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Towards Statistical Definition of Small-Scale Fisheries: A matrix scoring approach to characterization of the scale of fishing units

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Document Summary

This document presents a proposed approach for the characterization of Small Scale Fisheries to assist national management and enable inter-comparability of data and information on small-scale fisheries issues. The approach uses a matrix scoring approach to address the multi-character complexity and inter-regional diversity of small-scale fishing operations. The matrix is primarily intended as a research tool and with further testing and development, might be used more systematically for national or regional analytical or reporting purposes. CWP members are kindly invited to provide feedback on the proposed methodology and on the potential applicability in their region, including if it could be articulated with related objectives.

There is increasing interest in finding ways to objectively characterize small-scale and large-scale fisheries. This is for a variety of reasons which span the dimensions of governance (policy, legislation, access and tenure), economics (taxation, subsidies, special preference) and fishery management (regulation, gears, zoning).

At the global level, the endorsement of the FAO Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines)¹ is part of an ongoing process to recognize small-scale fisheries as an identifiable segment of fisheries that is important enough to warrant special consideration. Several regional instruments, policies and strategies also refer to the small-scale fisheries sector.

Many countries have some form of definition of small-scale and large-scale fisheries in their fishery legislation or fishery policy, but these are specific to the national or regional context and are not inter-comparable.

The issue of definition or characterization is further complicated by the application of varied terminology to the small scale sector (small-scale, artisanal, subsistence, aboriginal, coastal, nearshore, municipal) and the large-scale sectors (large-scale, commercial, semi-industrial, industrial). In some countries fishing units may be characterized into more than two categories, with the inclusion of one or more intermediate categories

¹ <http://www.fao.org/fishery/ssf/guidelines/en> (FAO Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication)

Problems also arise with definitions which are based on a limited set of quantitative metrics (such as vessel size and power, gear type, or area of operation). Narrow characterizations tend to exclude fishers that should rightfully be considered small scale, or allow larger scale vessels to be included in the small-scale fleet. This leads to disputes, conflicts, and dissatisfaction with fisheries regulations. It may also have serious economic consequences or unwanted impacts on resources.

The wide heterogeneity of small-scale fisheries around the world also challenges their inter-comparability between countries. It is almost impossible, where there is no common set of criteria that can be applied objectively, to determine the separation between small-scale and large-scale fishing units.

In reality, there is no one simple cut-off for distinguishing between small-scale or large-scale fishing activity, and the establishment of a simple cut-off type, universal statistical definition, is unlikely to be endorsed at the global level.

At the global level, there are currently only soft definitions of small-scale fisheries that give general characteristics, rather than quantitative metrics. Perhaps the most comprehensive definition was provided by the FAO Advisory Committee for Fisheries Research².

Despite these challenges, characterizing the scale of a fishing unit is often useful, and even necessary. It informs fisheries management, policy development, research and governance at national and regional levels, and may also support global understanding of small-scale fisheries and their role.

There is a need for methods that assess scale without imposing a narrow definition and, in line with the SSF Guidelines, also allow for a participatory characterization process³.

There have been a number of attempts to develop frameworks for the characterization of small-scale versus large-scale fisheries (e.g. Kesteven, 1973; Smith, 1979; Kurien, 1996; Thompson, 1980; Berkes et al., 2001; Chuenpagdee, et al., 2006; Sumaila et al., 2012; World Bank, 2012; Gibson and Sumaila, 2017).

These involved a description of the characteristics of SSF with a mixture of quantitative and qualitative descriptions with a single cut-off for each, that defined the small- versus large-scale fisheries.

Such approaches cannot be applied effectively where fisheries operations are quite heterogeneous, as they cannot accommodate fishing units that exhibit a mixture of large and small-scale characteristics (e.g. large vessels that are unpowered; or small vessels with very large engines). Globally and regionally, small-scale fisheries exhibit a range of characteristics that are placed along a continuum, rather than an explicit set of fixed measures (which is perhaps more typical in a single country for example). The use of qualitative characteristics constrains the establishment of a purely quantitative definition.

Other attempts at characterizing small-scale fisheries have tried to use only quantitative metrics (e.g. related to vessel specifications and the economics of operation and catch). These methods applied only economic measures, ranking fishing unit types (gears) with total catch value and applying an arbitrary 50% cut-off level to separate vessels into small and large scales.

² “Small-scale fisheries can be broadly characterized as a dynamic and evolving sub-sector of fisheries employing labour-intensive harvesting, processing and distribution technologies to exploit marine and inland water fishery resources. The activities of this sub-sector, conducted full-time or part-time, or just seasonally, are often targeted on supplying fish and fishery products to local and domestic markets, and for subsistence consumption. Export-oriented production, however, has increased in many small-scale fisheries during the last one to two decades because of greater market integration and globalization. While typically men are engaged in fishing and women in fish processing and marketing, women are also known to engage in near shore harvesting activities and men are known to engage in fish marketing and distribution. Other ancillary activities such as net-making, boat-building, engine repair and maintenance, etc. can provide additional fishery-related employment and income opportunities in marine and inland fishing communities. Small-scale fisheries operate at widely differing organizational levels ranging from self-employed single operators through informal micro-enterprises to formal sector businesses. This sub-sector, therefore, is not homogenous within and across countries and regions and attention to this fact is warranted when formulating strategies and policies for enhancing its contribution to food security and poverty alleviation.”

³ “These Guidelines recognize the great diversity of small-scale fisheries and that there is no single, agreed definition of the subsector. Accordingly, the Guidelines do not prescribe a standard definition of small-scale fisheries nor do they prescribe how the Guidelines should be applied in a national context. These Guidelines are especially relevant to subsistence small-scale fisheries and vulnerable fisheries people. To ensure transparency and accountability in the application of the Guidelines, it is important to ascertain which activities and operators are considered small-scale, and to identify vulnerable and marginalized groups needing greater attention. This should be undertaken at a regional, subregional or national level and according to the particular context in which they are to be applied. States should ensure that such identification and application are guided by meaningful and substantive participatory, consultative, multilevel and objective-oriented processes so that the voices of both men and women are heard. All parties should support and participate, as appropriate and relevant, in such processes.” (Par 2.4. p.1-2, Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication, FAO 2015)

In order to address this complexity, in a systematic, objective manner, the diversity of characteristics exhibited by small-scale fisheries can be assessed using a scoring approach. This applies a range of elements related to fishing units which in combination can be used to establish the extent to which a fishing unit is large or small-scale. Each of the characteristics under consideration (encompassing vessel types and gears, through harvesting operation, degree of organization, to the preservation and disposal of catch) is described across a range of scales from small to industrial (separated into four types) (see Annex 1).

A score is provided for each characteristic. Any given fishing unit may have characteristics typically associated with both smaller-scale and larger-scale fisheries, so many will receive lower scores in some categories and higher scores in others.

The aggregation of the scores from all the categories, provides an overall picture that facilitates differentiation between larger-scale and smaller-scale fisheries. Scoring allows for an objective characterization of the fishing unit, indicating whether it tends towards small-scale or large-scale. A decision is then made, based on an overall cut-off score, to separate small-scale and large-scale operations.

This cut-off score can be applied to fisheries within a country or region. It also has the potential for application across regions, if sufficient case material is used to rigorously test the method.

It is important to highlight that this characterization carries no value judgement of the nature of the fishing unit (no implication of a 'good or bad' activity).

The analysis of scores for different fishing units quickly yields a picture of whether there are clear cut-offs between distinctly small-scale fisheries and distinctly large-scale fisheries. It also enables the rapid identification of the key characteristics which determine this.

The advantage of this approach is that it is capable of accommodating the diverse characteristics of fishing units, whilst still providing a relatively clear cut-off for separating between small-and large scales. The approach also avoids inappropriate classifications that can emerge when relying on a single characteristic or a highly-constrained number of characteristics, such as gear and vessel length.

In theory, if the matrix is working well, it should highlight those fisheries which may be on the edge of small-scale and large-scale (i.e. a small vessel with a high-powered engine and large-scale level of fishing effort), assigning them their own category. Furthermore, by incorporating multiple dimensions, the matrix approach seeks to avoid misleading or inappropriate characterizations of fisheries as small-scale or large-scale, which can sometimes occur when a single criterion, such as vessel length, is emphasized.

The flexible nature of the matrix means that the fishing unit being assessed can either be an entire fishery/fleet, a part of it, or an individual vessel/ fisher. This flexibility allows the matrix to be applied to diverse types of fishing activity around the world.

The matrix approach presented here provides an effective research tool for exploring the characteristics of large and small scale fisheries. It has application in policy development as well as providing a common framework of inter-comparability of fishing units between countries and regions. This could facilitate discussions on fisheries related issues where the issue of scale arises, as well as enable greater clarity and objectivity over the scope of management or policy measures that are applied to large or small scale fishing units.

ANNEX 1: A matrix for characterizing the scale of fishing units

Description of fishing unit assessed⁴

Name of fishing unit:

Number of vessels/fishers:

Target specie(s):

Location (country and province/county/district, etc.):

Location of landing site:

Please select ONE option per row:

When assessing a fleet/fishery fishing unit (rather than a fisher/vessel fishing unit), select the option that most closely matches the majority of the group or majority of activities.

	0	1	2	3
Size of fishing vessel	<input type="checkbox"/> No vessel	<input type="checkbox"/> <12m, <10GT	<input type="checkbox"/> ≤24m, <50GT	<input type="checkbox"/> >24m, >50GT
<i>Comments: Although vessel size isn't necessarily an indicator of fishing scale and intensity, it is an important characteristic when paired with variables such as motorization and mechanisation. The four categories give a range of sizes which cover the majority of vessels (including shore-based activities) which occur globally.</i>				
Motorization	<input type="checkbox"/> No engine	<input type="checkbox"/> Outboard engine/ inboard engine ≤100hp	<input type="checkbox"/> Inboard engine <400hp	<input type="checkbox"/> Inboard >400hp
<i>Comments: Indicates the presence of an engine on board, its horse power (hp) and whether it is outboard or inboard. In the case of multiple engines, consider the main one only.</i>				
Mechanization	<input type="checkbox"/> No mechanization	<input type="checkbox"/> Small power winch/hauler powered off engine	<input type="checkbox"/> Independently powered gear deployment/hauling	<input type="checkbox"/> Fully mechanized gear deployment & hauling
<i>Comments: Indicates what type of mechanisation, if any, is used to deploy gear during the fishing unit.</i>				
Fishing gear	<input type="checkbox"/> Labour intensive gear	<input type="checkbox"/> Passive gear	<input type="checkbox"/> Gear with aggregating devices	<input type="checkbox"/> Highly active gear
<i>Comments: Labour intensive gear includes mostly small gear handled manually by the fisher (e.g. hand hauled nets, pole and line, crab pots); Passive gears includes larger gear sets that are deployed passively (e.g. longlines, trap sets, gillnets/driftnets); gear with aggregating devices includes larger gear sets which use aggregating and attracting methods such as light attraction and FADs; Highly active gear include gears that require vessel power to encircle, chase, deploy and retrieve fish.</i>				
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

⁴ Please insert a short description of the fishing unit assessed, including all information available, with particular reference to the terminology defined in the document glossary.

Refrigeration/Storage on board	No storage	Ice box (i.e. on deck)	Ice hold (i.e. below deck)	Refrigerated hold
<i>Comments: An ice box is a free-standing container filled with ice for the purpose of chilling fish (above or below deck); an ice hold is a structure below deck containing ice for the purpose of chilling fish; a refrigerated hold is part of boat structure and is mechanically refrigerated for the purpose of freezing fish.</i>				
Labour/Crew	<input type="checkbox"/> Individual and/or family members	<input type="checkbox"/> Cooperative group	<input type="checkbox"/> ≤2 paid crew	<input type="checkbox"/> >2 paid crew
<i>Comments: The term cooperative group refers to any arrangement in which individuals, other than family members or paid crew, work together to carry out the fishing unit. The two paid crew categories refer to fishers paid either in monetary or non-monetary (e.g. part of the catch) terms.</i>				
Ownership	<input type="checkbox"/> Owner/operator	<input type="checkbox"/> Leased arrangement	<input type="checkbox"/> Owner	<input type="checkbox"/> Corporate business
<i>Comments: Owner/operator refers to a fisher who operates their own vessel/gear owned; Leased arrangement refers to fishers who operate from a rented vessel/rent gear; Owner refers to a respondent who owns the vessel/gear but does not carry out the fishing units first hand; Corporate business refers to a company or group of people that carry out fishing activities as a single legal entity (usually own multiple vessels/gear and employ multiple crew).</i>				
Time commitment	<input type="checkbox"/> Occasional	<input type="checkbox"/> Full-time, but seasonal	<input type="checkbox"/> Part-time all year	<input type="checkbox"/> Full time
<i>Comments: Occasional fishers receive under 30% of their livelihood from fishing or spend under 30% of their working time in that occupation; Part-time fishers receive at least 30% but less than 90% of their livelihood from fishing or spend at least 30% but less than 90% of their working time in that occupation. Full-time fishers receive at least 90% of their livelihood from fishing or spend at least 90% of their working time in that occupation. The Full-time but seasonal category refers to fishers who are occupied with other full time seasonal activities when not fishing (such as farming), or where the fishing "season" may be adapted so that it does not coincide with the peak tourist period from which earnings might well be higher.</i>				
Daily trip/multiday	<input type="checkbox"/> <6 hours	<input type="checkbox"/> Day trip (< 24 hours)	<input type="checkbox"/> <4 days	<input type="checkbox"/> > 4 days
<i>Comments: Depending on the type of gear, this category could refer to a detailed unit of measure, i.e. hours fished; to "number of days fished", i.e., the number of days on which fishing took place (for those fisheries in which searching is a substantial part of the fishing unit, days in which searching but no fishing took place should be included); or to "number of days on ground", which in addition to days fishing and searching also includes all other days while the vessel was on the ground.</i>				
Fishing grounds/zone/ distance from shore	<input type="checkbox"/> <100 metres from shoreline/baselines/ high-water mark	<input type="checkbox"/> <10 km from shoreline	<input type="checkbox"/> <20km	<input type="checkbox"/> >20km from shoreline/ baselines
<i>Comments: Indicates at what distance from shore/baseline/high water mark the fishing activity is carried out.</i>				
Disposal of catch	<input type="checkbox"/> Household consumption/barter (exchange for payment in goods or services)	<input type="checkbox"/> Local direct sale (exchange for monetary payment)	<input type="checkbox"/> Sale to traders	<input type="checkbox"/> Onboard processing and/or delivery to processors
<i>Comments: Household consumption or barter applies to fisheries catch mainly consumed in the household or informally exchanged for goods or services. Local direct sale applies in the case of sales to individuals, restaurants or small local businesses, often close to landing sites. Sale to traders applies when one or multiple traders operate in the value chain between producer and consumer. On-board processing and/or delivery to processors applies when catch is processed for value-addition or preservation before being traded into the value chain.</i>				
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Utilization of catch, Value adding/ preservation	For direct human consumption	Chilled/ locally processed/ cured	Frozen	Frozen/chilled for factory processing (for human consumption or fishmeal)
Comments: Direct human consumption applies when fish is consumed fresh, with minimal to no processing. The other three categories indicate varying degrees of sophistication and durability of the preservation and value-adding methods. Chilled/locally processed/ cured includes smoking and salting.				
Integration into economy and/or management system	<input type="checkbox"/> Informal not integrated (no fees)	<input type="checkbox"/> Integrated (registered, untaxed)	<input type="checkbox"/> Formal integrated (licensed, landing fees)	<input type="checkbox"/> Formal, integrated (licensed, taxed)
Comments: This category provides a description of the level at which the fishing unit is integrated into formal economic and management systems. Informal/not integrated fishing units lack any form of license or registration and are not subject to license or landing fees or taxation. Integrated fishing units are formally registered however they are not taxed or charged a fee for their activities. Formal integrated operations are licensed and subject to license and/or landing fees, however they are not taxed as a commercial concern. Formal integrated fisheries are licensed and taxed as a commercial concern.				

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