Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

VIRTUAL COURSE

26 March to 15 April 2021

Design of an Active Surveillance for Tilapia Lake Virus (TILV) Disease and Its Implementation

TCP/INT/3707: Strengthening biosecurity (policy and farm level) governance to deal with Tilapia lake virus

Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

CHECKLIST 3

30 March 2021

Defining population

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TCP/INT/3707: Strengthening biosecurity (policy and farm level) governance to deal with Tilapia lake virus

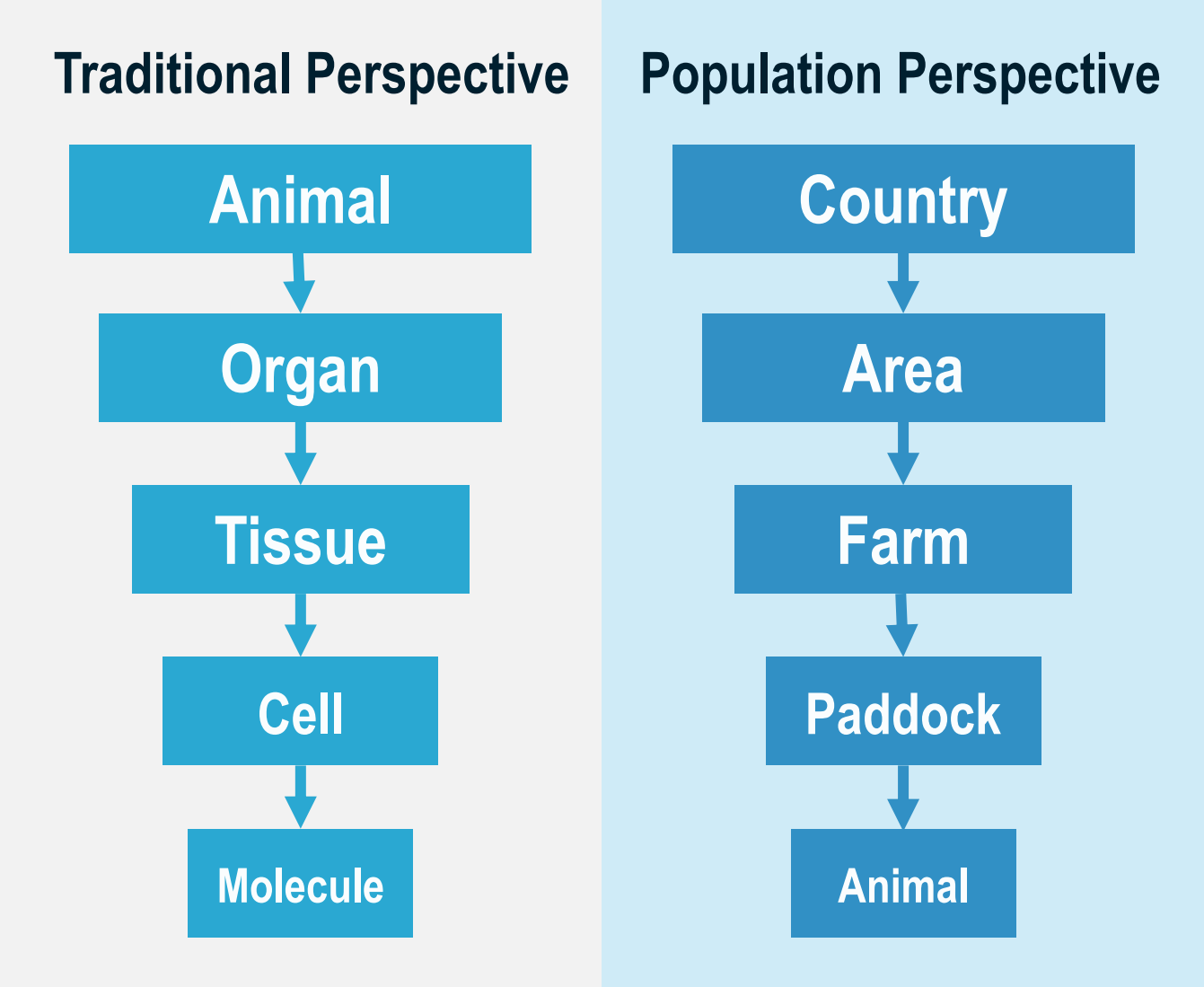
Learning objectives

- To understand the requirements and criteria for Checklist 3
- To define population of interest that will be considered in the active TiLV surveillance

Presentation topics

- Population
- Census ver survey
- Unit of interest
- Target population
- Study population
- Epidemiological unit
- Inclusion and exclusion criteria

Diseases in fish population



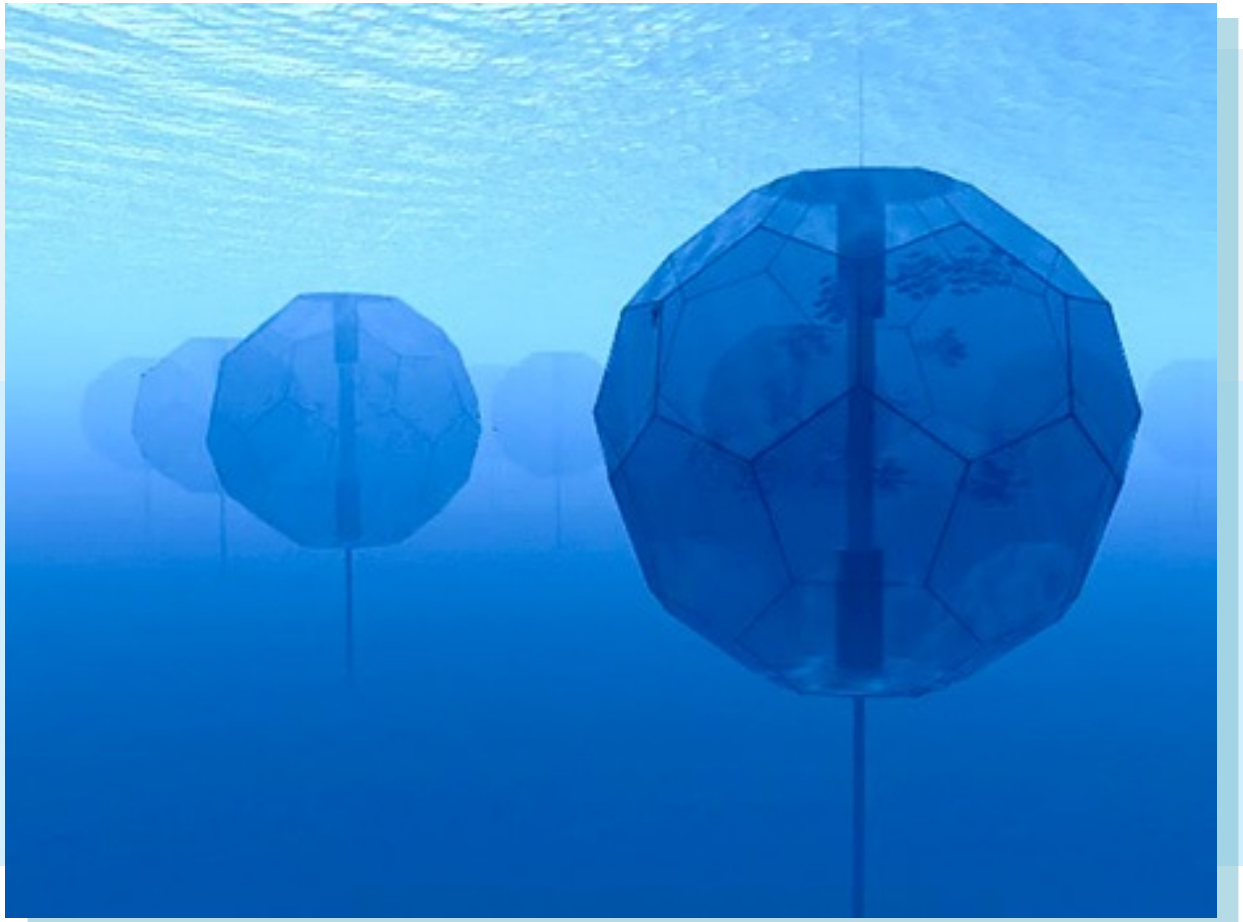
- **Fig. 1.1.** Representation of the relationship between the traditional perspective of investigating disease and a population perspective

Aquatic vs. Terrestrial surveillance

- **Challenge 1 – Environment**

- **Terrestrial sp**. – housing, ventilation, lighting, feed and feed, distribution, water

- **Aquatic sp.** – water is all
  - Fresh water, salt water
  - Still water bodies, rivers
  - Density



Aquatic vs. Terrestrial surveillance

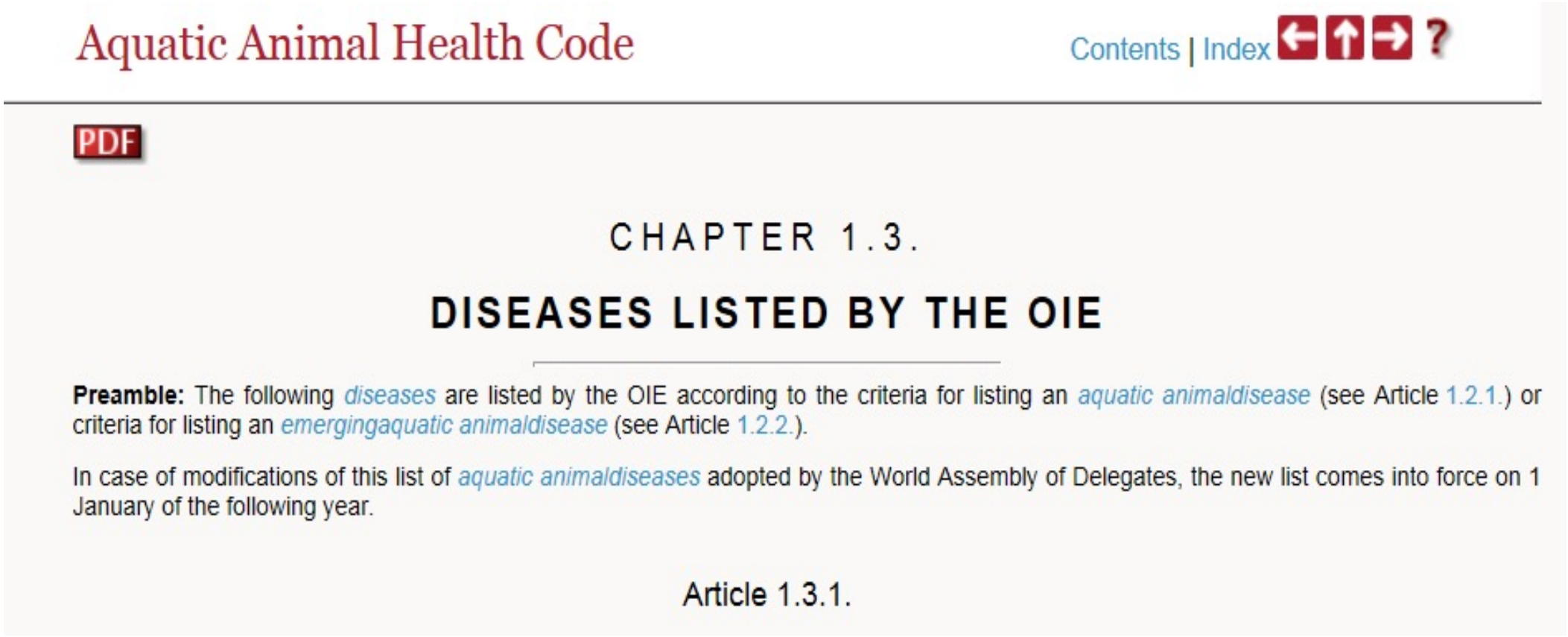
- **Challenge 2 – Biology of host**

- **Most terrestrial animals**
  - Warm blood
  - Vertebrate
  - Mammals
  - Containment and biosecurity (movement, housing)

- **Aquatic animals (and plants!)**
  - Cold blood
  - Many invertebrates
  - Fish, crustaceans, mollusks
  - Farming integrated into environment

Aquatic vs. Terrestrial surveillance

- Challenge 3 – Diversity of pathogens



Aquatic Animal Health Code

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CHAPTER 1.3.

DISEASES LISTED BY THE OIE

Preamble: The following *diseases* are listed by the OIE according to the criteria for listing an *aquatic animaldisease* (see Article 1.2.1.) or criteria for listing an *emergingaquatic animaldisease* (see Article 1.2.2.).

In case of modifications of this list of *aquatic animaldiseases* adopted by the World Assembly of Delegates, the new list comes into force on 1 January of the following year.

Article 1.3.1.

Aquatic vs. Terrestrial surveillance

- **Challenge 4 – diversity of management systems**
  - Extensive systems
    - cages, still water ponds/reservoirs
    - Tilapines, catfish, Cyprinids
  - Semi-intensive systems
    - the ponds are fertilized
    - Exogenous feeding
  - Intensive systems
    - water flows in and out continuously
    - higher stocking densities
    - complete feeds and water aeration
- Integrated Multi-species Aquaculture
- 425 farmed species (22 of that accounting for 75 % of global production)

Aquatic vs. Terrestrial surveillance

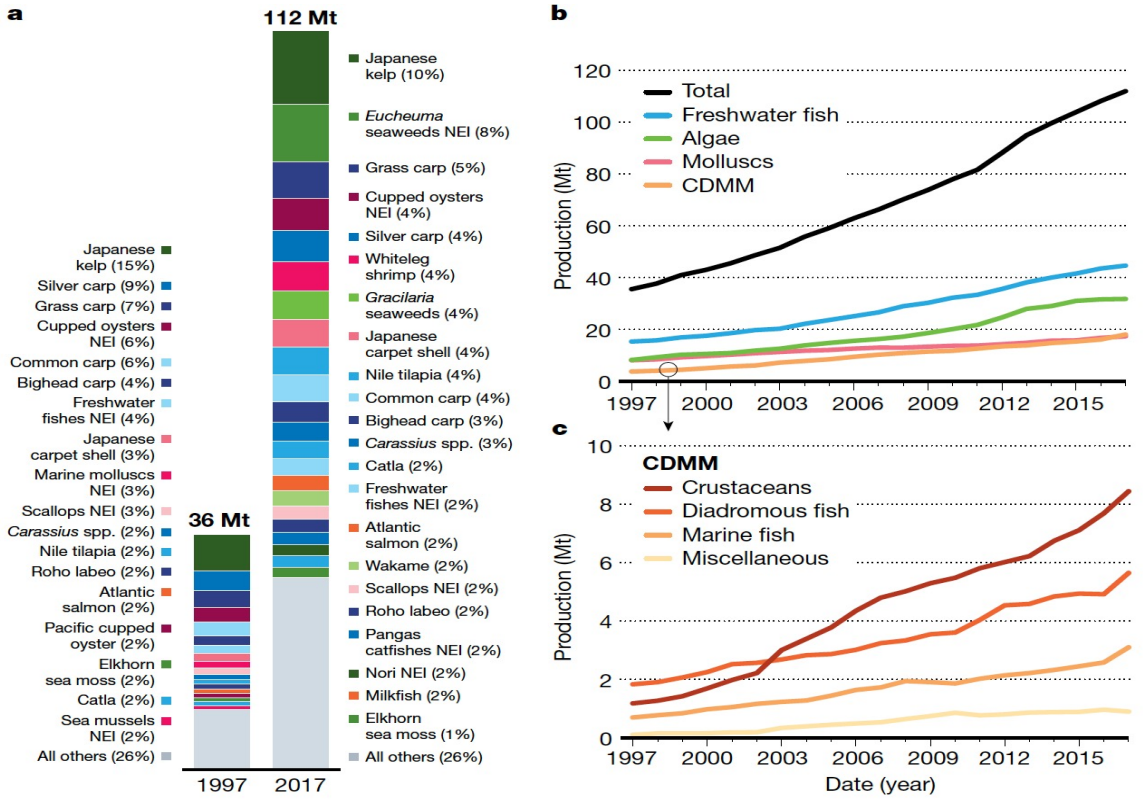

Fig. 1 | Composition and growth of global live-weight aquaculture production. a, The species composition is shown for 1997 and 2017. Green, plants and algae; blue, freshwater fish; pink, shellfish; orange, diadromous fish. **b**, **c**, Growth is shown from 1997 to 2017 for the following production categories (**b**): total, freshwater fish, algae, molluscs and CDMM, which comprises crustaceans, diadromous fish, marine fish, and miscellaneous species and is expanded in **c**. Algae comprised more than 99% of the production weight of 'algae and aquatic plants' production in 2017. Data were obtained from the FAO[2]. National data are reported on the basis of the ASFIS List of Species (http://www.fao.org/fishery/collection/asfis/en). NEI, not elsewhere included for species identification in question.

Source: Naylor at al., 2021

In summary: key challenges related with population for surveillance planning for AAD

- Animals are kept in water
- Often in complex rearing system
- The size of the fish population on farm
- Accessibility for inspecting and sampling animals
- Some basic information relevant to planning such as expected prevalence in infected population and diagnostic test performance is often limited or not available

Population

- Proper consideration of population provides authority with the flexibility to design **well- targeted surveillance system**.

- The **target population** to which the surveillance applies is all individuals of all species susceptible to the infection in the country or zone

- Whenever the **study population** (individuals selected to participate in study) is different from the **target population**, there is a risk that the findings from the study population may not represent the true situation.

Population definitions (1)

- **Population of interest**
  - aim to get a representative sampling of this susceptible population
  - affects agent entry, agent spread and likelihood of agent/disease detection
    - Population structure (demography)
    - Locations
    - Disease histories
    - Exposure
    - Susceptibility

Population definitions (2)

- **Population of interest**

- **Target population**
  - population to which the conclusions (absence/presence) will be applied

- **Study population**
  - population from which the surveillance data are gathered
  - may be same as target population or be a subset of it

Study population should be:

- As defined in the relevant disease chapter of the OIE Code, where exists;

- A subset of target population defined by:
  - Species
  - Time, season or month of year
  - Stage of life cycle
  - Production/management system
  - Location

Needs to be considered:

- Single or mixed species
- Separation (strata) by species
- Separation (strata) by size and age
- Aquatic animal population are often considered infinite for the purpose of sample size calculation
- Difficulties in access to and visibility of aquaculture fish mean that disease problems may not be noticed immediately
- Collecting of moribund or newly dead fish essential for good surveillance

Epidemiological unit

In the context of surveillance:

- = units selected when sampling
- E.g. animals, ponds/cages, farms, villages, districts
- Epidemiological unit can be same as sampling unit
- Definition of epidemiological unit will have impact on surveilance design and interpretation of surveillance data

Population and the design of survey

Will depend on the size and and structure of the population being studied:

- Single stage survey (individual animals)
  - Certification of batches of animals for export
  - Certification of single establishment (one pond/cage)

- Stratified (multistage) surveys: ponds, farms or villages
  - By species
  - By region
  - By production type
  - Allows multiple sampling methods to account for differences

Homework

- Whatever the study population used, it is most important to document it, to consider how it differs from the target population, to account for any effects.
- Target population for TiLV in participating countries?
- Describe farming system, farm registration data, approval of farms, if exist
- Wild fish population

Definition of population: criteria

- Includes definition of the population of interest
- Includes definition of the targeted population
- Includes definition of the study population (population used for sampling)
  - Inclusion criteria are set and described
  - Exclusion criteria are set and described

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Thank you for your attention!

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Norad