



Recommendation on Aquaculture Definitions

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I. Justification

As the definition is *par excellence* a dynamic structure allowing the deepening of understanding as long as it maintains its consistency and due to the speed at which new concepts and trends are enriching the modern society the AAC considers as appropriate and necessary to ensure that policy-makers and the general public have a common understanding of some concepts and terms which are widely used in relation to aquaculture.

Considering that AAC integrates a wide range of stakeholders related directly or indirectly to aquaculture in its various forms it is important to provide an insight view on the meaning of some relevant concepts and terms used in regulations, strategies, guidelines and more often in the public speech.

This recommendation builds on the discussions and conclusions of the AAC Seminar about Definition that took place on the 9th of June 2021 to recommend definitions on "aquaculture", "extensive aquaculture", "semi-intensive aquaculture" and "intensive aquaculture" and on "sustainable aquaculture".

II. Background

Defining concepts, notions is a tool for organizing the comprehension of the world around us into meaningful categories and describe their attributes for a common understanding of the users. Apart from being a philosophical demarche, in the last decades it became a necessary tool in order to ensure that various legislative and non-legislative documents which are shaping the regulatory environment for the economic activities have the intended consequences.

For aquaculture, which is one of the most complex activities in agriculture, involving hundreds of species and hybrids, various infrastructures and technologies and different environments defining concepts and notions to cover the sector is of utmost importance, not only from a regulatory point of view but also from the public perception perspective.

One of the most elementary questions about aquaculture is its definitions. The term is usually associated to propagation and rearing of the aquatic species in selected environments involving the individual or corporate ownership of the agricultural livestock¹. From various definitions which are used around the globe by different jurisdictions two are the ones with a relevant impact on European aquaculture. The first is the definition mentioned in art. 4, (25) of the Regulation on Common Fisheries Policy² which states that: "**aquaculture** means the rearing or cultivation of aquatic organisms using techniques designed to increase the production of the organisms in question beyond the natural capacity of the environment, where the organisms remain the property of a natural or legal person throughout the rearing and culture stage, up to and including harvesting". One of the main disadvantages of this definition is that aquaculture is linked with a threshold of production set at the natural capacity of the environment, which excludes types of extractive/extensive aquaculture such as algae, shellfish or extensive pond fish farming which are performed below that limit without having the possibility to

¹ McCoy II, H. D. (2000). American and international aquaculture law: a comprehensive legal treatise and handbook covering aquaculture law, business and finance of fishes, shellfish and aquatic plants. Peterstown, West Virginia, U.S.A: Supranational Publishing Company

² <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32013R1380>

exceed it. On the other hand, FAO is defining aquaculture³ as *“the farming of aquatic organisms, including fish, molluscs, crustaceans and aquatic plants. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Farming also implies individual or **corporate ownership of the stock being cultivated”** highlighting the three main pillars: aquatic organisms, ownership and management practices.*

We also plan to address definitions of aquaculture as “extensive” or “intensive”. In reality, the classifications systems developed in aquaculture followed its broad coverage of different variables which are defining the activity. Therefore, aquaculture could be classified in multiple ways by the number of species (e.g. monoculture, polyculture, integrated), by the water salinity (e.g. freshwater, brackish water, metahaline and mariculture), by the placement of the infrastructure (e.g. land-based, tidal farms, water based), by the type of infrastructure (e.g. ponds, pens, cages, rafts, etc.), by the level of water exchange (e.g. static, open, closed), by the taxonomic classification (salmonids, cyprinids, sturgeons, shellfish, algae, etc.), by the life stage of the species (e.g. hatcheries, juveniles farms, on-growing farms, complete cycle), by the introduction of feeds and nutrients (e.g. fed, unfed), by the intensity of stocking/harvest per unit (e.g. extensive, intensive), by the energy consumed for a unit of weight gain, including feed, labour and conventional energy (e.g. extensive, intensive), by the dependency of added nutrients (extensive, intensive, semi-intensive). And to make the description of aquaculture more complex there is an extensive possibility of combining all the above-mentioned categories (e.g. Integrated Multitrophic Aquaculture, Intensive-Extensive Systems, aquaponics, biofloc, semi-intensive).

For the purpose of a simple understanding of the general trait of an aquaculture system the AAC decided to focus on the added nutrients classification scheme.

Finally, the AAC focused also on the meaning of the concept of “sustainability” for the EU aquaculture sector and what would be the outcome of a “sustainable aquaculture” approach. From a linguistic point of view “sustainable” means⁴ *“involving the use of natural products and energy in a way that does not harm the environment”* or “that can continue or be continued for a long time”. The definition is still quite simple and clear.

The decades following WWII which were skyrocketing the economic development with less concern on the environment made, finally (the 1972 UN Conference on the Human Environment in Stockholm⁵), room for the initial concept of ‘*environmentally sound development*’, developed into ‘*eco-development*’ and defined by Ignacy Sachs in 1978 as “an approach to development aimed at harmonising social and economic objectives with ecologically sound management, in a spirit of solidarity with future generations”.

Later on, in 1987, in the UN Report of the World Commission on Environment and Development ***Our Common Future***⁶ it has been stated that “*Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs*” and became a concept capable of achieving consensus at that time, but which could be vaguely defined: “Sustainable development is a term that everyone likes, but nobody is sure

³ <https://www.fao.org/3/x6941e/x6941e04.htm>

⁴ <https://www.oxfordlearnersdictionaries.com/definition/english/sustainable?q=sustainable>

⁵ <https://undocs.org/en/A/CONF.48/14/Rev.1>

⁶ <https://www.are.admin.ch/are/en/home/media/publications/sustainable-development/brundtland-report.html>



of what it means.”⁷ As if a definition includes everything leaving nothing outside then it becomes worthless.

In 1989, The FAO Council defined sustainable agriculture and rural development as:

“... the management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry and fisheries sectors) conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable (FAO 1989)⁸.”

This definition incorporates the needs of humans well, both in the present and the future, but some environmentalists want a more positive approach that enhances the environment and biodiversity rather than just avoiding damage. The definition also fails to mention animal welfare. For some, this is covered by the reference to social acceptability; for animal welfare groups the issue is intrinsic to sustainability because it directly affects the animals.

Economic growth, environmental protection, animal welfare and social equity should be interdependent, mutually reinforcing national goals, and policies to achieve these goals should be integrated.

UN focused, in the following years⁹, on the three pillars considered to be the key elements of sustainability: economic, environmental and social. These are widely accepted, but it must be noted again that animal welfare does not fit well into any of these categories. Animal welfare groups support adding animal welfare as a fourth pillar to recognise the particular needs of non-human animals; others disagree, arguing that you would then need additional pillars to accommodate other concerns.

Further, in 2015, UN adopted a universal call to action to end poverty, protect the planet and improve the lives and prospects of everyone, everywhere through the 17 sustainable developments goals which set the indicators needed for the concept validation.

In this linguistic and conceptual context the “sustainable aquaculture” paradigm is trying to catch up with the new trends. The United States Farm Bill of 1990 defined sustainability as maintaining profitability, using non-renewable resources efficiently, supplying food and fibre needs, enhancing renewable resources and improving the quality of life in rural areas¹⁰. The European Commission ascertained in a publication called ‘Sustainable Aquaculture’ that “there is a growing gap between the amount of aquatic food consumed in the EU, and the amount caught from wild fisheries and calls for this gap to be partly filled with environmentally responsible aquaculture. Aquaculture thus has an important role to play in Europe’s food security as well as its economic growth.”¹¹

Considering the:

⁷ Daly, H. E. (1996). Beyond growth: The economics of sustainable development. Boston: Beacon Press.

⁸ <https://www.fao.org/3/w7541e/w7541e02.htm>

⁹ Purvis, B., Mao, Y. & Robinson, D. Three pillars of sustainability: in search of conceptual origins. *Sustain Sci* 14, 681–695 (2019). <https://doi.org/10.1007/s11625-018-0627-5>

¹⁰ Wurts, William. (2007). SUSTAINABLE AQUACULTURE: CONCEPT OR PRACTICE. In book: Encyclopedia of Life Support Systems (EOLSS)Chapter: In BIOTECHNOLOGY -- Vol. XPublisher: UNESCO, Eolss Publishers, Oxford ,UKEditors: Horst W. Doelle, and Edgar J.DaSilva

¹¹ Science for Environment Policy (2015) Sustainable Aquaculture. Future Brief 11. Brief produced for the European Commission DG Environment by the Science Communication Unit, UWE, Bristol. Available at: <http://ec.europa.eu/science-environment-policy>

- EU Farm to Fork Strategy and the recognition that the shift to sustainable aquatic food production must also be accelerated. Economic data show that, where fishing has become sustainable, income has grown in parallel.¹²
- The Strategic Guidelines for EU Aquaculture and particularly their aim to help building an EU aquaculture sector that: (i) is competitive and resilient; (ii) ensures the supply of nutritious and healthy food; (iii) reduces the EU's dependency on seafood imports; (iv) creates economic opportunities and jobs; (v) aims to improve animal welfare and (vi) becomes a global reference for sustainability¹³.
- The overwhelmingly abundance of the "sustainability" goals and claims determined the AAC members to reflect upon the needs of clarification and simplification of the concept in order to make it practical

III. Definitions of extensive, semi-intensive and intensive aquaculture

First of all as the current definition of aquaculture is not reflecting various types of aquatic organisms farming there is a need to define aquaculture according to FAO:

Aquaculture is the farming of aquatic organisms, vertebrates including fish; invertebrates including molluscs and crustaceans; and aquatic plants implying individual or corporate ownership of the stock being cultivated and some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc.

The AAC proposes the definitions on extensive, semi-intensive and intensive aquaculture based on provision of feed and fertilisers. The AAC recognises that the complexity and the differences during the lifecycle of the farmed aquatic species (e.g. that hatchery and growing can combine different methods) should be considered when applying these definitions. The definitions below are based on feed and other nutrients, but other definitions, eg relating to stocking density or the carrying capacity of the ecosystem, could also be devised if clearly defined.

It should be noted that these are technical definitions; the AAC is not passing judgement as to their relative sustainability.

(a) extensive aquaculture, there is no external supply of feed or fertilisers supplied by the aquaculture farmer, and this type of culture depends entirely on natural processes for production or on nutrients coming from other anthropogenic activity than the aquaculture farm in question.

(b) semi-intensive aquaculture, some supplementary feed or fertilisers supplied by the aquaculture farmer to increase the production, in addition to the natural processes.

(c) intensive culture systems, there is a full dependency for production on the use of external feeds or fertilisers.

¹² COM / 2020 / 381 final "A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system"

¹³ COM/2021/236 final "Strategic guidelines for a more sustainable and competitive EU aquaculture for the period 2021 to 2030"



In practice, there will be gradations between the three.

IV. Definition of sustainable development of aquaculture

The AAC propose an adaptation of the FAO definition¹⁴, as follows:

“Sustainable development of aquaculture is the way of carrying out the farming of aquatic species that contributes to meeting the needs of the present, without compromising the ability of future generations to meet the needs of the future. This development conserves land, water, natural resources and biodiversity, while being environmentally non-degrading, technologically appropriate, economically viable, socially acceptable and ensures animal health and welfare”.

V. Recommendation

The AAC recommends that the Commission adopt definitions for:

1. Aquaculture
2. Extensive, semi-intensive and intensive aquaculture
3. Sustainable development of aquaculture

These definitions should also be incorporated into the next revision of the CFP.

The AAC commends the definitions above.

¹⁴ Ecosystem approach to aquaculture management, FAO, 2020:
<http://www.fao.org/3/ca7972en/ca7972en.pdf>



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