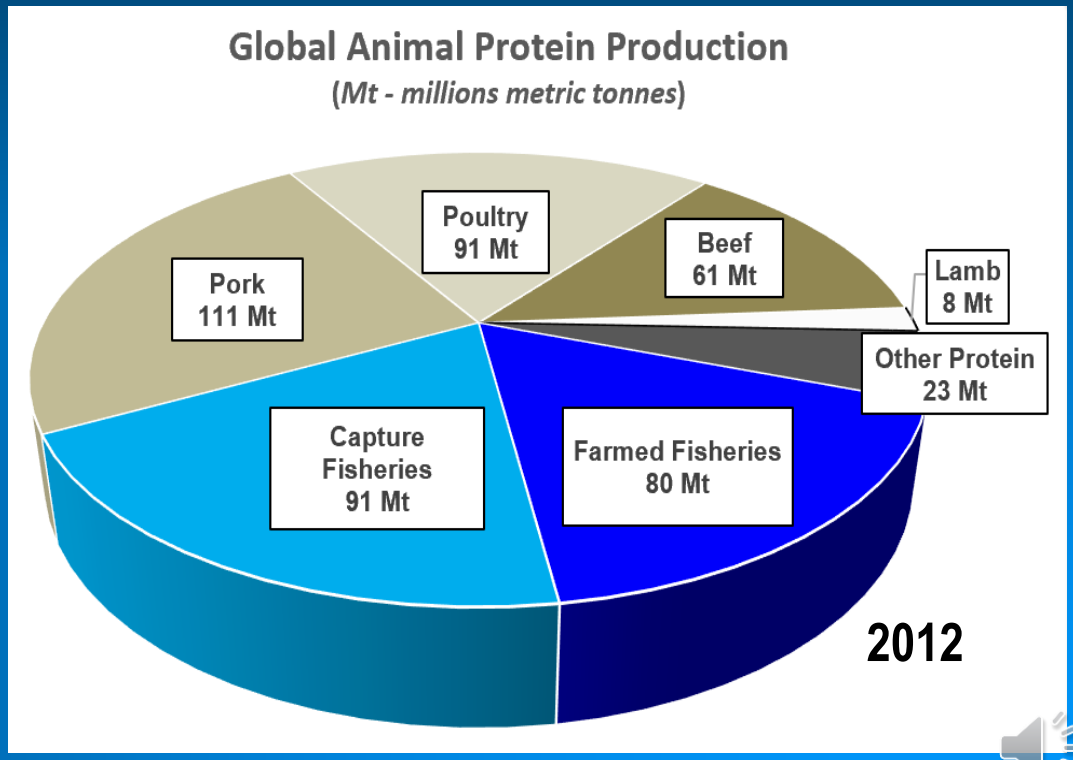
But can only be achieved through networking & sharing information! **It Takes a Village …**

1 Imperative: Food Security (particularly protein)

" ... predictions are that by 2050 half the animal protein consumed by people will come from aquaculture."

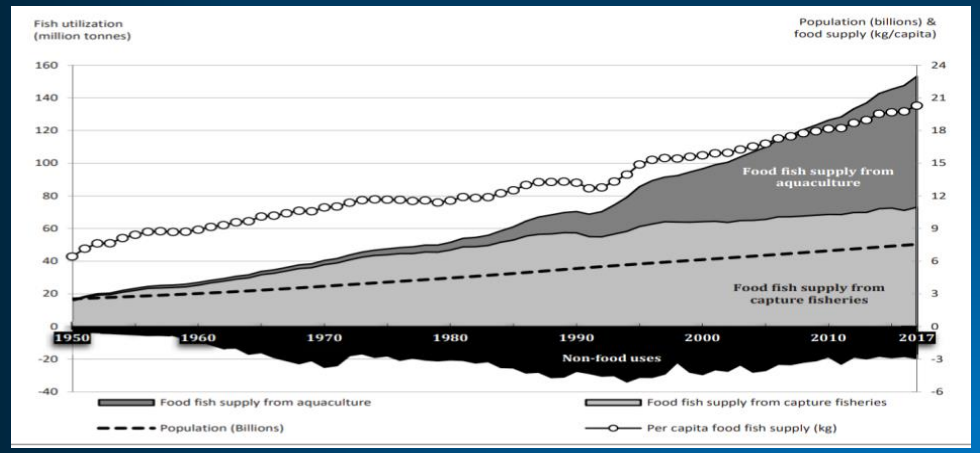
Barry O'Neil, President OIE – May 24, 2009

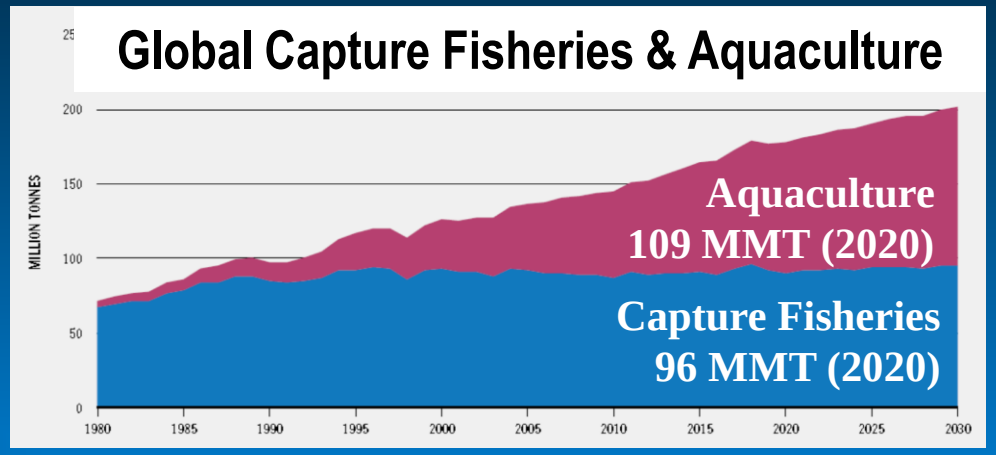
~2015 Global Farmed Fisheries (aquaculture) for human consumption exceeded Harvest Fisheries **(FAO SOFIA, 2022)**

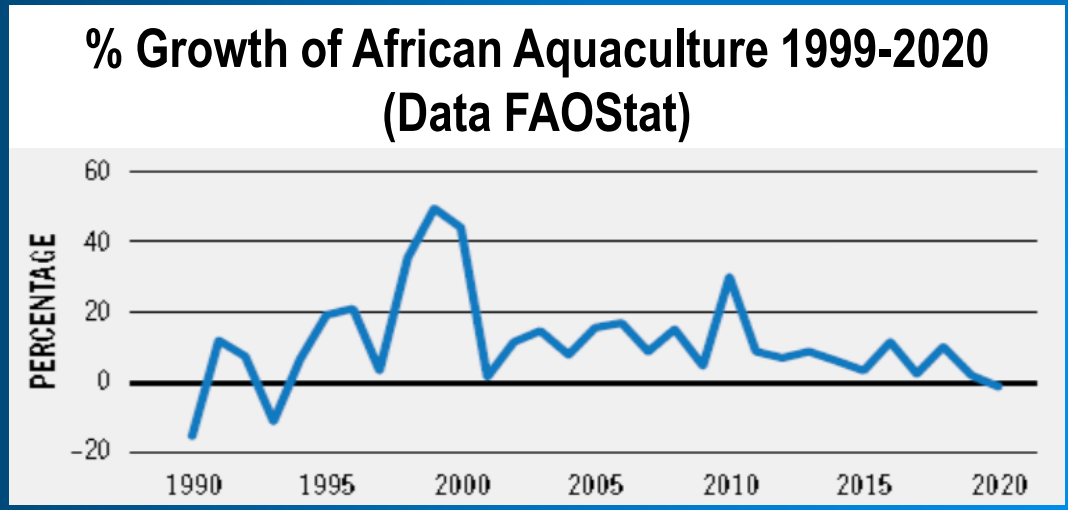


Source: FAO Stat www.fao.org/fishery/en/statistics

Aquaculture to Feed a Growing Human Population

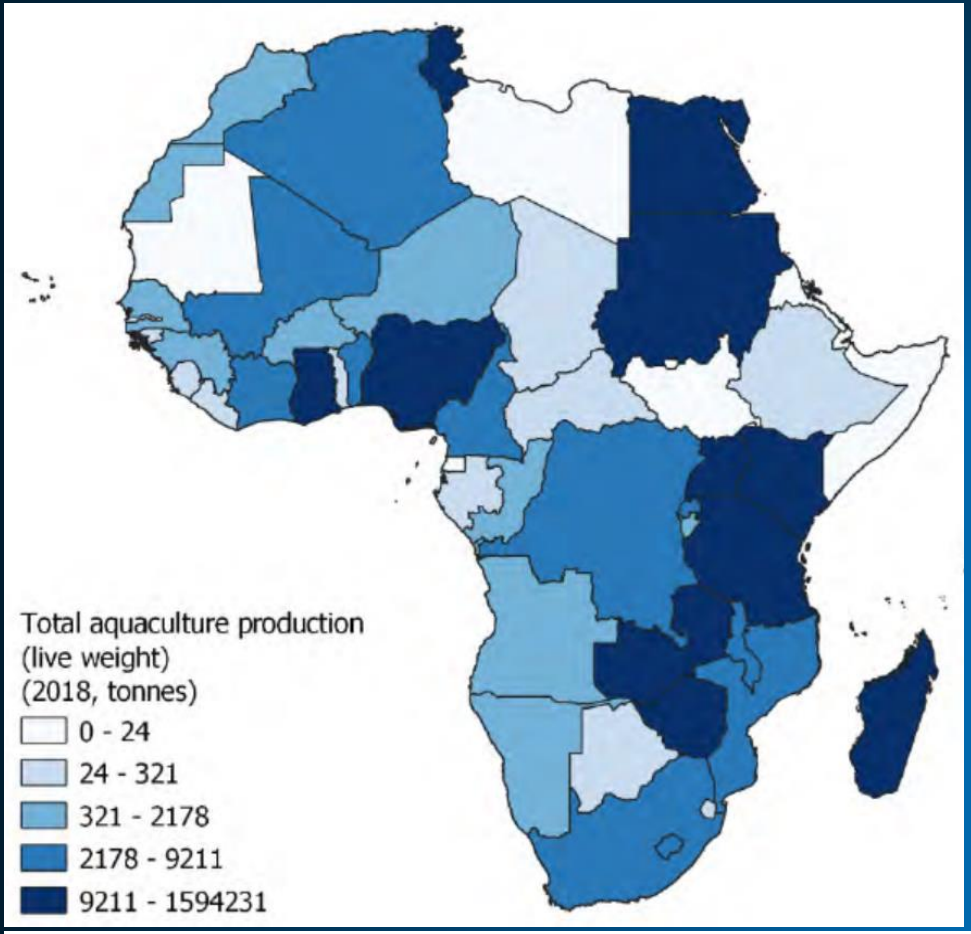




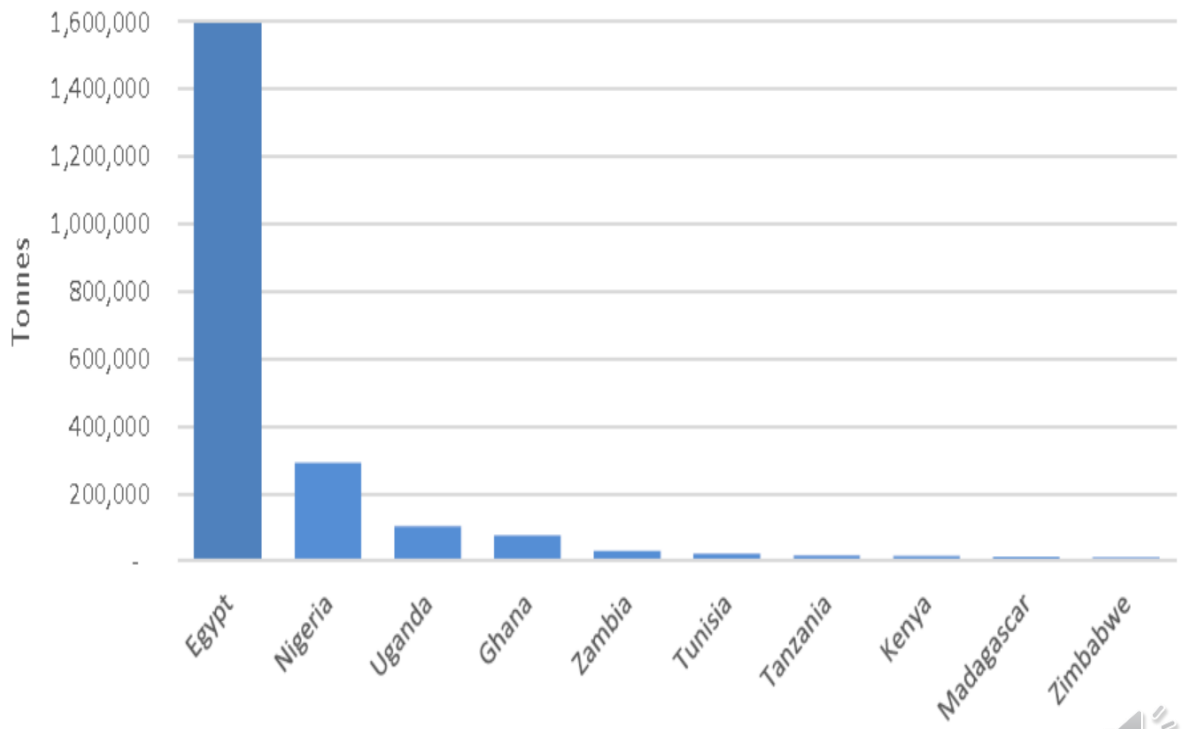


Futurist.com (based on FAO 2018 SOFIA data)

African Aquaculture Production



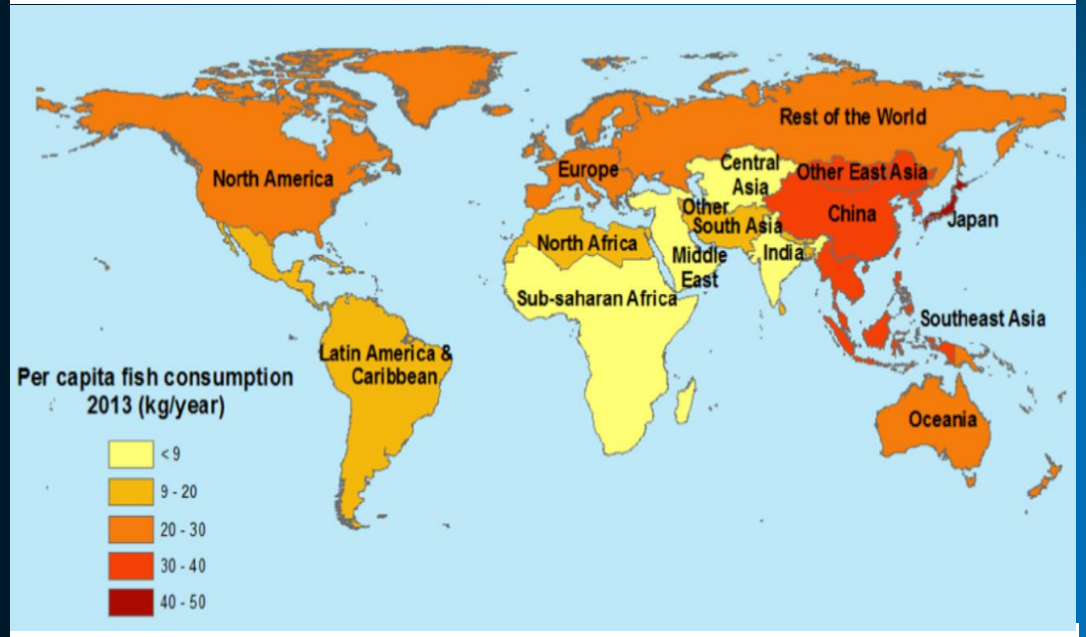
2022 Top 10 African Aquaculture Producing Countries (tonnes)



Hinrichsen, E. et al. (2022). Prospects for aquaculture development in Africa: A review of past performance to assess future potential, ZEF Working Paper Series, No. 211, University of Bonn.

Seafood Demand & Economic Impact

Per Capita Demand for Seafood



Chin et al. (2019). Prospect & Challenges of Fish for Food Security in Africa. *Global Food Security, 20: 17–25*

AFRICAN DEVELOPMENT BANK GROUP

"If Africa continues to be subjected to a worsening in the fish trade imbalance at the current average rate of 13% per year, its deficit shall reach US $1.2 billion by 2025, which will quadruple in 10 years."

Aquaculture Disease Outbreak Impacts
– the biggest need for an aquatic vet workforce –

Direct Losses from Aquatic Animal Diseases

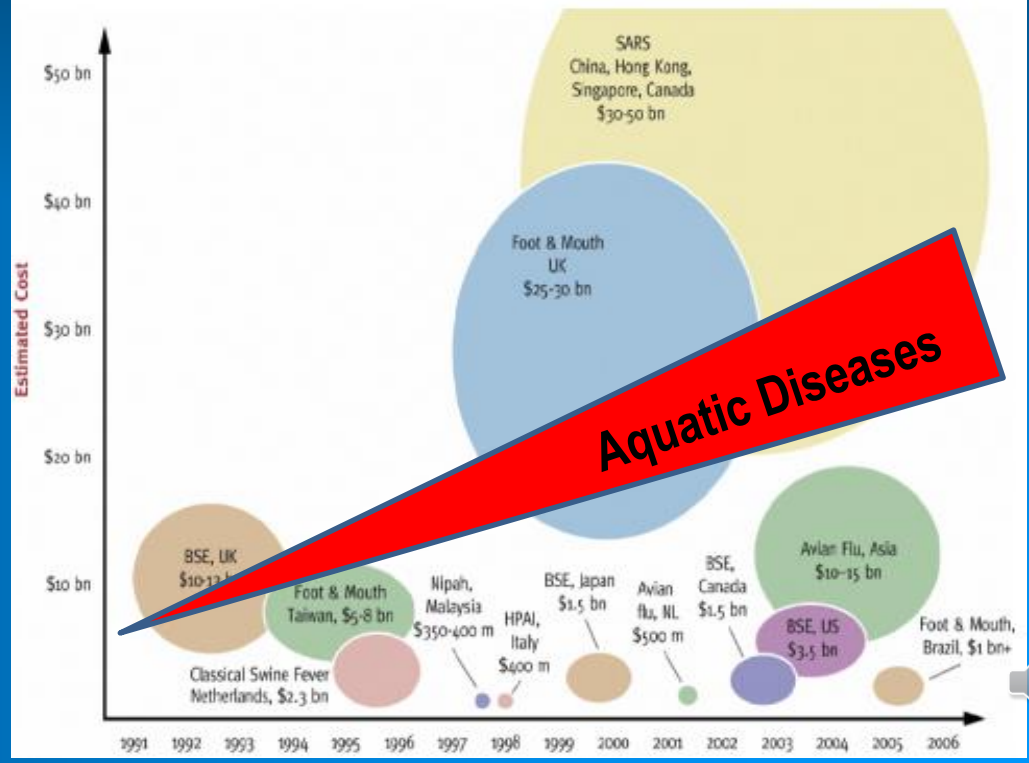
Thailand (1983-93)	US$100M
China (1993)	US$400M
India (1994)	US$17.6M
Thailand (1996)	US$600M
Ecuador (1999)	US$280M
Global loss (1997)	US$300M

Shrimp Diseases – Americas

WSSV	(1999)	US$ >1B
TSV	(1991-92)	US$ 1-2B
YHV	(1992)	US$ 0.1-0.5B
IHHNV	(1981)	US$ 0.5-1.0B

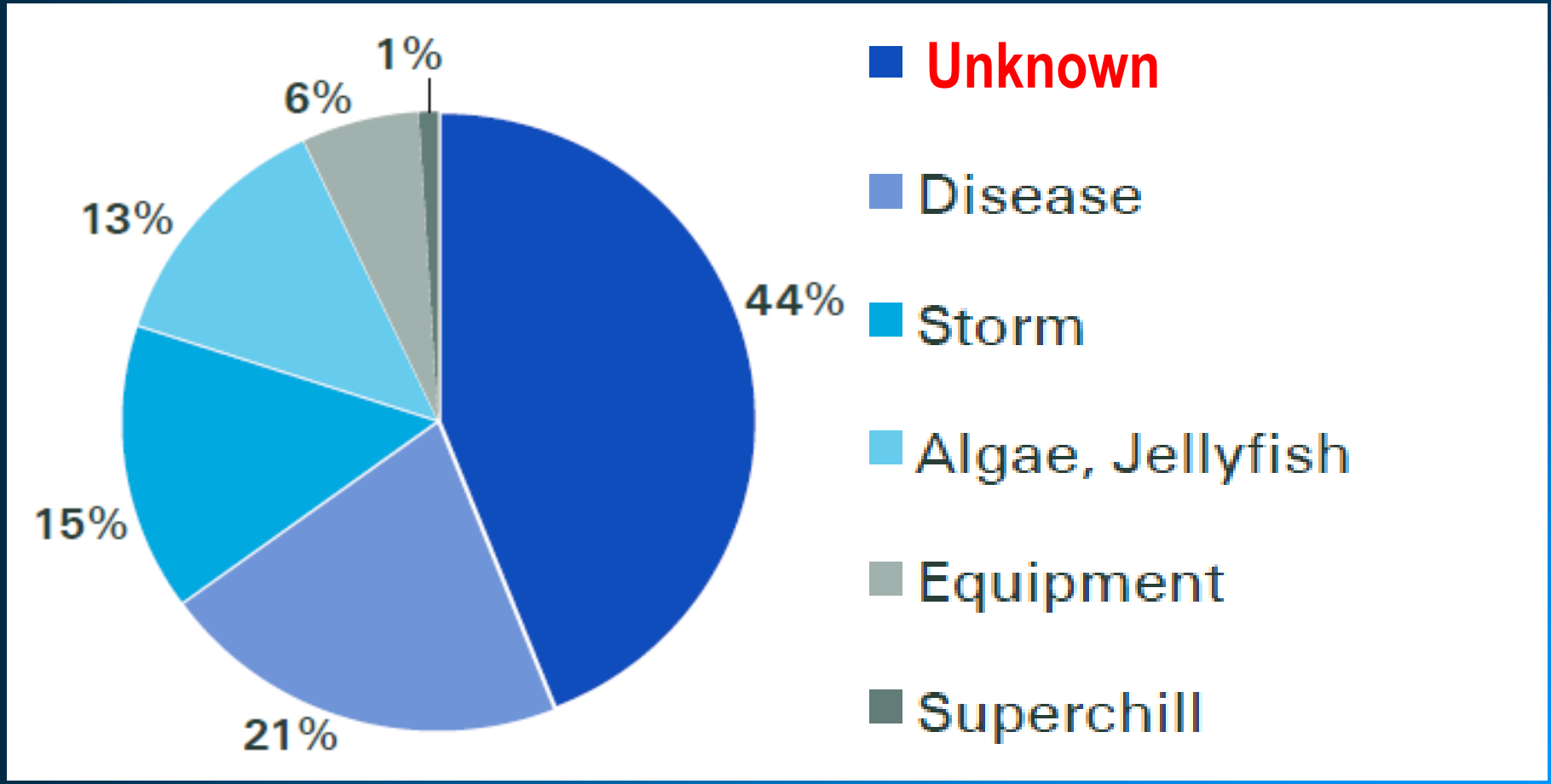
Source: Lightner, (2003, 2005)

Comparable Aquatic & Terrestrial Animal Diseases Impacts



K. de Balogh FAO (2010)

Aquaculture Losses



Adapted from Swiss Re (global reinsurance and insurance provider)

Disease – the largest impediment to aquatic animal industries

What it will take for effective disease prevention, control & eradication (biosecurity) programs:

- ✓ Fully functioning disease ***diagnostic*** services/laboratories
- ✓ Workable disease ***surveillance & reporting*** system/s
- ✓ Appropriate government/industry infrastructure with public/private investment & partnerships (***collaboration, networking & funding***)
- ✓ A well-trained & equipped ***veterinary workforce***

An Aquatic Veterinary Workforce

Includes *all personnel* dealing with aquatic animal health & diseases, working together (*networking*), all with *unique education, experience & skill sets*

- Veterinarians
- Veterinary nurses/technicians
- Diagnostic laboratory personnel
- Extension specialists & agents
- Field animal health workers
- Farm workers
- Academicians
- Government agencies
- Pharmaceutical companies
- Investment companies
- National & International Organizations

Current African Aquatic Veterinary Training Resources

Recognition: ~85% of current veterinary & para-veterinary education can be easily applied to aquatic species & diseases

- ✓ Largely draw on non-Veterinary courses & degrees
- ✓ Post-veterinary Continuing Education & Professional Development
- ✓ Veterinary degrees with some aquatic medicine in the Europe, USA or other countries

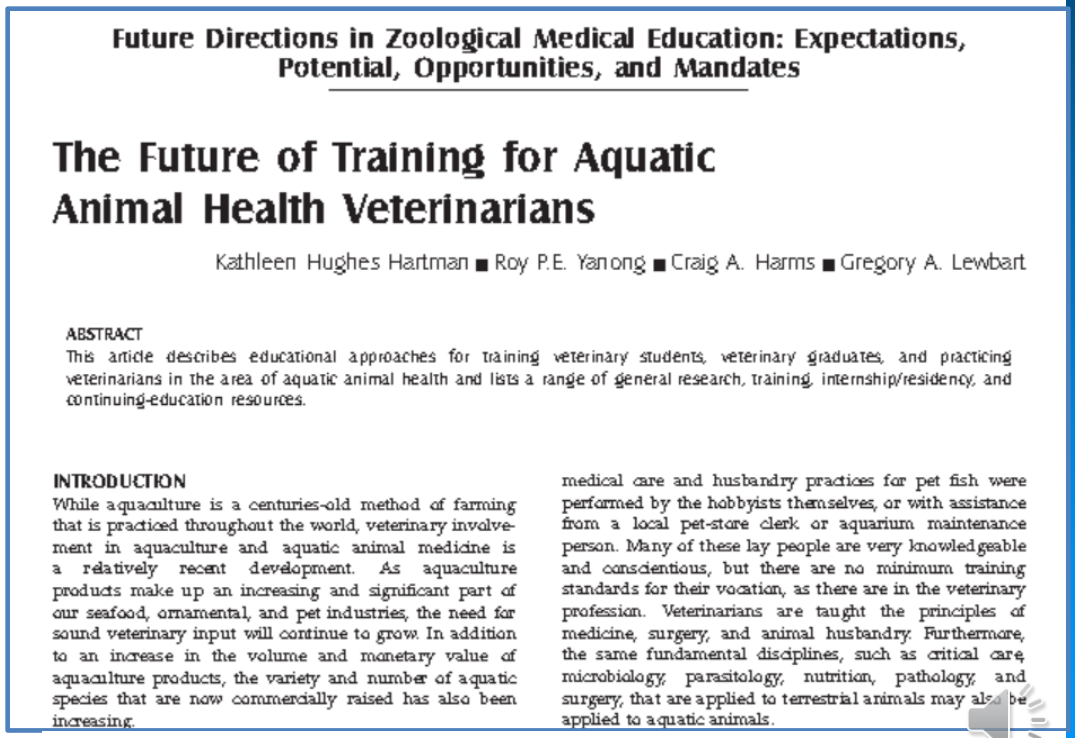
Deciding core (Day-1) needs

Generally agreed supplemental education/training needs:

- Basic aquatic veterinary medicine
- Clinical & laboratory diagnostics
- Production systems knowledge
- Seafood safety
- Animal welfare

✓ **Large amount of continuing education & professional development**

✓ **Optimal if in veterinary curriculum**



Future Directions in Zoological Medical Education: Expectations, Potential, Opportunities, and Mandates

The Future of Training for Aquatic Animal Health Veterinarians

Kathleen Hughes Hartman ■ Roy P.E. Yanong ■ Craig A. Harms ■ Gregory A. Lewbart

ABSTRACT

This article describes educational approaches for training veterinary students, veterinary graduates, and practicing veterinarians in the area of aquatic animal health and lists a range of general research, training, internship/residency, and continuing-education resources.

INTRODUCTION

While aquaculture is a centuries-old method of farming that is practiced throughout the world, veterinary involvement in aquaculture and aquatic animal medicine is a relatively recent development. As aquaculture products make up an increasing and significant part of our seafood, ornamental, and pet industries, the need for sound veterinary input will continue to grow. In addition to an increase in the volume and monetary value of aquaculture products, the variety and number of aquatic species that are now commercially raised has also been increasing.

medical care and husbandry practices for pet fish were performed by the hobbyists themselves, or with assistance from a local pet-store clerk or aquarium maintenance person. Many of these lay people are very knowledgeable and conscientious, but there are no minimum training standards for their vocation, as there are in the veterinary profession. Veterinarians are taught the principles of medicine, surgery, and animal husbandry. Furthermore, the same fundamental disciplines, such as critical care, microbiology, parasitology, nutrition, pathology, and surgery, that are applied to terrestrial animals may also be applied to aquatic animals.

Hartman, et al (2006) JVME, 33(3): 389-393.

Requirements for aquatic veterinary workforce competency needs

Recognized the needs for outcome-based competencies

Identify

- ✓ **Education** – Knowledge, Skills & Experience (KSEs)
- ✓ **Evaluation** – Knowledge & Skills Assessments (KSAs)
- ✓ **Recognition** – Certify individual's competency

Professional education and aquatic animal health: a focus on aquatic veterinarians and veterinary para-professionals

W.R. DeHaven* & A.D. Scarfe**
American Veterinary Medical Association, 1931 N. Meacham Road, Schaumburg, IL, USA

Proceedings of the 2011 OIE Conference, *Aquatic Animal Health Programs: their benefits for global food security*. Panama City, June 28-30.

Core (Day-1) Aquatic Veterinary Subject Matter needed to deliver services to producers & industries

9 Core pre-clinical & clinical subject matter – *unique to aquatic medicine*

1. Life Support & Environmental Systems
2. Taxonomy, Anatomy & Physiology
3. Industries & Husbandry
4. Pathobiology & Epidemiology
5. Diseases, Diagnostics & Treatment
6. Public Health, Zoonotics & Seafood Safety
7. Legislation, Regulations & Policies
8. Practical Veterinary Experience, Client Communications & Entrepreneurship
9. Principles of Aquatic Animal Welfare & Well-being

World Aquatic Veterinary Medical Association CertAqV Program

Initiated in 2013

What core or "Day-1" competency is needed?

Program Details www.wavma.org/CertAqV-Pgm

https://www.wavma.org/CertAqV-Pgm

Developing & Documenting Competency
Certified Aquatic Veterinarian Program (CertAqV)

World Aquatic Veterinary Medical Association
www.wavma.org
One Profession; One Discipline; One Voice
Cohesive & Inclusive!

WAVMA "Day-1" Competency in Aquatic Veterinary Medicine

- ✓ Identifies 9 core competency areas for all aquatic veterinarians
- ✓ Establishes Knowledge, Skills & Experience (KSE) & Assessment (KSA) requirements
- ✓ Identifies sources of KSEs (University courses, Continuing Education & Professional Development, Self study, etc.)
- ✓ Recognizes (certifies) those documenting core competency
- ✓ Supplements what may not be available in a veterinary curricula

WAVMA CertAqV Program

Requirements

- ✓ Register & selector a mentor
- ✓ Document where/when completed KSE requirements for 9 core areas
- ✓ Peer-review KSA evaluation (by other CertAqV veterinarians & WAVMA Board)
- ✓ Only awarded if/when veterinary degree earned
- ✓ 5-year Renewal (requires 50 hours of CEPD & clinical experience)

Currently ~250 veterinarians certified; ~65 in process
2023 started similar program for para-veterinarians

i-PAVE Evaluation & Validation of the CertAqV Program & Day-1 Competency

"DACUM" Evaluation/Validation Workshops

(using practicing aquatic veterinarians)

Targeted at:

- ✓ N. America – completed
- ✓ Asia-Pacific – completed
- ➢ Africa – planned for 2023/24
- ➢ Europe – planned for 2024
- ➢ Latin America –planned for 2025

International Partnership for Aquatic Veterinary Education

Collaboration to Ensure a Well-trained Global Veterinary Workforce

2017-2019 Grants

The Council on International Veterinary Medical Education

Sea Grant Oregon

DACUM Process (Developing A CurriculUM)

Driven Bottom-up

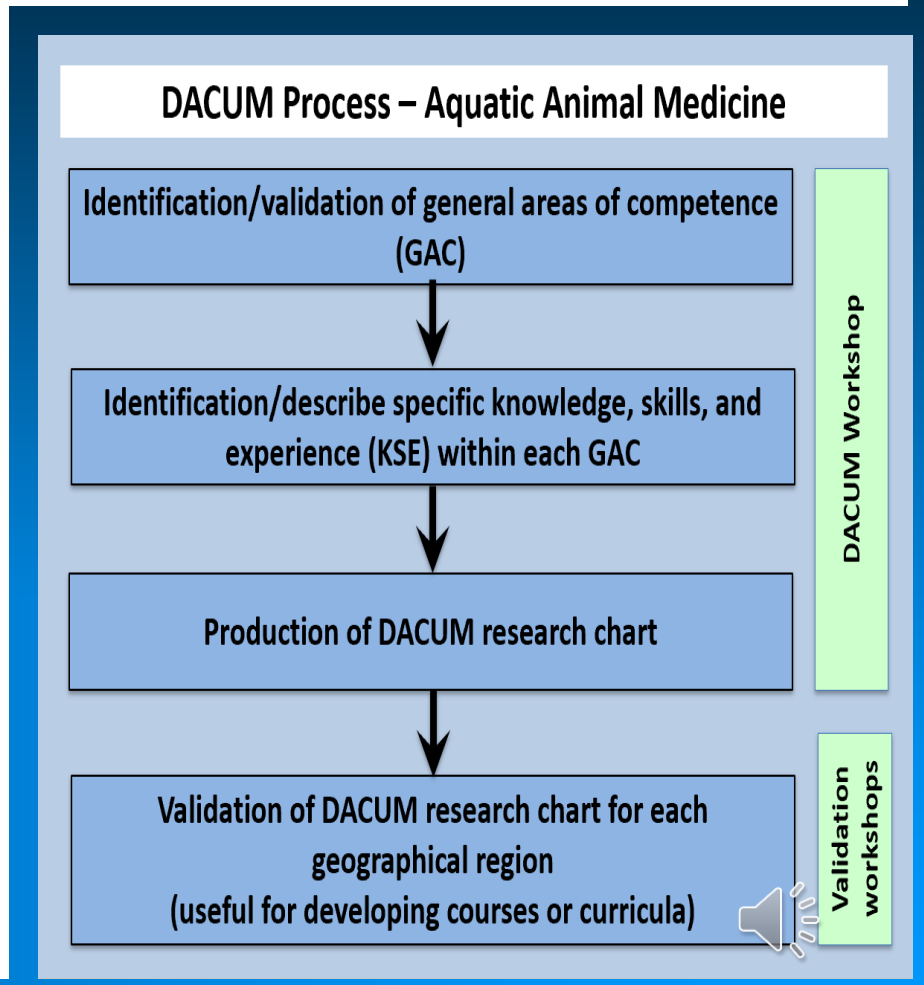
Use aquatic veterinarians actively engaged in private aquatic practice

3-day DACUM Job/Occupational Workshop

- ✓ Identify General Areas of Competence (GACs) & Specific Tasks (≈core tasks needed in WAVMA CertAqV subject areas to provide aquatic veterinary services)

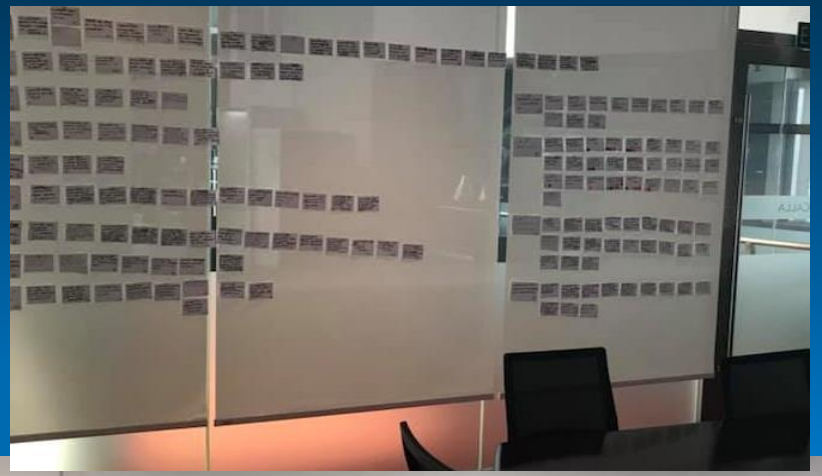
1-day DACUM Validation Workshops

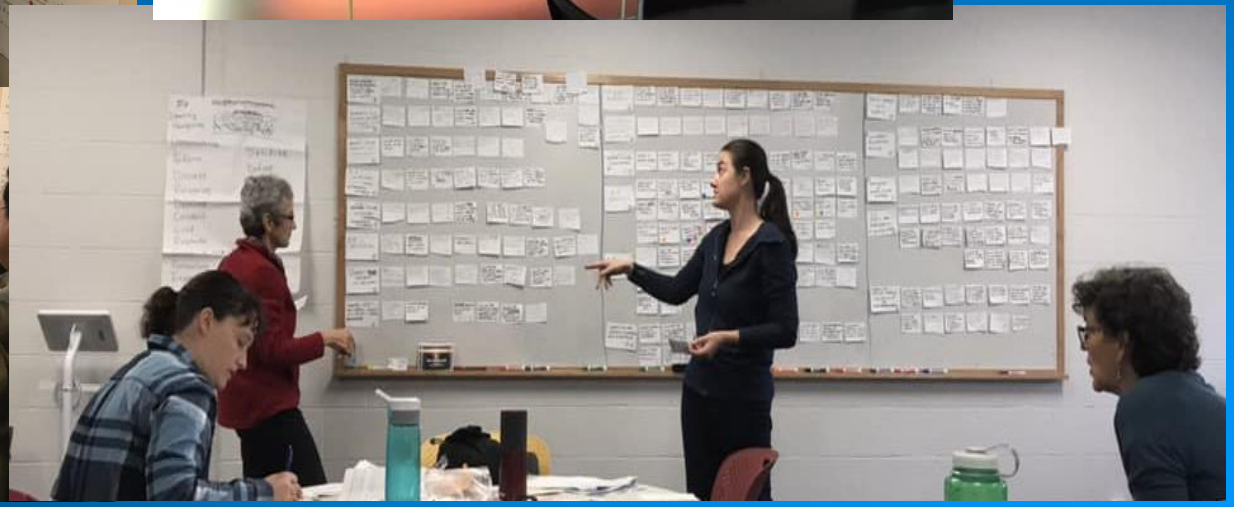
- ✓ Validate/modify GACs and Specific Tasks to ensure the apply to veterinarians in different global regions



Adams RE, RL Hogan & LJ Steinke (2015). DACUM: The seminal book. Edwin & Associates.

Job Analysis & Job Validation Workshops





Findings: DACUM Job Analysis Workshops

- ✓ Identified 18 General Areas of Competence (GAC) within the 9 CertAqV Domains
- ✓ 231 Specific Competencies associated with the GAC's – sequenced in order of mastery.

WAVMA CertAqV GACs	DACUM Process GACs	# KSEs Required
1. Aquatic Environment and Life Support Systems	1A. Environmental factors affecting aquatic animal health	15
	1B. Components and function of aquatic production and life support systems	9
2. Taxonomy, Anatomy and Physiology	2A. Aquatic animal anatomy, physiology and immunology	6
	2B. Aquatic animal nutrition	12
	2C. Aquatic animal life history and ecology	8
3. Husbandry and Industries	3A. Aquatic animal husbandry	10
	3B. Aquatic animal acquisition, harvest, collection, transport, acclimation and handling	9
4. Pathobiology and Epidemiology of Aquatic Animal Diseases	4A. Infectious, non-infectious and parasitic diseases of aquatic animals	12
	4B. Principles of biosecurity (disease prevention, control & eradication)	11
5. Diagnostics and Treatment of Aquatic Animal Diseases	5A. Aquatic animal history & clinical examination	10
	5B. Aquatic animal diagnostics	28
	5C. Aquatic animal treatments and management strategies	20
	5D. Aquatic animal sedation, anesthesia and euthanasia (*also applies to DACUM GAC 9B)	*13
6. Clinical Practice Experience and Client Communications	6A. Veterinary ethics, professionalism, and communication	16
	6B. Veterinary business and practice management	12
7. Public Health, Zoonotics and Seafood Safety	7A. Public health and safety	10
	7B. Aquaculture product quality	5
8. Legislation, Regulations, and Policies	8A. Legislation, regulations, and policies	16
9. Principles of Aquatic Animal Welfare	9A. Principles of aquatic animal welfare	9
	9B. Aquatic animal euthanasia (*covered in DACUM GAC 5D)	*13

What Aquatic Courses Exist in Vet School Curricula?

N. America vs. European Surveys

Similarities

- ✓ ~ 60% returned

(USA/Canada: 20 of 33; EU 60 of 100 completed)

- ✓ ~60% a least 1 course (range 1-16)
- ✓ ~60% courses are mandatory (vs. elective)
- ❖ ***None cover all 9 WAVMA subject matter***

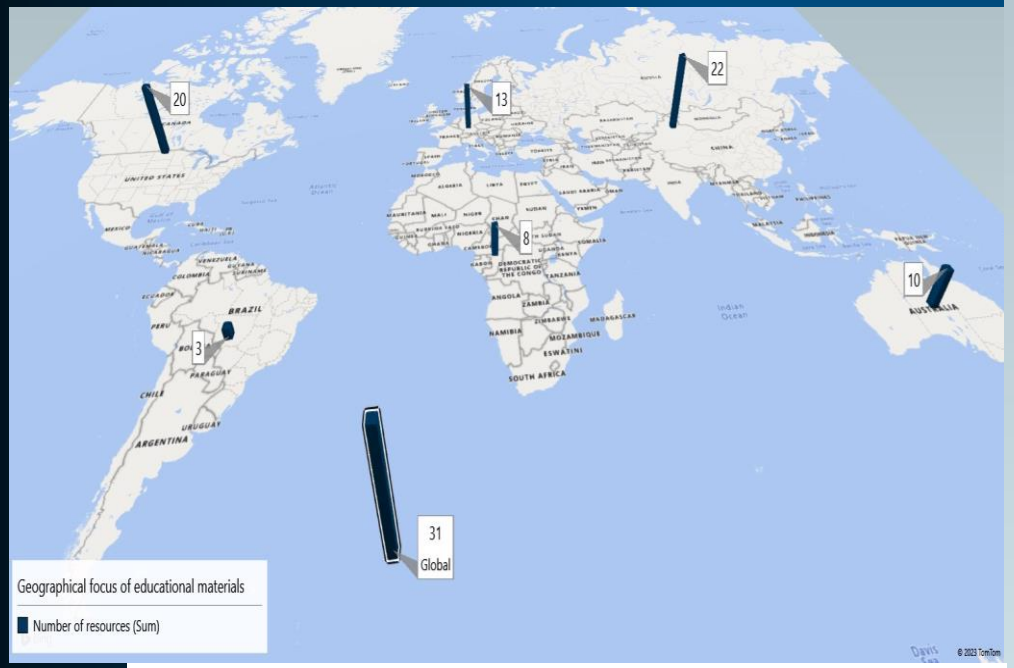
Differences – USA/Canada

- Pre-vet degree + 4 yr curriculum
- More comprehensive coverage
- Broader species coverage (finfish, mammals & invertebrates)

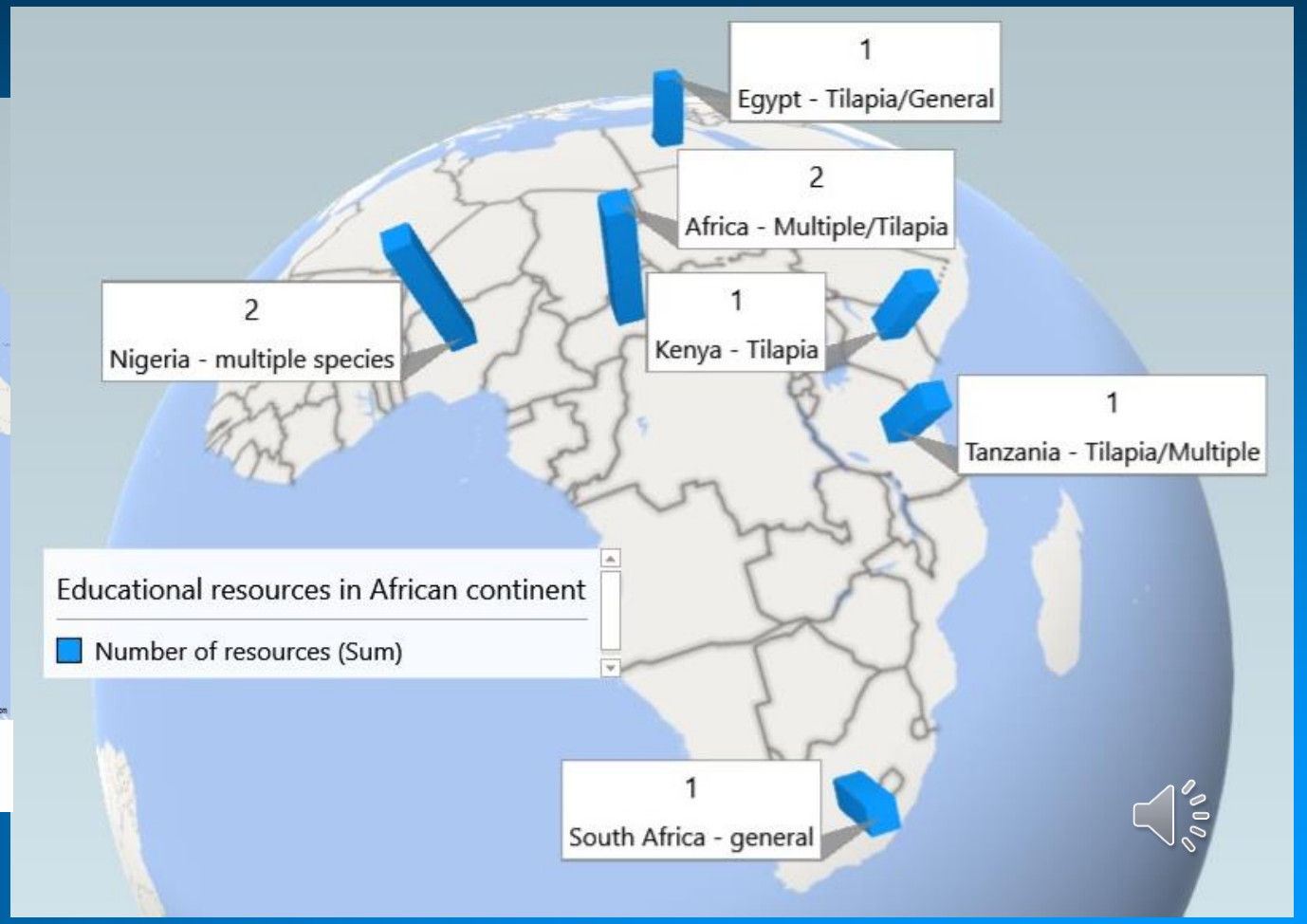
Differences – EU

- 5 or 6 yr curriculum
- Courses focus on clinical pathology, anesthesiology, welfare, ethics
- Largely cover finfish
- 10% (6) allow non-vet curriculum courses
- **33% suggest Post-grad (MSc/PhD) is required**

Started Examining Other Aquatic Veterinary Educational Efforts – Preliminary Information



Maps courtesy of D. Palić



Onderstepoort Aquatic Animal Health/Veterinary Unit

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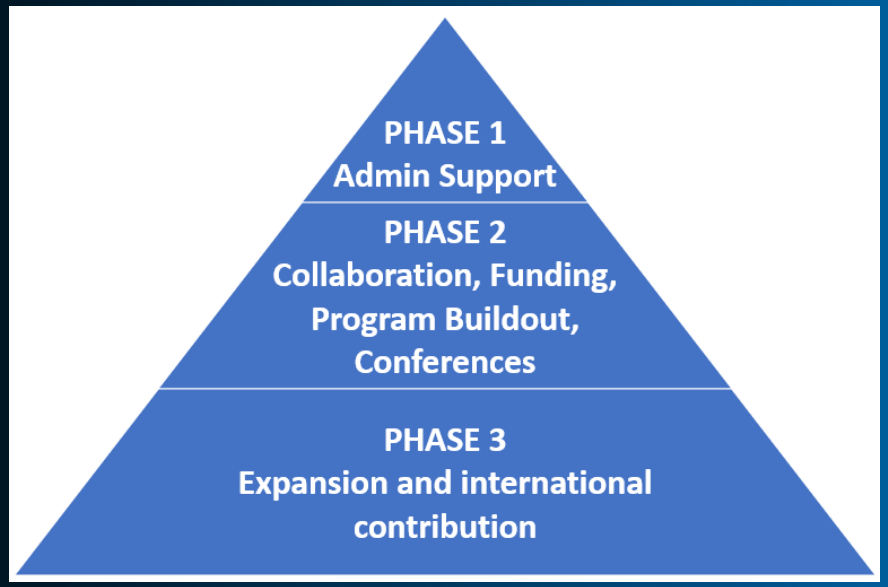
Faculty of Veterinary Science



Initiated in 2022

Vision: a global leader of aquaculture, aquatic health research & veterinary medicine through research, training and service in public health, infectious disease control, aquatic health and welfare, and sustainable African aquaculture.

Programs Being Implemented

UNIVERSITEIT VAN PRETORIA
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Faculty of Veterinary Science

- Incorporating/refining aquatic courses into veterinary curriculum
- Developing a final year Aquaculture Elective Week
- Onderstepoort Aquatic Student Club fully functional
- Developing a post-graduate Aquatic Veterinary Internships
- Expanding post-graduate aquatic focused MSc/PhD programs aquatics

- African Vet Schools Survey
- African producer biosecurity needs survey
- Develop disease surveillance & reporting system for Southern Africa
- Looking into expanding Extension efforts

❖ **Working towards private/public partnerships (farmer-industry-government-academia collaboration/interactions)**

❖ **Seeking collaboration & networking with other African entities**

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International Partnership for Aquatic Veterinary Education

Collaboration to Ensure a Well-trained Global Veterinary Workforce

i-PAVE

- A non-profit partnership (collaboration) drawing on subject matter experts & supporters around the world
- Provide libraries of recorded web-based lectures & curated, peer-reviewed publications for veterinarians & para-veterinarians on key aquatic veterinary subjects.
- Incorporate a Learning Management Systems to track progress through lectures/publications, & issue Certificates of Completion for CPD Credit after successfully completing a quiz on subject matter.
- Assist Vet Schools develop courses from library content, tailored to local needs.

Take-home Messages

- There are ***compelling reasons*** for a well-trained aquatic vet workforce
- There are a ***number of models*** to follow & tailor to African needs
- There are a ***number of existing programs*** to participate in
- ***Networking*** with existing organizations is key to understanding different approached to obtaining knowledge, skills & experience
- ***Several initiatives*** are being considered ***for Southern (and all of) Africa***
- Forming ***new local & country-based aquatic veterinary organizations*** (with CEPD & networking) are encouraged.

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Veterinarians

Doctors Protecting
The Health of Animals and People

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International Aquatic Veterinary Biosecurity Consortium

Food for Thought

" In Sub-Saharan Africa, per capita consumption has already dropped and we can little afford to see this trend continue or worsen. Thus, for the coming years and decades, Africa should be a high priority region for aquaculture development. We should join hands with all development agents and institutions to ensure that aquaculture and fish production in Africa becomes part of the overall development process for the continent. … There is thus a need for renewed and long-term assistance to Africa's aquaculture sector. This approach should favour public-private investment; it is imperative that we all learn from mistakes of the past."

2006 Rohana P. Subasinghe, FAO Technical Secretary of the Sub-Committee on Aquaculture.