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Converting small-scale aquaculture systems from characterization one to an indicator system for assessing sustainability and its contribution to food safety

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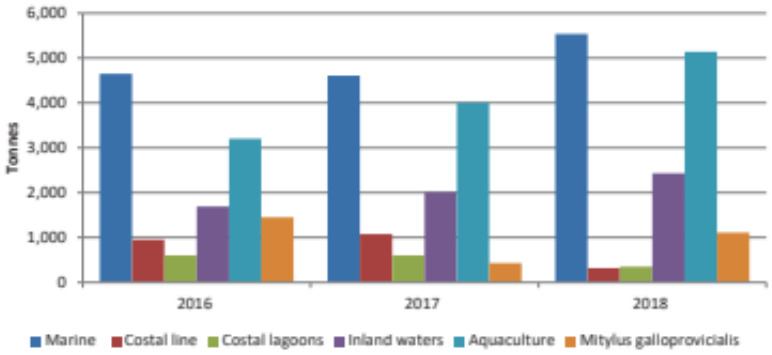
Abstract

In the last decades the contribution of small-scale aquaculture to particular areas of Albania has played important role for income generation and helped towards goals for sustainable rural development. Given to the fact that these systems: (i) are lacking health standards for securing requirements of food safety; (ii) are not integrate din the local territorial development of regions and (iii) there is a poor integration of development practices into conservation approaches, this study aims at establishment of set indicators that measure the role of aquaculture into sustainable economy and food safety. So, it describes the scientific needs of converting approach from simple characterization of small-scale aquaculture towards the indicator system. Following FAO examples, best practices, and different references the indicator system includes a roster of economic, health state, incidence of disease, value chain, contribution to local economy, gender access to resources, employment generation, etc. In our approach from the potential indicators, a matrix was developed showing the rationale for the indicator, the means of measurement and the methods of data collection in the Albanian circumstances of small-scale farming system. From the list of initial ca. 40 indicators, we narrowed the list to 13 indicators that will assess the contribution of small-scale aquaculture to sustainability, integration to conservation approaches and food safety.

Introduction

The contribution of small-scale aquaculture to global aquaculture production as well as rural livelihood development is generally well recognized [1,2]. These include providing livelihoods and income generating opportunities for rural communities, enhancing food security, improving social equity and enhancing the quality of life of rural poor communities [3]. The aim of this paper is to introduce the FAO approaches and best practices with regard to aquaculture indicators and assessment of its sustainability and contribution towards food safety. Following different references [1] the indicator system that includes a roster of economic, health state, incidence of disease, value chain, contribution to local economy, gender access to resources, employment generation, etc. In our approach from the potential indicators, a matrix was developed showing the rationale for the indicator, the means of measurement and the methods of data collection in the Albanian circumstances of small-scale farming system. From the list of initial ca. 40 indicators, we narrowed the list to 13 indicators that will assess the contribution of small-scale aquaculture to sustainability, integration to conservation approaches and food safety.
In line to UN developments and in order to support SDG action, Albania has prepared an SDG baseline report to explore the specific components of the National Strategy for Development and Integration (NSDI) components [4]. Albania's baseline report underscores that the national strategic policy framework is most harmonized with the SDG targets in SDG 14 (life bellow water); SDG 14 life bellow water) is directly connected with aquaculture production and its role in prosperity of the local economies and directly contributing at the biodiversity conservation.

The standard definition of sustainable development has been expanded by the 2002 World Summit on Sustainable Development to include three major pillars: economic, social and environmental. The review of three pillars of sustainable development [5] has underlined that while the three pillars are acceptable to most nations, no agreement was made on details. The major variants are in terms of the social pillar. These variants include social development or social progress (a generic one); human development, human well-being or people; and lastly, one that focuses on issues of justice and equity, i.e., "social justice", "equity" and "poverty alleviation" [2].



(a)

	In tonnes		
Categories	2016	2017	2018
Total fishing	**12,534**	**12,719**	**14,875**
Marine	4,646	4,609	5,537
Costal line	952	1,074	315
Costal lagoons	598	599	350
Inland waters	1,688	2,007	2,427
Aquaculture	3,200	4,000	5,138
Mitylus galloprovicialis	1,450	430	1,108

(b)

Figure 1. (a) Contribution of fishery and aquaculture in total production in Albania; (b). Production in tones of main categories (INSTAT, 2019)

Following [6] the fish catch during 2018 has increased by 20.0 % compared to 2017. The Aquaculture sector has risen rapidly as a new sector with perspective. During the year 2018, were cultivated in different reserves and specialized fish tanks about 5,138 tonnes of fish or 28. 5 % more than 2017. This amount represents approximately 35.0 % of the total fish production, following the marine fishery production by 37.0 %.

Material and Methods

Fish catch data (fish and aquaculture production) are collected by water categories and mostly are based on official sources (INSTAT, 2018). The aquatic fisheries categories are: marine fishing, brackish waters, lagoons, inland waters, aquaculture and molluscs.

Development of indicators is based on two major sources of physical macroeconomic indicators are the National Accounting Matrix including Environmental Accounts (NAMEA) and the Material Flow Accounts (MFA), which are closely related to environmental accounts [2, 7]. The NAMEA provides indicators for major environmental policy themes: climate change, acidification of the atmosphere, eutrophication of water bodies and solid wastes.

Results and Discussions

In line to national policy for biodiversity conservation [8] and from an environmental perspective, the goal for sustainable aquaculture is to ensure that society benefits not only from the production of food and materials but also from the maintenance, restoration or enhancement of ecosystems services such as the protection of mangroves and other wetlands, corals, watershed, water resources, soil, and the biodiversity that depends on them [7].

One of the biggest problems with developing indicators of sustainability is that frequently the best indicators are those for which there is no data [7], while the indicators for which there is data are the least able to measure sustainability, which usually leads to the choice of traditional data sources and measures for indicators. This is a typical case for the developing countries including Albania.

Table 1. Indicators, their measures and possible data sources (Derived and adapted from [8])

Sustainability Indicators	Measures	Data Source
Investment into farm improvements	Quantitative on farm information	Farmers
Loan repayment/loan default	Quantitative – No. of farmers; percentage repayment	Bank, financial institution, lenders
Farm workers' wages compared to other sectors	Quantitative – community information	Government labor office, job brokers, farmers
Diversity of farm products	Quantitative on farm information	Farmer, local market
Ready availability of farm workers/non-seasonality of labor	Qualitative expressed in a scale: Low-Medium-High	Key informants, farmers
Lack of conflicts	Quantitative (frequency) or scale (Low-Medium-High); Number, nature of and intensity	Local government, key informants in community
Membership in an active farmer association or group (FMO-Albania)	Quantitative: presence of association and membership; also, qualitative such as status of association and even motivations for membership.	Farmer association officers; key informants
Rapidity and prevalence (among farmers) of adoption of new practices	Qualitative: adoption rate and speed of adoption; quantitative: adoptors and non-adoptors	Extension workers, farmers, key informants
Preference for the products of the farm	Qualitative: Scale or Yes/No	Traders, buyers, local market
Percent of recycled farm waste	Quantitative on farm information	Farmer
Lack of conflicts	Quantitative (historical frequency) or Scale: Low-Moderate-High	Key informants, farmers
Non-use of antibiotics and chemicals	Yes/No; If yes, in which operations are they used?	Farmer, extension worker, traders
On farm soil and water conservation structures and practices	Yes/No or Low-Medium-High	Farmer, extension worker

Conclusion

In context of this study the practical use of sustainability indicators is that they provide guides to an integrated approach to sustainable development. Such approach enables to problem solving at both the farm and local community levels. It would also be a useful basis for integration to local and regional planning practices, development planning that considers also the small-scale farmers.

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