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Fiscal Policies for the Fisheries Sector in Selected African Countries.

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Introduction and structure of the report.

This report represents the final output of the project "Domestic resource mobilisation for fisheries resources in Sub-Saharan Africa", funded by the French Ministry for Europe and Foreign Affairs. The overall aim of the project was to assess the current and potential contribution of the fisheries sector to domestic revenue mobilisation in Sub-Saharan Africa, an objective to be achieved through two separate phases.

The first phase of the project consisted of a review of the existing literature on the fiscal treatment of the fisheries sector in high- and low-income countries (HICs and LICs respectively). The review revealed that, in HICs especially, taxes towards the sector have mostly been used and assessed on their capacity to induce a sustainable harvest rate. Fisheries-specific taxes aimed to contribute to public revenue only exist in the few examples in which proper management has led to the creation of a resource rent in the fisheries, part of which could then be captured by the state. Ignoring management fees, which cannot strictly speaking be considered taxes, fisheries then usually contribute to total revenue only through normal fiscality, that is corporate income tax (CIT), value added tax (VAT) and pay-as-you-earn (PAYE). However, studies aiming at quantifying the sector tax contribution are virtually inexistent for both HICs and LICs, with the partial exclusion of analyses assessing the role of fishing agreements (FAs) with distant water fishing nations (DWFNs) in the latter. This is not in itself surprising, as tax policies in LICs has only emerged as a dedicated academic subject over the last couple of decades, so that many areas are yet to receive a particular focus.

On the other hand, other aspects of fisheries' contribution to LICs' development have received more attention, as they greatly contribute to food security and often act as employers of last resort. Both contributions are possible as fisheries remain functionally open access to artisanal domestic actors, who are though increasingly competing over fish resources with foreign industrial vessels. The difficulties of balancing the welfare function of fisheries – employment and food securities – and their economic valorisation – mostly by foreign industrial vessels – in LICs emerged as a theme for debate in the late 2000s and evolved through the 2010s. However, no definitive answers on what should be prioritised has been reached. This balancing has also be made more complex by the decentralisation of artisanal fisheries management, which aimed at increasing their sustainability and democratising their control. With co-management of artisanal fisheries between central and local government now the norm in most countries, fisheries' revenue has become essential for many local governments, but positive impacts on sustainability are yet to be seen.

As evidence of fisheries' over-exploitation kept on mounting since the 1990s, more attention has also been dedicated to the number and amount of subsidies received from the sector, most of which have been identified as harmful. Negotiations on their regulations have been proceeding under the World Trade Organisation (WTO) umbrella since 2001, and although important progresses have been made by the end summer 2021, a few issues still need to be resolved before an agreement is found. Finally, another harmful practice which received increased focus is that of illegal, unregulated and unrecorded fishing (IUUF), which is depriving

coastal states of billions of dollars in revenue. IUUF has been connected to organised crime, to DWFNs' fleets operating without supervision and to scarcely monitored artisanal actors looking to maintain their usual catch level as pressure on fish resources increases. Each of these causes calls for a different approach, and a solution to this issue still seems far.

The first phase of the project also revealed a general lack of publicly available information on both fiscal and para-fiscal policies applied to African fisheries' sector. As a consequence, the second phase of the project – which aimed to provide an actual quantification of fisheries revenue contribution – reduced the scope of the analysis to five selected countries – Guinea, Mauritania, Senegal, Sierra Leone and Uganda. The four West Africa countries have received some attention in the literature, as they are situated in the Gulf of Guinea, one of the richest fishing grounds in the world and a hotspot for IUUF. Despite their geographical proximity and the importance of fisheries in their national economies, they present some relevant differences, as only two of them have FAs with the European Union and some relevant processing capacity. The fifth one, Uganda, despite being a landlocked country, also possesses exclusive exploitation right over 45% of Lake Victoria, the second largest freshwater body in the world. Fisheries then also play an important role in the Ugandan economy, and the impact of their co-management between central and local governments has received quite some attention in the literature.

The attempt to quantify fisheries' revenue contribution in the selected countries followed two separate but parallel lines. First, the study team, supported by Expertise France, submitted a data request form to the revenue authorities of all 5 countries, in order to obtain first-hand information about actual revenue collected from the sector under specific tax handles. Second, information on value of fish caught and on the cost of fishing, both collated by the University of British Columbia was to be combined to estimate the overall CIT and VAT potential from the sector. The comparison of the data obtained from each country revenue authority with the estimates produced was to give an indication of the current tax gap in the sector. Unfortunately, neither of these two lines of investigation proved as promising as originally thought. While some revenue data was obtained from 4 of the 5 selected countries[1], information as per the data request form was only available for Uganda, with data from other three countries only available in varying formats for different time periods. Although this made any comparison tentative at best, it nevertheless emerged that revenue from fisheries has a vastly different relevance across the four economies, as their contribution ranges from 0.05% of total revenue in Uganda to 10.61% of total revenue in Mauritania. It must also be noted that the case of Uganda does not seem to be related to its status as a landlocked country, as the sector contribution to total revenue in Guinea is 0.53%. The other trend which emerged is that more information is generally available on levies on export and on registration of foreign vessels than it is on the sector contribution to domestic revenue, which is unavailable in all but one case.

The attempt to estimate fisheries potential contribution to CIT and VAT from the originally selected data sources proved even less fruitful. Data on the cost of fishing could not be

[1] Senegal is the only country for which no data was received.

accessed, while, after its initial exploration, the information on catch value was deemed not fit for the purpose of the analysis. This implied abandoning the aim of estimating the sector CIT contribution, while data from the Food and Agricultural Organisation fishery division was used to pursue an alternative estimation of its VAT potential. The estimates show that this varies significantly across the 5 selected countries, due to both differences in the structure of their fisheries sector – significant processing capacity are only present in Senegal and Uganda, and to a lesser extent in Mauritania – and to what is subjected to VAT – all type of processed fish in Guinea, Sierra Leone and Uganda, only frozen and filleted fish in Mauritania and only filleted fish in Senegal. Consequently, the average estimated VAT potential ranges from of 0.09% of total VAT collection in Senegal to 15.69% of total VAT collection in Mauritania. However, it must be noted that, due to the lack of official figures, comparison between the estimated VAT potential and actual collection was only possible for Uganda, in which case the difference between the two figures is of an order of magnitude. Given the absence of alternative points of comparison, is then hard to judge how close to the actual collection gaps is to the produced estimates.

The second phase of the project also involved 6 experts' interviews, aimed at acquiring a better understanding of how some of the issues identified in the literature are impacting the fisheries sector in the African continent, and consequently its development and economic contribution. Specifically, the themes covered were: the connection between subsidies and fishing activities of distant water fishing nations (DWFNs); the positive and negative consequences of fishing agreements between African states and DWFNs; the impact of illegal, unreported and unregulated fishing on the fisheries sector of West Africa co-management of artisanal fisheries between central and local governments; and the availability of different types of data required for fisheries management in the African continent. These interviews proved important to acquire a series of insights from both academics and practitioners who have been involved in the sector for a long period of time.

Overall, while the initial aim of the project – namely, the estimation of current and potential revenue contribution of the fisheries sector in the 5 selected countries – was admittedly only partially achieved, a series of relevant policy conclusions could nonetheless be obtained. To start with, there is a clear need of making better data on the social and economic contribution of fisheries available to policy makers and researcher, as the information gap impedes efforts to improve their management. Furthermore, as the international dimension of fishing activities is currently the main revenue generator of many African countries, supporting the negotiating capacity of African states can help them obtaining better economic outcome from fishing agreement. Promoting the participation of civil society organisations in fishing agreement negotiations could also help ensuring that their economic benefits are evenly and widely spread within society. Better monitoring of the behaviour of vessels from international fleets accessing African waters through fishing agreements would also be important. This is both because they have already been involved in IUUF and because they directly compete over some of the same fish resources on which artisanal fishermen relies on. The latter have been facing increasing economic hardship due to a reduction in stock availability and generally have access to a much lower level of subsidies than their international counterparts. Hence, supporting the current negotiation under the WTO umbrella to both significantly reduce subsidies to industrial fishing

vessels from distant water fishing nations, while maintaining some level of subsidisation to LICs' artisanal vessels, will also be important to ensure a viable growth of the sector in the continent. On the side of support to domestic fisheries policies, focusing on promoting and upgrading processing capacity should be paramount, in order to increase the sector value addition and hence earnings from export.

The rest of this report is structured as follows. Part 1 includes the literature review, spanning sections 1.1 to 1.6, and the bulk of the expert interviews, providing further insights on some of the themes treated in the review, presented in sections 1.7. Part 2 starts by providing an overview of the global status of the fisheries and aquacultures sectors, covering economic, social and sustainability angles (section 2.1). Section 2.2 then provides a more detailed picture of the fisheries sectors of each of the five countries included in the study, drawn from a variety of different sources. This section also includes the presentation of the actual collection figures obtained for the study and concludes with some comparative considerations. Section 2.3 presents both the methodology and results of our estimation of the sector VAT potential in the selected countries, as well as the limitations of the results obtained. Part 3 provides instead a detailed explanation of the difficulties encountered in accessing some of the data required for the CIT estimation and of the issues discovered in those that could be accessed, which led to the decision of dropping this segment of the analysis (section 3.1). To complement this, section 3.2 presents various consideration on the relevance of data quality for fisheries management which emerged from the expert interviews. Finally, Part 4 summarises the outcome of the report and concludes with a series of recommendations.

Part 1. Fisheries Management and Domestic Revenue Mobilisation in Sub-Saharan Africa – a Review of the Literature and 5 Experts Interviews.

Part 1 of the report includes the literature review which was produced in the first phase of the project, as well as the bulk of five of the six experts' interviews carried out during the second phase of the project.[2] This part of the report is structured as follow. Section 1.1 introduces the literature review, and section 1.2 moves then to presenting the economic theory behind the regulation and taxation of fisheries. Section 1.3 successively introduces some recent case studies from HICs, while section 1.4 provides some key figures on the economic contributions of fisheries in LICs. Section 1.5 touches upon the most relevant issues for the management and taxation of fisheries in LICs, namely: the debate between wealth-based and welfare-based fisheries' management approaches (section 1.5.1); the role of co-management practices (section 1.5.2); the role of fishing agreements with distant water fishing nations (section 1.5.3); the role of subsidises towards the fishing industry (section 1.5.4) and that of crime in the fishery sector (section 1.5.5). Section 1.6 then concludes the review proper, and section 1.7 then presents the expert interviews, which provide a more in-depth and up-to-date discussion of many of the themes covered in section 1.5.

1.1 Introduction to the literature review.

Many LICs have long struggled to increase their domestic revenue mobilisation, often seen as a necessary step to achieve a more sustained economic development. A wider fiscal space can lead to more funds being available for social spending and infrastructure investment, both of which are required to improve livelihood opportunities for their citizens. A decreased dependence on external aid to finance domestic policies, coupled with more frequent bargaining about revenue extraction between the government and the population, could also lead to better governance outcome. The current economic downturn, caused by the COVID-19 pandemic, has also further highlighted the role of fiscal policies as buffer in time of crisis, while putting even more strain on often already stretched public finances. During the coming months of recovery, governments of LICs all over the world will be looking for new sources of revenue. However, it will not necessarily be easy to individuate them, as the economic structure of LICs makes it complex to tax many economic activities (Moore and Prichard 2017).

In this context, various voices have pointed towards the need of LICs to focus on fiscal policies targeting the production of environmental goods or climate "bads". It is argued that this focus could lead to both an increased availability of domestic revenue and to a more sustainable management of natural resources, reducing future impacts from their overexploitation and from climate change (WB 2019). While much of the debate is focusing on carbon taxes (WB

[2] The 6th interview is presented in Part 2 of the report, as it only covered issues relevant for the case of Uganda.

2019, OECD 2021), forestry taxation has also seen a resurgence of interest (WB 2021), as improving the taxation of extractive sectors has previously been individuated as a dangling fruit for LICs (Moore and Prichard 2017). One such sector which has so far received limited increased attention is fisheries. However, given that 34.2% of the world fish stock is considered over-fished and that close to 56 million people are employed in fisheries in Africa and Asia (FAO 2020), it seems important to understand if fiscal policies can play a role in increasing the sector sustainability and its contribution to public revenue.

The taxation and regulation of fisheries has been a subject of academic analysis since at least the mid-1950s, when economists started considering how their common property nature could impact their optimal exploitation path (Gordon 1954, Scott 1955). While work on the issue of optimal regulation of the sector in HICs never stopped since, academic attention towards the same issue in LICs seems to only emerge much later, following the establishment of exclusive economic zones during the third United Nations Conference on the Law of the Sea (Neiland 2004). However, as we shall see, fisheries' developmental role has received quite some attention since, although the focus was usually placed more on their contribution to poverty alleviation and food security (Béné et al. 2003, Neiland 2004, Béné et al. 2009, 2010, Béné et al. 2016) and less on their contribution to economic growth and revenue mobilisation (Cunningham et al. 2009). Indeed, how best to conceive the developmental role of fisheries, if as a source of economic wealth or as a social safety net for rural populations, constitutes an important academic debate (Cunningham et al. 2009, Béné et al 2010, Nunan 2014*)*.

The reasons for this lack of attention are multiple. To start with, even in HICs, taxes specific to the fishery sector are usually conceived more as a mean to ensure their optimal exploitation than as a way to mobilise public revenue. While the situation has slowly been changing over the last decade, taxes on fisheries rent can only be charged when the latter exist, which is not often the case when fisheries are over-exploited such as in many LICs (Gunnlaugsson et al. 2018, Gunnlaugsson and Agnarsson 2019, FAO 2020). Before the emergence of said rents, it is generally assumed that resources extracted specifically from the fishing industry through licensing or fees will be directed towards the implementation of fishery management policies. Given how costly and complex the latter are, even in most HICs cases para-fiscal revenue from the sector is not enough to cover for the whole of its management cost (Arnason et al. 2000). That is, in the vast majority of HICs cases, fisheries contribute to revenue mobilisation through the same general tax handles of other industries, Corporate Income Tax (CIT) and Value Added Tax (VAT), and not through industry-specific charges.

Furthermore, the fishery sector of many LICs is usually characterised by the coexistence of two very different set of actors. On the one extreme there are the fleets from distant water fishing nations (DWFNs), and more generally industrial fishing fleets, targeting high value species, usually destined to export markets, relying on advanced technologies and usually supported by subsidies from their home countries (Kaczynski and Fluharty 2002, Gagern and van den Bergh 2013,). On the other, there are traditional and artisanal fishermen, generally utilising less advanced gear, targeting species directed to the domestic markets and operating closer to the coast (Okafor-Yarwood 2019, Okafor-Yarwood and Belhabib 2020*)*. While both of these actors are subjected to a range of diverse regulations, fees and taxes, these often both emanate from,

and accrue to, different sources, i.e. central and/or local government agencies, as well as dedicated management bodies (Kaczynski and Fluharty 2002, Horemans and Kébé 2006, Béné et al 2009, Nunan 2014).

At the same time, they are also both involved, to different extents, in the practice of illegal, unreported and unregulated fishing (IUUF), which is increasingly seen as one of the main dangers to the preservation of fish stocks worldwide (FAO 2014, Vrancken et al. 2019, Witbooi 2020). Apart from having a direct impact on the sustainability of fish stock and on the sector contribution to public revenue, IUUF also contributes to the paucity of available catch data from LICs, which are generally considered to be significantly underreported (Belhabib et al. 2015b, Zeller et al. 2016, 2018, 2020). Given how important catch data is for all aspects of efficient fishery management, it is unlikely that significant progresses on the sector sustainability and contribution will be achieved without dedicating more resources to monitoring of current practices.

What this introduction points toward is the complexity of the fishery sector, with its many economic and institutional actors, as well as the diverse, and sometimes competing, objectives which its development should aim to achieve. The scope of this section shall then be to provide the reader with an overview of these different themes and debates, obtained through the review of a substantial amount of material published during the last 30 years in both academic and grey literature. The studies covered within the review were selected based on relevance amongst those obtained through multiple searches in Google Scholar, Scopus, Science Direct, Web of Science, Semantic Scholar combining a variety of different terms.[3] While it would be impossible to claim complete coverage, they should suffice to give the reader a thorough overview of issues pertinent to fisheries' multiple roles in the development trajectories of LICs.

1.2 The economic case for the regulation and taxation.

In this section, we will provide a general overview of the economic theories justifying governments' intervention in the fishery sector, both through means of taxation and of more general regulations. As mentioned in the introduction, academic economists started focusing on the economics of fishery exploitation in the mid-1950s, when two seminal pieces by American scholars were published in the Journal of Political Economy (Gordon 1954, Scott 1955). Both authors were concerned with the common property and open access nature of fisheries and with the management problems associated with it. In short, when every fisherman is free to fish as much as he wants, no fisherman has the incentive to use the fishery conservatively, as he has no insurance that he will be the one reaping the benefit from such approach. The general tendency will be to for each to increase his own catch until the average benefit from the catch equals the marginal cost of it, i.e. until the average cost of fish caught is

[3] These include "Africa*" / "Asia*" / "Pacific" / "Pacific Island*" /"Low Income Countr*" / "Developing countr*" / "marine" / "inland" + "Fisher*" + "tax" / "revenue" / "fiscal" / "subsid*"/ "polic*"/ "regulation*" / "management". Searches were conducted on Titles, Abstract and Keywords where the option was available, and results were limited to "economics", "social sciences" and "multidisciplinary".

equal to the fish price. In this situation, there is no surplus accruing to the fishing industry, as in equilibrium the value of the catch is exactly equal to the cost of landing it.

In practical terms, this coincide with an over-accumulation of capital in the industry – too many boats – and with an excess use of labour – too many fishermen – both of which would be more productive if employed somewhere else (Gordon 1954, Scott 1955). Apart from not being an economically optimal equilibrium, there is also no insurance that this level of catch will be biologically sustainable in the long run, in fact it usually is not[4]. However, this latter point has always been intuitively appreciated by fishery regulators, who usually introduce control measures based on biological considerations. These could take many forms, but are generally directed towards curtailing fish mortality, either directly or by impacting the age and size of the fish caught (Morey 1980). In practice, this implies a limitation to total allowable catch (TAC) in the fishery, to total effort limits[5], to the type of gears allowed or some combination of the above.

While these measures may indeed help in maintaining a viable fish population,[6] they do nothing to ensure that the benefit from the fishery are close to the social optimum. This is because the biological boundary at which a fishery can be sustainably exploited, dubbed Maximum Sustainable Yield (MSY), generally exceeds the catch level associated with maximisation of fisheries rent,[7] dubbed Maximum Economic Yield (MEY). The latter can only be obtained when some form of private or public government control is introduced, that is by instituting some form of regulation, taxation or of property rights within fisheries. The basis for taxation is to be found in the misalignment between the private and the social costs of catching a given quantity of fish, which creates a negative externality, as the former ignores both costs falling on other actors and future generations.

Finding what form of regulation, taxation or property right would lead to an optimal economic outcome, as well as estimating the costs of failure to regulate the industry, was the objective of a second wave of economics studies on fisheries taking place through the 1960s and 1970s (some examples of which are Crutchfield 1961, Crutchfield and Zellner 1962, Turvey 1964, Smith 1969, Clark 1971, Clark 1973, Clark and Munro 1975, Clark 1976, Clark et al. 1979). While an extended coverage of this literature is outside the scope of the paper, a few important developments are worth mentioning. First, it is during this period that the dynamic models – formally accounting for the effect of current harvest on future stock – become predominant. While these considerations were always implicitly present in the analysis, it is only by the formal

[4] Gordon (1954) includes a series of example of fisheries from the US and Canada where some form of regulation was introduced to counter stock depletion.

[5] The term "effort" is used in the fishery literature to describe the vector of inputs of production used by fishermen considered in their entirety, i.e. number of boats, boats' size and power, number of crew members, days at sea etc.

[6] And they may as well do not, especially in the case of regulation of total effort applied on its own, as it is already recognised in Gordon (1954). This is due to the fact that "total effort" is particularly hard to observe, so that regulation usually targets only one or some of the observable variables, e.g. days at sea when a fishery is opened seasonally as a control measure. Although this measure could have been introduced to decrease, say by a half, some initial effort level applied to the fishery, nothing prevents the fishermen to alter other inputs of production not covered by the regulator, e.g. boat size and crew member, to achieve the same initial level of total effort.

[7] Defined as the difference between total cost of fishing effort and the total revenue from the catch.

introduction of discount rates that the MSY acquires the current interpretation of hard boundary for exploitation (Crutchfield and Zellner 1962). Furthermore, this also implied that it could be economically rational for the private owner of a fishery to drive it to extinction under given circumstances (Clark 1973). Second, it is over this period that the economic and biological models of fisheries become inextricably linked. While the two were also always implicitly connected[8], it is only over this period that economists gain a full appreciation of the potential impacts of mis-specifying the stock growth function, which could basically render their economic modelling useless (Clark and Munro 1975, Clark 1976). The explicit link between the two also allows for a better modelling of the cost of fish harvesting, which in many cases depends on the size of the fish stock, i.e. the bigger the fish stock, the lower the cost to catch a fish[9]. That is, once more it is re-emphasised that the economically optimal size of the fish stock is above the MSY.

Third, combining the increased importance of biological and time horizon considerations, it becomes apparent that different fisheries will require different management approaches – potentially drastically so – depending on the natural growth rate of the species under consideration, on the current stock size and on the current level of under- or overcapitalisation. That is, in a fishery characterised by a slow growing species, with a stock already over-exploited and with significant over-capitalisation, the optimal policy might well be to stop the harvest all together until the stock has recovered enough (Clark 1976). This conclusion was to be rectified by later work (Clark *et al* 1979), suggesting that when capital investments are non-malleable[10] the optimal strategy is to significantly divest from the fishery fleet over a long-time horizon, even in cases of an already overfished stock. However, the basic connection between stock species, stock dimension and size of required policy adjustments was to remain a tenant of fishery economics.

However, so far nothing has been said about what is the optimal form of property right to be introduced in the fishery. This is because in many – though not all – of the above quoted studies, the focus was more on determining what the correct conception of the social optimum is rather than on how to achieve it. Commonly, three types of regulatory measures were applied to the fishery, all of which remain in use to this day: restrictions on gear, quotas and taxes – with both of the latter being applicable to either effort or catches. Initial work on the topic, refining intuitions already contained in Gordon (1954) and aptly summarised by Morey (1980), determined that gear regulations is never an economically optimal solution, as it forces the fishermen to use more expensive gear to catch the same quantity of fish without anyone benefitting from the loss. On the other hand, in abstract both quotas and taxes could be used to achieve the optimum, regardless of what they are imposed or levied upon, that is catches or

[8] The basic biological model of fishery used by most economic application up to that date, as well as by quite a few others through the 1980s, is to be found in Schaefer (1957).

[9] However, it worth noting that is not always the case, as there fish species for which there is no direct correlation between biomass density and harvesting cost,

[10] Malleability of capital is akin to liquidity of a financial investment. When a capital investment is non-malleable, then it cannot be easily redirected towards a different use or disposed of without incurring in significant capital losses.

effort. This could be obtainable by fixing a catch quota equal to the MEY/MSY[11], or by imposing a tax on catch or effort which would increase the marginal cost of fishing to the point at which the equilibrium catch corresponds to the MEY/MSY.

However, as already noted above, while useful for analysis, the concept of fishing effort is hard to operationalize as basis for either a quota or a tax, as the terms describe a variety of different inputs – boats type and power, equipment installed on them, fishermen time, etc. That is, in practice taxes or quotas are never applied on effort, but on some specific inputs' subset. Once again, this implies that fishermen could alter the amount of inputs other than those on which the tax is levied (or subject to a quota) and still achieve the same effort level, although at a higher cost. It follows that while theoretically equivalent, regulation or taxation of effort is unlikely to lead to the social optimum. On the other hand, quotas on total catch would automatically lead to the optimal biomass size. However, without some other form of limitation, such as limiting the number of vessels, they would also lead to various economic inefficiencies, as they do nothing to limit overcapacity in the fleet. Even in cases in which the vessels number is limited, each vessel would have an incentive to fish as much as possible as quickly as possible until the quota is reached, again distorting input decisions. This leaves taxes on catch, which are instead fully coherent with the social optimum when fixed at a level sufficient to force fishermen to internalise the difference between private and social cost of fishing.

However, while theoretically sound, it was already clear at the time that imposing such a tax would prove problematic, for two main reasons. First, it is not at all straightforward to calculate what the appropriate tax rate would be, as this would require the knowledge of a variety of different biological and economic parameters. Second, even if the appropriate tax rate is known, it is highly likely that it will not be possible to apply it to domestic actors, as political considerations generally require the majority of benefit from fishery sectors to accrue to the industry rather than to the treasury (Clark 1980). An alternative measure, which could theoretically achieve the same efficient result (Moloney and Pearse 1979, Clark 1980) without presenting the same political obstacles is the institution of individual transferrable quotas (ITQ). [12] With this system, the TAC of a given fishery is divided amongst all vessels allowed access to it according to some criteria, generally grandfathering[13], although initial auction is also possible.[14] As long as a market for the quotas exists and any of their portions can be reallocated amongst vessels, ITQ would also lead to an economically optimal equilibrium, regardless of the initial quota allocation. While these two instruments might theoretically be equivalent, in practice they have a very relevant difference (Clark 1980). Namely, while quotas directly establish a limit on TAC, taxes only affect catches indirectly. The channels through which taxes impact on fishermen economic behaviours are various, and changes in fish price or in cost of

[11] Or alternatively on the amount of fishing effort which would lead to catching the MSY/MEY equivalent.
[12] Although being characterised by a set of different one, as it will become clear in the next section, see Grainger and Parker (2013)
[13] "Grandfathering" describes the situation in which fishermen who can prove a sustained historical claim on the catch of a fishery are freely allocated a quota of the TAC proportional to their estimated share of total catches from the fishery over a given period of time.
[14] However, in practice this outcome is extremely rare due to political opposition, see Grainger and Parker (2013)

fishing effort will alter the size of the optimal tax rate. Given that both of these are subjected to fluctuation, ITQ are less subject to uncertainties than tax instruments.

The theoretical superiority of quotas under uncertainty was though going to be challenged over the coming years, with different studies demonstrating that taxes are more efficient than quotas as long as the stock size is known (Koenig 1984), or at least the growth rate of the stock size is known (Anderson 1986). However, even when taking into account results from more advanced modelling techniques incorporating fishermen's (rational) expectations about future tax levels (Rosenman 1986), or fully stochastic fishery models (Androkovich and Kennet 1991), one of the two main reasons for the superiority of ITQs remained unchallenged: optimal tax rates for many fisheries remain politically unfeasible.

Further developments on the economics and regulation of fisheries, chiefly concerning the emergence of international agreements[15] and a more thorough modelling of the impact of fishing on marine habitat carrying capacity[16], emerged over the last couple of decades. However, neither of these strands of literature challenged the basic tenants reached by the earlier work hereby presented, which constitutes the economics foundation of fishery management. In the next section, we shall see how relevant these theoretical considerations have been for the management of fisheries in HICs, while from the following one we shall move the focus on LICs.

1.3. The management and taxation of fisheries in HICs: experiences from North America and Scandinavian countries.

As we have seen, interests in the economics basis for regulation of fisheries emerges in the mid-1950s in the US. However, this does not mean that up-to-that point there had been no government intervention in the management of fishery resources. On the contrary, gear limitations, seasonal closures or institution of TAC in specific fisheries had been taking place in the US as a form of stock control since the early 20th century (Crutchfield and Pontecorvo 1969). Regulators experiences in this early period already points toward the type of challenges which will characterise attempts to control the sector, namely balancing considerations about productive efficiency and employment and distribution effects (Grainger and Parker 2013). An example can be seen in the banning of fish traps in the state of Washington in 1934. While they are a highly efficient fishing tool, their ownership was concentrated in the hands of a few corporations and land-owners, and their use would impact on the profitability of fishing boats, with important employment consequences (Crutchfield and Pontecorvo 1969, Grainger and Parker 2013). The coalition of interests between fishing boats' crews and investors was too

15 This strand of the literature is heavily influenced by game theory, as this branch of economics fits well description of how international agreements might emerge. For a thorough review of early applications of game theory see Bailey et al. (2010), for more recent applications see the special issue of *Fisheries Research* introduced by Grønbæk et al. (2018).

16 This strand of literature tries to explicitly model how fishing practices impact habitats carrying capacity, and hence alter what can be considered as the MSY. The seminal piece is Barbier and Strand (1998), more recent applications include Armstrong et al. (2015), Nichols et al. (2018) and Van Long et al. (2020).

powerful to ignore for regulators, who, by introducing a ban on the technology, favoured the emergence of overcapitalisation in the state fisheries – but also increased their employment contribution.

Overcapitalisation in the industry and excessive extraction of resources connected with open access were also amongst the motivating factors behind the first push towards entry limitation, taking place in North America and Australia between the late 1960s and early 1970s, and more widely since the establishment of exclusive economic zones in 1976 (Grainger and Parker 2013). While the introduction of a cap on the number of vessels allowed to fish in a given area, managed through transferrable licenses, contributed to increase the sector profitability, its main driver was the widespread fear of fishery collapse amongst marine biologists (Wilen 1988). These new regulations were also fiercely opposed by many fishermen, despite the ongoing declining trend in catches and profitability, as they were perceived to impact on their "natural right to fish" (Barsh 1977). However, it must also be noted that the opposition amongst fishermen was not homogenous. Most of those opposing limited entry were small-scale, local fishermen, who feared the increased competition from commercial ones having access to more capital, and hence better boats and gear – the object of the regulation existing at the time (Karpoff 1987). This latter type of fishermen had long been in favour of limited entry, but lacked the political saliency to convince the regulator. Even when fear of fishery collapse led to the eventual introduction of this measure, it had to be implemented through grandfathering[17] and accompanied by extensive buyback of excess licenses which had to be granted for political reasons (Grainger and Parker 2013).

Once more, it becomes then apparent that employment considerations are at least as important for the regulators as those based on economic efficiency, particularly when employment is concentrated in specific geographical areas. That is, political preferences seem to favour the employment of more fishermen than those required to catch the fish, especially if more efficient fishermen operate across several geographical areas and are perceived as outsiders by local fishing communities. Without the risk of fishery collapse, it is unlikely that there would have been a strong enough incentive to change management practices due to this heterogeneity of economic and political interests (Johnson and Libecap 1982, Karpoff 1987, Grainger and Parker 2013).

Given these political obstacles, it is not surprising to find that the determination of ITQs, let alone catch taxes, as the economically optimal regulation strategy in the early 1980s was not followed by its widespread introduction. As of late 2010s, it was estimated that only 5% of world fisheries had introduced some form of ITQs, often accompanied by other types of regulation (Costello et al. 2008). Where they were introduced, available evidence points toward the fact that they contributed to increase fishery profitability (Grafton et al. 2000, Newell et al. 2005), as well as helping to stop and sometime reverse stock decline (Costello 2008). Political opposition to ITQs stems from the same reason as other type of policies aiming at the economic rationalisation of the sector: they favour concentration of fishing rights in the hand of the

[17] In this case implying preserving right to access for incumbents while introducing a moratorium on new resource users.

economically more efficient operators, with adverse impact on employment (Abbott and Wilen 2010). Even though the initial quota allocation might not impact the eventual achievement of the economic optimum (Clark 1980), it has important consequences on the distribution of benefits, and is thus relevant for equity concerns. Distribution of quotas amongst sectors – fish harvesters vs. fish processors, commercial vs. recreational fishing – can also further complicate the matter (Grainger and Parker 2013).

To address these concerns, in many cases ITQs have been subjected to different type of restrictions. To limit adverse impacts on local communities, experiments have been made with "community quotas", which can only be traded within and not across different groups (Grainger and Parker 2013, De Alessi 2012). To avoid excessive concentration in the hand of a limited number of groups, consolidation caps can be introduced, such as in certain fisheries in Alaska or New Zealand (Bonzon et al. 2010, De Alessi 2012). Clauses can also be introduced to allow a given proportion of quotas to accrue to each specific sector, a logic which can also be expanded to allow purchase of quotas by association who want to create or support the establishment of marine protected areas, as it happened in California (Deacon and Parker 2009).

Two observations should emerge from the cases presented so far. The first is that many obstacles to the economically efficient management of fishery stems from political factors, as there always are constituencies which stands to lose from reforms. The second is that very little discussion on the role of taxes, or on the contribution of the fishery sector to public finances has so far been presented. The reason for the latter is two-fold. To start with, although the vast majority of fishery management models include some form of levy or fee – be that for the registration of the vessel, the acquisition of a fishing license or the use of port facilities – these are usually well below what is required to cover management costs, which is often substantial (Arnason et al. 2000). In fact, if one considers the public expenditure required to facilitate retirement of vessels contributing to over-capacity (Grainger and Parker 2013), as well as the other many subsidies directed towards the sector (Merayo et al. 2019), it is not unlikely that fisheries might be a net fiscal receiver in certain contexts. Secondly, as long as the fishery management model does not create resource rents, there is little economic justification to extract more resources from the domestic fishery sector than those accruing from the general fiscal legislation, i.e. corporate income tax (CIT) and value added tax (VAT) (Gunnlaugsson et al 2018). Both points might warrant some further elaboration.

As the reader might have noticed, the cost of different management strategies has so far been ignored. Rather than a conscious choice, this reflects the scarce attention that the topic has received in the academic literature (Arnason et al. 2000). However, if the objective of introducing economically sound management practices in the fishery sector is to increase its net societal benefit, then costs should clearly be taken into account. The proper management of fisheries requires a well-functioning bureaucracy to be in place to gather and process information about both fish stocks and fishing practices, i.e. a variety of differently trained personnel and a fleet. Its cost can be substantial: 10% of the total value of landings in Australia, 7.5% in the UK, 15% in the US, 8% in Norway, 3% in Iceland, between 15% and 25% in Newfoundland (Arnason et al. 2000). Figures for other OECD countries could be even higher (Wallis and Flaaten 2000). Although based on somehow different basis, these figures clearly

indicate that this is an aspect worth considering explicitly when thinking about different management models. Despite this, cost-recovery from the industry is in many cases only partial[18], although it has become more important over time (Arnason et al. 2000).

Who should pay for management services is a question in itself. It is easy to argue that the industry should pay for services which are only present for their direct benefit, such as observation of catch type or stock measurement, respectively the first and second most expensive component of fishery management (Arnason 2000). On the other hand, other services are also to the benefit of the general public, such as the existence of lighthouses or of search and rescue services (Arnason 2000, Wallis and Flaaten 2000). Regardless, most aspects of fishery management have characteristics of public goods – they are largely non-rival and non-excludable. So, even if the first were to be left to the industry, it is unlikely that they will be provided to their optimal level. Given that a suboptimal provision of this services will likely lead to both biological – collapse of the fishery – and economic – collapse of the fishing industries – issues, government worldwide usually step in. However, the tenuous connection between who pays for these services – i.e. taxpayers at large – ad who chiefly benefits from them – i.e. the industry – often leads to perverse incentives to the rationalisation of management expenses. That is, taxpayers do not care much about how the relatively small fraction of their tax bills that goes towards fisheries is used, while industry players do not value enough the services that they receive for free (Arnason 2000).

The above discussion clearly connects to the question of what form should the contribution of the fishery sector to the general public take. Such question can be seen as only really emerging once EEZ were established in the 1970s, as before this date fisheries were often seen as belonging to coastal communities, at least in Nordic countries (Holm et al 2015). As economic considerations became more prevalent in dictating strategies towards the sector – and even in Scandinavian states, this only happened through extensive political confrontations and negotiations, in part still ongoing (Holm et al 2015, Chambers and Carothers 2017, Gunnlaugsson et al 2018) – discussions about its contributions the national economy became more frequent. However, these are much more commonly seen through the lenses of providing employment and livelihood opportunities to rural communities than through those of contributing to public revenue. That is, the fishery sector contributes to domestic revenue mobilisation as much as every other sector through CIT and VAT. Sector specific taxes are only charged in a handful of cases throughout the world, and generally when the existence of a resource rent is firmly established (Holm et al 2015).

One of this handful of cases is Iceland, which is generally considered to be the model country when it comes to fishery management (Arnason et al 2000, Holm et al 2015, Gunnlaugsson et al 2018)[19]. In fact, Iceland was on the first countries to introduce ITQs for some fisheries in the

[18] Anarson et al 2000 reports that the Australian Fishery Management Authority considers only about half of its cost as recoverable, while the New Zealand Authority collects about 5% of the value of fish landing with the explicit aim of recovering management cost. A few fishery management bodies in the US had also started charging fees for the same scope.

[19] A tax similar to that described in this paragraph was also experimented with in New Zealand, but it was rolled back as a consequence of a legal dispute between the industry and the government (Hannesson 2005)

early 1970s, a system which had by the 1990s been expanded to cover almost all national fisheries (Gunnlaugsson et al 2018). Although there has been opposition to ITQs on the ground of their impact on the livelihood of small fishermen and of rural communities (Holm et al 2015, Chambers and Carothers 2017), they have also undoubtedly contributed to the sector profitability (Arnason 2005, Gunnlaugsson and Saevaldsson 2016, Gunnlaugsson et al. 2018). The clear profitability of the fisheries led to the introduction of a "fishing fee" in 2004, based on the value of landed catch and changing from species to species. While initially the fee was presented mostly as the evolution of the "supervision fee" introduced in the 1980s to recover 50% of ITQs management cost, over time it moved closer and closer to a true resource rent tax. In its current version, the fishing fee is divided into two different components, one paid by all operators – the old "supervision fee" – and one only charged on companies which are making supernormal profits.[20] The combined value of these two fees is approximately 6% of catch value, and it currently contributes around 1.2% of total tax revenue.

Two factors made the evolution of the supervision fee into a resource rent possible. The first is that operators in the sector had long been subject to sector specific charges, which made discussions about their modification less contentious than in other countries. The second is that, 30 years after the introduction of ITQs, it had become clear that this system had indeed created a rent for the economic actors involved in it: catch per unit of effort tripled between 2000 and 2016, due to an increase in fish biomass of 50% between 1990 and 2016 (Gunnlaugsson and Agnarsson 2019). Furthermore, the realisation that the sector management strategy had started to create a rent came during the late 2000s, a period in which the country at large was dealing with the consequences of the 2008 financial crash. Apart from increasing the need of expanding government revenue, the situation created a stronger moral argument for taxing private revenue accruing from a public resource, especially when part of this revenue was generated by the increasing competitiveness caused by a general currency devaluation (Gunnlaugsson et al. 2018, Gunnlaaugsson and Agnarsson 2019). Much care still had to be taken to ensure that the fee was not going to adversely impact highly indebted or smaller companies, as well as its fair distribution between harvesting and processing companies, both of which can enjoy benefits from the creation of a resource rent. However, it is probably justifiable to say that said goal has been achieved: the 25 largest firm operating in the country pay 88.6% of the additional fees, with the following 25 paying an additional 10.1% (Gunnlaugsson et al 2018), with the overall revenue from it capturing between 13% and 15% of the resource rent accruing to the industry between 2009 and 2016 (Gunnlaaugsson and Agnarsson 2019).

To summarise, experiences from HICs highlight a series of relevant lesson for thinking about fishery regulation and taxation. To start with, borrowing from Grainger and Parker (2013), "there is no political constituency for economic efficiency". That is, the capacity of different groups to mobilise politically to influence regulation has always been important to determine what reforms are introduced, more so than how economically sound those reforms are. This is

[20] While a true rent tax should not be strictly connected to company profit, the complexity of calculating a species-specific tax led to the decision of making aggregate earnings before tax the base for this component of the levy, making it closer to a sector specific corporate tax (Gunnlaugsson et al. 2018, Gunnlaaugsson and Agnarsson 2019).

especially relevant given that one of the biggest inefficiencies of the fishery sector is its overcapitalisation and overcapacity, which translates into excess employment. Reducing the number of actors involved in the fishery sector is generally one of the main goals of modern management strategies, but it is also politically unappealing. Some form of compensation for the loser are generally required to make reform politically palatable. Even without accounting for compensation of the losers, modern fishery management strategies are usually costly, as they require extensive bureaucracy to be effective. While this has at times led to the introduction of cost recovery fees, over and above the licensing fees which are generally present in all schemes, these very rarely cover for the overall management cost, with the difference covered by general tax revenue. Outside of recovering management cost, it is also extremely rare for the fishery sector to be subject to specific taxes, which have so far been discussed only in the very few cases in which management practices have led to creation of a resource rent over long time periods, and actually introduced in only a handful of cases.

1.4. Economic contribution of fisheries in LICs and in SSA – key figures.

Although the focus up to this point has been on either theory or HICs experiences, the objective was to provide the necessary background to discuss which role could fisheries play in increasing resource mobilisation in LICs, and especially in SSA. While figures about economic contribution of fisheries in LICs are at best indicative estimates given the relevance of artisanal, small-scale fisheries, they are undoubtedly important. The most recent flagship publication about fishery from the Food and Agriculture Organisation, "The state of World Fisheries and Aquaculture 2020", estimates that 59.5 million people were directly employed in fisheries and aquaculture in 2018 (FAO 2020). The overwhelming majority are in Asia (50.4 million people), with Africa being a distant second at 5.4 million people. With regard to Africa, these figures are roughly in line with previous estimation, both from FAO – which estimated the total number of fishermen and fish farmers in the continent as 6.1 million in 2014 (FAO 2014) – and from other sources – the World Bank (WB) puts this figure at 7.8 million in 2012 (WB 2012).

What these figures represent though is the number of individuals engaged in harvesting fish, thus ignoring the remainder of the value chain: aggregation, processing and marketing. According to the WB, 17.6 million people were employed in post-harvest activities in the African continent in 2012 (WB 2012), a figure more conservatively estimated at 5.2 million by the FAO (FAO 2014). While different extrapolation processes lead to a substantial difference between the two figures, what they agree on is that at least as many people are employed in post-harvest activities as they are in harvest. Furthermore, gender composition of employment is significantly different between the two: while only 3.94% of African fishers are female, they account for 58.94% of those employed in post-harvest activities (FAO 2014).[21]

[21] The particular role of women in the fishery value chain has received some attention in the literature. For an overview of the topic see Kawarazuka et al. (2017); Harper et al. (2017) offers a comparative analysis of case studies on 5 different LICs; Geheb et. al (2008) focuses on Lake Victoria, Matsue et al. (2014) on Kenya, Lymuwa and Synnevag (2018) on Malawi and Torell et al. (2019) on Ghana.

The economic contribution of fisheries to LICs' GDP is also subject to a similar variation depending on the assumptions used for its calculation. A study from the WB in 2012 estimated the average sector contribution at 3.23% of GDP in LICs and at 2.17% in SSA (WB 2012), while the FAO puts the figure for the African continent at 1.26%, of which 0.33% accruing from inland fisheries, 0.43% from artisanal marine fisheries, 0.36% from industrial marine fisheries and 0.15% from aquaculture (FAO 2014). However, these average figures hide some very important variations, as the sector contribution ranges from close to 0% in six landlocked countries to 8% in Ghana or 9.4% in Sierra Leone amongst the 40 countries included in the WB study (WB 2012), and again from 0.17% in Mauritius to 5.53% in DRC amongst the 23 countries included in the FAO one (FAO 2014)[22]. In fact, despite having been included amongst the indicators for achieving the Sustainable Development Goals (SDG)[23], there is still is no internationally agreed upon methodology on how to best calculate the contribution of fisheries to GDP (Cai, Huang and Leung 2019).

For a long time, data on actual catches for most LICs has also been quite scarce and was mostly constituted by official statistics communicated to the FAO by national bodies, often considered unreliable (Garibaldi 2012). However, since the mid-2000s, the emergence of the "Sea around us" project at the University of British Columbia greatly contributed to change this picture. Marine scientists working on the project have complemented the data from official FAO statistic by estimating both the amount of unreported catch by industrial, artisanal and subsistence fishermen (Zeller et al. 2016) and that of major discards due to by-catch[24] (Zeller and Pauly 2018). While augmentation of official statistics through modelling comes with associated uncertainties (Pauly and Zeller 2017), the contribution of this approach to a better understanding of trends in global marine fisheries has also been officially recognised by the FAO (Pauly and Zeller 2019). What this augmented data shows for the African continent is that catches increased almost exponentially from between the 1950s and the late 1960s, grew more steadily through the 1970s and most of the 1980s to peak at 19 million tonnes in 1988, to then start a steadily declining trend continuing to this day towards 13 million tonnes. While these trends exhibit some variation across different African large marine areas, the overall picture suggests that fisheries in the continent have been operating at best at peak, and very often beyond it, for quite some time (Zeller et al. 2020).

Fish products also represent an important source of foreign currency for many LICs, as they are one of the most frequently traded food commodities – in 2018, 38% of global fish production was traded internationally (FAO 2020). Between 1976 and 2018, the volume of traded fish commodities increased of 3% annually, while their real value increased of 4% annually (FAO 2020). LICs have been one of the key actors involved in this trade expansion. UNCTAD estimated that 52% of the USD264 billion worth of fish products which were traded in 2013 was exported from developing countries, with a significant impact on the trade balance of both small island

[22] More recent estimates for specific countries, compiled by the FAO fishery division and available at a country level from http://www.fao.org/fishery/countryprofiles/search/en , are generally in line with those presented in earlier studies.

[23] The SDG indicator 14.7.1 is "Sustainable fisheries as a percentage of GDP in small island developing states, least developed countries and all countries".

[24] The term by-catch refers to the capture of non-targeted species which are returned to the sea.

nation states and least developed countries (LDCs) (UNCTAD 2015). However, due to the highly globalised nature of fishery value chains, most of the produce exported from LDCs is in its raw state, with filleting and packaging usually taking place in ASEAN countries or in Eastern and Central Europe (UNCTAD 2015). While LDCs would clearly stand to gain from increasing their processing capacity, so to export product with higher value added – which will still receive preferential access to HICs market under WTO-rules – phytosanitary regulations and other non-tariff barriers would still represent a relevant obstacle for them to overcome (UNCTAD 2015).

Given the somehow wide range of estimates about both fishery contributions to employment and to GDP in LICs in general and in Africa specifically, it is not surprising that publicly available data on fisheries contribution to tax revenue is virtually inexistent. In fact, as recently as 2017, a report from the WB dedicated to progress and challenges in global marine fisheries stated that "there is inadequate knowledge of fishery sector taxes and subsidies worldwide to conduct true economic analysis" of its net contribution (WB 2017, p.21). This can also be seen through an analysis of the data available from the Organisation of Economic Cooperation and Development (OECD) database on Policy Instruments for the Environment (PINE). Out of 49 African countries covered in PINE, only 12 have an entry connected to tax, fee and charges specific to the fishery sector,[25] and revenue figures are only available for 9 of them. This is not to say that estimates are not at time available, but they often are presented as ballpark figures: for example, Horemans and Kébé (2006), summarising the results from a series of case studies from Western and Central African countries, state that "taxes represent approximately 5 to 10 percent of the value added from fisheries-related activities" (p.4).

What is clear from the review of the literature is that fiscal instruments directed towards the fishery sector are as varied in LICs in general and in SSA specifically as they are in HICs. Virtually every LIC has a set of different vessel licences, whose value varies according to the type of boat, the fishery and the nationality of the boat owner. However, these are unlikely to provide a massive contribution to public revenue – the FAO in 2014 estimated from survey data that their average contribution in the 23 African states under analysis was 0.002% of GDP (FAO 2014). On top of this, countries who have entered agreements with DWFNs for exploitation of their EEZ earn both a lump-sum tax and a royalty based on the value of the catch, which are generally much more important for revenue generation than domestic licenses (Kaczynski and Fluharty 2002, Alder and Sumaila 2004, Gagern and van den Bergh 2013, FAO 2014, Belhabib et al. 2015a, Seto 2017). Revenue could potentially also accrue from management of catch share quotas such as ITQs, which have been established for specific, highly concentrated industrial fisheries in a few African countries (Jardine and Sanchirico 2012), such as Mauritius (Hollup 2000), South Africa (Nielsen and Hara 2006), Mozambique (de Sousa et al 2006) and Namibia (Oelofsen 1999, Kirchner and Leiman 2014). Finally, the fishery sector is subjected to the same type of formal and informal taxes applied to other economic activities, with the latter being

[25] Furthermore, in 3 of these cases it is not clear if the reported instrument is actually directed specifically to fisheries, as in Burkina Faso the tax is dubbed "Tax on forests, hunting and fishing", in DRC "Forestry and wildlife permits" and in Ghana "Tax on forests, hunting and fishing".

potentially important sources of revenue for local government (Horemans and Kébé 2006, Béné et al 2009, Nunan 2014) and the former having at times being individuated as excessive for the sector in specific countries (UNCTAD 2014).

However, the lack of readily available data on the contribution of fishery to revenue mobilisation in LICs has not stopped calls by some authors for fiscal policies to be put front and centre by policymakers looking to reform the sector (Steinbach et al. 2016, Mohammed et al. 2018), especially with reference to the role of subsidies (Da Rocha et al 2017, Sumaila et al 2016, 2019, Merayo et al. 2019). A careful reading of the fishery management literature also highlights several other different areas which should be taken into account when considering potential reforms of fiscal rules for the policy sector. These include the role of co-management of fisheries between central and local government bodies, competition to small-scale artisanal fishers arising from fishing agreements and losses due to IUUF. All of these aspects fit into a wider debate about what should be the role of fishery in the development process, i.e. to work as a sort of employment of last resort for those who have no other opportunities, hence chiefly contributing through a welfare buffer effect, or to contribute revenue for the national development through economically sound management. All of these topics will be covered in the next section.

1.5. The management, regulation and taxation of fisheries in LICs – selected issues.

After introducing the debate between wealth-based and welfare-based fishery management model for LICs, this section will cover other 4 issues relevant for the management, regulation and taxation of African and LICs fisheries, namely the role of co-management practices; of fishing agreements with distant water fishing nations (DWFNs); of subsidises towards the fishing industry; and of illegal, unreported and unregulated fishing (IUUF).

1.5.1 Wealth-based vs. Welfare-based approaches to fishery management.

Proponents of wealth-based fishery management, an expression first introduced by Cunningham et al. (2009), support the view that policy makers from LICs should focus on the creation of fisheries' resource rent in order to unlock their true potential contribution to national growth. In their view, the key to maximise societal benefits from fisheries in LICs is to incentivise their economically efficient use (WB and FAO 2009), addressing the issues of weak governance which are behind their overexploitation (WB 2004) and recognising that a more rational management of both inland and high sea fisheries is central to both increasing revenue and sustaining livelihoods (Munro 2010, Welcomme et al. 2010). The establishment of better-defined property rights and of fisheries management units (FMUs), relying on market-based mechanisms to reduce capacity on overexploited fisheries, constitute the basis of this approach (Cunningham et al 2009). The alternative would be to allow the current situation to remain, in which "poor fishers contribute to their own poverty by destroying the fish resource and wealth on which they depend" (Cunningham et al. 2009, p.286). Thanks to a strong international

support to this approach, a move towards wealth-based fishery management was endorsed by the "Conference of African Ministers of Fisheries and Aquaculture" in 2010 and made a pillar of the Comprehensive African Fisheries Reform Strategy in 2012 (SmartFish 2013, Nunan 2014).

However, a critique of this position emerged quickly and was more strongly represented by Béné et al. (2010), who proposed instead a welfare-based approach to fishery management. Rather than their potential to generate economic rents, these authors stressed instead small-scale fisheries' role in providing an income to households who would not have access to alternative sources of livelihood. They support the view, first proposed by Jul Larsen (2003), that the main contribution of small-scale fisheries to the development process of LICs is their capacity to absorb surplus of rural labour, including seasonal or temporary one[26], a function which fisheries use to perform also in HICs. By focusing on the development of Norwegian fisheries, they show that the reduction in the number of small fishermen, which contributed to the emergence of economic rents from what was previously a subsistence activity, was strongly connected to pull-factors from industrial development in the country (Hersoug 2008, Béné et al 2010). These pull-factors are largely absent in the majority of LICs. Demographic dynamics lead to an increase in the number of fishermen even in countries in which industrial growth is taking place and the government is trying to explicitly reduce overcapitalisation in the industry, such as Vietnam (Béné et al 2010, Armitage and Marschke 2013). Given this lack of alternative employment opportunities in the industrial sector, a simple strategy of limiting the number of fishermen would lead to an increase in poverty rather than an increase in economic efficiency. In fact, there are also cases in which this is exactly the notion informing government policies towards the sector, such as Indonesia (Hersoug 2008, Béné et al 2010). Ultimately, the authors are not completely dismissive of the points made by proponents of the wealth-based approach but are instead convinced that such an approach would only be useful after a wider formalisation process in the rest of economy has taken place. As long as this is not the case, fisheries' function of providing a labour buffer and a social safety net to vulnerable and marginalised populations should be preserved (Béné et al. 2010), and policymakers should focus on rationalising open-access fisheries as much as possible (Wilson and Boncoeur 2008).

This debate ultimately boils down to what should be the central tenet of fishery management policies in LICs, that is maximising sustainable catch and employment or improving conservation of fish resources and creation of economic rent (Hillborn 2007)[27]. As we have seen in section 3 this tension has also characterised the development of fishery management policies in HICs (Grainger and Parker 2013), where it remains relevant to this date even in the country considered to be the example for optimal fishery management (Chambers and Carothers

[26] For an extensive systematic review on fisheries contribution to food security and poverty reduction in LICs, see Béné et al. (2016).

[27] Some would define this as a false dichotomy, given that frequently updated information about fish stock could be used to create a system of capped licenses auctioned after a fixed time limit in exchange for a royalty payment, allowing for both a wide employment effect and the capture of some rents (Bromley 2009). However, lack of scientific evidence on stock status and weak institutional capacity makes this model very hard to apply in LICs (Ratner and Baran 2008).

2017)[28]. In practice, similarly to HICs, LICs often pursue a balance between wealth-based and welfare-based approaches. This point is aptly demonstrated for the management of the fisheries of Lake Victoria, which employ approximately 2 million people and generate USD600 million per year, by Nunan (2014). Thanks to donor support, more than a 1000s FMUs have been created across the lake shore in Uganda, Kenya and Tanzania, who can issue licences and charge fees with the objective of rationalising fisheries' use according to wealth-based models. While these instruments have generated revenue for both local and central governments, due to the lack of alternative employment opportunities in the area, no restrictions on the number of emittable licenses have ever been implemented, as it will be politically unfeasible. As a consequence, the number of fishing boats in the lake has increased by 50% between 2000 and 2010. So, while on paper the Ugandan, Kenyan and Tanzanian governments are following a wealth-based approach, in practice welfare considerations have stopped them short of introducing excludable property right on the lake resources (Nunan 2014).

1.5.2 Devolution of fisheries management in LICs.

Creation of FMUs with the aim of bringing together the multitude of different actors involved in management and use of fisheries has also been one of the key components of the devolution of fisheries management, another commonly applied policy in LICs in general and in SSA in particular. This has taken different forms – community based and co-management of fisheries (in which resource users acquire rights and responsibilities on the resource), deconcentration (transferral of decision-making capabilities to local level offices of the central authority) and territorial decentralisation (transferral of decision-making authority from central to local governments). These three models can also coexist to different extents, and while useful for analytical purposes, distinctions amongst them are seldom made in the literature (Béné et al. 2009), so that we will simply use the term "co-management" to indicate any of them in the remainder of the section. Examples of fisheries co-management in Africa which received some attention in the literature can be found in Cameroon, Chad, Nigeria (Béné et al. 2003, Béné et al. 2009), Niger, Zambia (Béné et al 2009), Malawi (Béné et al. 2009, Nunan et al. 2015), Uganda, Tanzania (Nunan 2014) and Kenya (Nunan 2014, Cinner and McClanahan 2015).

Co-management models for fisheries were usually promoted during the 1980s in the context of the wider push for decentralising reforms in LICs, which had an important impact on natural resource management (Ayar 1995). In brief, such reforms aimed at empowering local communities by giving them more control over natural resources such as forests or fisheries on which many of their livelihoods depended. Local governments' power to raise revenue from these resources was seen as important for fostering local democracy – by providing them with a source of funding for local expenditure – and to promote their more sustainable use (Ribot 2003, Béné et al. 2003, Conyers 2004). Delocalisation of fisheries management generally includes the transfer of some decision-making powers both from central to local units of the

[28] The topic of small-scale fisheries has received quite some attention in the context of Asia too. For an overview, see Pomeroy (2012), for an application to Vietnam, see Armitage and Marschke (2013), for one on the Philippines Mualill et al. (2014).

ministry in charge of fishery and from the central to local government bodies, both to existing ones (province, districts, etc.) and to those appositely created (i.e. FMUs). Often, this also implied according a greater relevance to traditional management strategies based on common property regimes managed by local or traditional authorities, especially for small-scale fisheries (Béné et al 2003). When their creation was accounted for, FMUs were to include representatives from the different institutional authorities with some claim on the fishery and from all stakeholders involved in the sector, with a view of guaranteeing balance in the representation of different interest groups and of both genders. However, in practice this balance is rarely achieved, with more powerful actors enjoying a greater say about the overarching objectives and practices of the FMU (Béné et. al 2003, 2009, Nunan 2014, Nunan et al. 2015).

Revenue raising capacity are often shared amongst FMUs – which should use it to fund their management practices – local and central governments, for which they contribute to general expenditure. Potential sources of revenue include boat, fishing and gear licenses, landing taxes and fees from fish traders (Béné et al 2003, 2009, Nunan 2014). Actual collection practices and distribution mechanisms have a strong impact on the final distribution of this revenue. For example, in Cameroon all revenue from fisheries is collected by central and local tax administrators and transferred to the Ministry of Finance, which then redistributes 70% of it to local representatives of the Department of Fisheries. In practice, this implies that no revenue accrues to final end-users (Béné et al. 2009). In Nigeria, agents from both the Federal and the State Department of Fisheries have been tasked with revenue collecting power, but the redistribution mechanism has not been stipulated in law, leading to institutional conflicts (Béné et al 2009). Where traditional management system are prevalent, such as in many community managed inland fisheries in Nigeria and Chad, revenue from fisheries is never remitted to the central government, and either accrues to traditional authorities or it is used to fund communal projects (Béné et al. 2003). At times, due to lack of human resources, certain FMUs or local government contract out revenue collection to private agents, who are then perceived to withhold an excessive amount of revenue, a claim which is though hard to substantiate due to a lack of data (Nunan 2014). It is also worth noting that increased availability of revenue at the local level does not necessarily coincide with increased development outcome: as accounting practices are seldom transparent, it might simply lead to private enrichment (Etiegni, Irvine and Kooy 2017).

There is also no clear answer regarding the impact that co-management reforms have had on the sustainability of fishing practices, one of their stated goals. Given the lack of taxation capacities which characterises local governments in many LICs, there is a tendency to see the devolution of fishery management purely as a revenue raising opportunity (Béné et al. 2009). This is as true for traditionally managed fisheries, where common property regimes often allow traditional authorities to charge more to fishermen outside of the community (Béné et al. 2003), as it is for fisheries theoretically managed through wealth-based practices, such as those in the Lake Victoria, where neither central nor local government has an incentive to introduce a cap on vessel license (Nunan 2014). Evidence from 15 years of co-management of fisheries in Malawi also suggests that they have not contributed to improving the situation of fisheries for similar reasons, i.e. seeing licensing as a revenue raising measure, the existence of parallel

charges from traditional authorities and lack of the support to local governments required for proper implementation (Nuan et al. 2015). However, positive examples also exist, such as those arising from the piloting of co-management practices in Kenya (Cinner and McClanahan 2015)[29]. While examples of increased licensing to migrant fishermen exist also in this case, many of the piloting communities established community-based protected areas, which allowed them to charge tourism fees to those coming for snorkelling or diving[30]. All of these newly established reserves showed a statistically significant increase in ecological conditions 6-years into the pilot (Cinner and McClanahan 2015).

What emerges from the literature reviewed is then a complex picture of different institutional settings created by devolution reforms, which have sometimes created new management bodies from the ground up and other times increased the relevance of traditional practices. While most of these reforms have led to an increased availability of resources at the local level, this seems to have happened at the expenses of the sustainability of fishing practices, and not necessarily leading to improved development outcomes. This is strongly connected to the scarcity of revenue sources available at the local level, creating an incentive for local authorities to see licensing purely as a revenue measure, and to a lack of political will to reduce the number of fishermen at all levels of government.

1.5.3 Trade Agreements with Distant Water Fishing Nations (DWFNs).

While in the two previous sub-sections the focus has mostly been directed towards purely national issues, international fishing agreements between DWFNs and LICs have a significant impact on both government revenue and the sustainability of the fishing sector. The relevance of this type of trade agreements changes significantly amongst geographical areas and is the greatest for pacific island nations – in 2013, 43% of total government revenue for Kiribati (USD 86 million) arose from agreements with DWFNs (UNCTAD 2015). The general relevance of fisheries in the economies of pacific islands has led them to invest substantially in their management, but what helped them to maximise the economic benefits from fishing agreement was to present a united front, i.e. developing a common floor price for the right to access any of their EEZs (Kaczynski and Fluharty 2002, Virdin et al. 2019).

The capacity of African states to extract values from this type of agreements is quite different – the FAO estimated in 2014 that African countries would earn 8 times as much as what is paid by DWFNs if they had the capacity to catch the same fish themselves (FAO 2014). The FAO estimates that African nations received approximately USD 400 million from DWFNs in 2011 (FAO 2014). However, data on many agreements other than those with the European Union (EU) are especially hard to find (Gagern and van den Bergh 2013), so that this figure is likely to

[29] Satria and Matsida (2004) also suggests that the spreading of co-management practices in Indonesia was effective in overcoming the use of destructive fishing practices from local fishermen.

[30] Although the topic has not been explored much due to a lack of data, it seems that a development of recreational fisheries could give an important contribution to the valorisation of African fisheries, see Du Preez and Lee (2010) for South Africa, Belhabib et al. (2016) for West Africa and Butler et al. (2020) for Angola.

be an underestimate (FAO 2014).[31] Foreign fleets have been free to fish around Africa until the establishment of EEZs through the 1980s, and due to their geographical proximity many European fishermen had been exploiting easy access to Western African waters since colonial times (Alder and Sumaila 2004). One of the main reasons behind the creation of EEZs was indeed to defuse growing tensions about fishing rights, and while the UNCLOS attributes ownership of fish resources to coastal states, it also mandates for states to cooperate in order to achieve their sustainable exploitation (Neiland 2004). This cooperation generally takes the form of a fishing agreement (FA) amongst two states or block of states, in which either unilateral or bilateral access to EEZs is granted in exchange for some economic compensation (Gagern and van den Bergh 2013).

FAs between African states and European countries did not take long to emerge after EEZ were created, as the first was signed between Senegal and the EU in 1979 (Witbooi 2008)[32].The first wave of FAs between the EU and various African countries (1979-1998), usually located in West Africa, were purely commercial in nature, and mainly aimed at easing problems of overcapitalisation in the EU fishing sector by redirecting existing overcapacity (Kaczynski and Fluharty 2002, Witbooi 2008, Seto 2017). The only developmental component of those FAs was a one-off payment into a dedicated fishery-development fund, but not much attention was dedicated to actually verify where the funds were directed (Kaczynski and Fluharty 2002, Gagern and van den Bergh 2013). This first set of FAs came under much scrutiny by the end of the 1990s, as they were perceived to be increasingly misaligned with the stated priority of EU developmental policies to support fisheries development in LICs (Kaczynski and Fluharty 2002, Witbooi 2008).

This misalignment was due to multiple reasons. To start with, the signing of FAs was not preceded by any assessment of the health of the targeted fish stocks, which would have been compulsory if the same expansion of fishing effort were to take place in European waters (Witbooi 2008). Furthermore, these FAs did not have any provision for catch quotas, they simply stated the allowed number of vessels, their allowed tonnage and time of operation. This gave signatory African countries very little control over European fishing effort, with many vessels targeting species other than those for which they held a license using the excuse of them simply being by-catch (Kaczynski and Fluharty 2002). Agreements were also discussed separately with each state rather than with West Africa as a block, and an analysis of their evolution over time shows that their duration and compensation increased for countries whose waters remained rich in fish and decreased in the opposite case (Kaczynski and Fluharty 2002, Witbooi 2008). Finally, no explicit compensation was included for coastal communities which might have had bear the blunt of increased competition in their waters, nor did they contain any support for the development of post-harvest capacity in the country (Kaczynski and Fluharty 2002, Gagern and van den Bergh 2013).

[31] However, FAO (2014) also reports that catches by DWFNs are also somewhat underestimated, which is probably as far as an UN body can go in term of doubting the quality of reported data (Gagern and van den Bergh 2013)

[32] Technically, the agreement were signed between Senegal and the European Commission, but only the term European Union will be used throughout the section for ease of reading.

Due to increasing pressure by multiple internal stakeholders and to an update in regulation of EU fisheries, in 2002 the EU decided to create a second generation of more explicitly developmental FAs, recognising the likely detrimental effects of its past practices (Witbooi 2008, Seto 2017). These new FAs included a provision for an independent or joint stock assessment to take place before they entered into force, as well as a stronger focus on the actual utilisation of funds theoretically dedicated to fishery management (Witbooi 2008). However, they still lacked any explicit compensation for coastal communities, they included no support for the development of post-harvest capacity and no obligation for EU vessels to report to national authorities the amount of fish caught. Furthermore, they still lacked any regulation of what proportion of by-catch to targeted species was allowed, nor did they set any explicit catch quota (Kaczynski and Fluharty 2002, Witbooi 2008, Gagern and van den Bergh 2013). The second generation of FAs also shifted a greater economic burden on the fishing companies, which in the first-generation FAs had to cover at most one-third of the license price, as the remainder was covered by the EU (Kaczynski and Fluharty 2002, Witbooi 2008). While this was a positive development from the point of view of reducing subsidisation of overcapacity, it is not clear if it led to a lower or greater EU ability of monitoring the behaviour of its fleet (Kaczynski and Fluharty 2002, Witbooi 2008).

A couple of authors in the literature also provide a closer look to the actual impact of EU FAs with specific West African countries. Kaczynski and Fluharty (2002) suggests that between 1995 and 1997, the total compensation received by the government of Guinea Bissau from its FAs with the EU was equal to 10.5% of European vessels' catch value and 7.5% of the value of processed products. The cost of licensing an EU tuna boat in the country was between 0.24% and 0.4% of the market value of harvested tuna, 25 times less than the 10% which would be required to license a similar vessel in the waters of pacific nations. A similar analysis, conducted more recently by Virdin et al. (2019), showed however that Guinea-Bissau managed to greatly improve its capacity of retaining resource rents from foreign fleets, as the value of FAs for bottom-trawlers had increased to 17% of landed catch value.[33] Nevertheless, the same was not true of other three neighbouring countries – Guinea, Liberia and Sierra Leone – which earned respectively 2%, 5% and 8% of estimated catch values, significantly lower than the estimated 12% earned by Pacific Islands (Virdin et al. 2019). Again, using examples from Liberia and Guinea-Bissau, Okafor-Yarwood and Belhabib (2020) also show that the EU seems to be rather selective in its application of regulation against IUUF, prioritising commercial interests over sustainability ones when it sees fit to do so.

To sum up, FAs between DWFNs and African countries represent an important source of revenue for the latter. However, it is also clear that African countries could stand to gain more from them if they were able of negotiate as a block rather than individually, a strategy already pursued by Pacific Island Nations. Much of the focus from the literature has been on FAs with the EU, due to the fact that they are the only one for which terms are easily accessible. They have come under much criticism over the years, as they have been perceived to be both

[33] While Virdin et al. (2019) focuses on foreign bottom-trawlers rather than explicitly EU bottom-trawlers, catch from EU vessels represents 74.5% of reported foreign catches in Guinea Bissau, 97.4% of those reported in Guinea, 96.7% of those reported in Sierra Leone and 85.5% of those reported in Liberia.

economically exploitative and contributing to unsustainable fishing practices. Some of the concerns expressed were tackled by the EU when second generation agreements were developed in the 2000s, and even more were tackled in third generation agreements developed through the 2010s, which now include explicit quota setting, although they are seldom used in negotiation with African states. Another argument often found is that African countries should focus on developing more domestic capacity, especially in post-harvesting activities where most of the value added lies, and include more clauses in FAs to ensure that DWFNs support such development.

1.5.4 The role of fisheries subsidies in increasing competition on LICs fish stocks.

Part of the reason why fishermen from DWFNs find it profitable to enter in FAs with LICs is that their home countries usually foot a significant portion of the bill. Kaczynski and Fluharty (2002) calculated that in the framework of first-generation FAs, the EU covered 85% of licensing costs of vessels operating in Mauritania, 92% of licensing costs in the Gambia, 90% in Senegal, 74% in Guinea Bissau and 84% in Guinea. While second and third generation agreement increased operators' contributions towards licensing, a substantial share remains covered by EU subsidies, without which it would not be profitable for most fishermen to relocate to these waters (Kaczynski and Fluharty 2002, Witbooi 2008, Okafor-Yarwood and Belhabib 2020). Subsidies then play a direct role in both allowing LICs government to earn some revenue from FAs with DWFNs and in increasing competition between commercial fleets from HICs and artisanal one from LICs.

The problem of subsidies towards the fishery sector has received quite some attention in the literature, as they have been identified as one of the greatest contributors to overcapacity and overfishing (Sumaila et al. 2010, 2016, 2019, UNCTAD 2015, Steinbach et al. 2016, Merayo et al. 2019, Arthur et al. 2019). While figures are somehow different across sources depending on the aggregation technique used, a few of points seems to be generally agreed upon: upper-middle income and HICs contribute to subsidisation much more than lower middle income and LICs, although the latter also dedicates significant resources in absolute term; China contributes by far the most to global subsidies. Continuing, one of the most significant proportions of subsidies arises due to tax exemptions for fishing fuels, without which high sea fishing would not be profitable; and subsidies have a negative impact on equity of fishing outcome, as they are mostly directed to support activities of commercial fleets HICs rather than artisanal ones from LICs (Sumaila et. al 2016, Arthur et al. 2019, Merayo et al. 2019).

When thinking about subsidies, the literature tends to discern between harmful ones – those increasing fishing capacity or favouring IUUF; beneficial ones – those increasing scientific knowledge of stock status, monitoring and enforcement capacity, establishment of marine protected areas; and uncertain ones – which need to be evaluated in the specific context (Sumaila et al. 2013, 2016, Steinbach 2016 , Arthur et al. 2019). Without disagreeing with the general focus of the literature on their environmental impact, Merayo et al. (2019) suggest that in subsidies' analysis more focus should also be directed towards their distributive effects, as subsidies which are beneficial for the environment might disproportionally impact lower income group – or the opposite. The distribution of subsidies across the above categories is

something else on which the literature agrees: harmful capacity-enhancing subsidies represents the vast majority of those granted by virtually all nations, and the 7 biggest DWFNs alone contributes USD 20 billion of them per year based on the most recent estimates (Sumaila et al. 2016, Arthur et al. 2019). While long-going discussions on regulations to curb harmful subsidies under WTO rules (UNCTAD 2015) were set to reach a conclusion by the end of 2020 (Merayo et al. 2019), the emergence of the COIVID pandemic led to a shift in the timeline, so that negotiations are still ongoing at the time of writing, with no clear agreement in sight.

1.5.5 IUUF and other crimes in the fishery sector.

Since a seminal report from the UN Office on Drugs and Crime from 2011, quite some attention has been dedicated to the nexus between transnational crime organisation and the fishery sector. In a nutshell, due to the lack of a comprehensive system to track and monitor fishing vessels at-sea, a lack of international records of fishing vessels' ownership and history and an increase in the number of destitute fishermen, it is relatively easy for organised crime groups to tap into the fishing sector (UNODC 2011, OECD 2013, Vrancken et al. 2019, Witbooi et al. 2020). While there is evidence that crimes committed range from smuggling of weapons to human trafficking, for the context of this review we will focus only on illegal, unreported or unregulated fishing (IUUF) and other tax crimes.

With regard to the latter, an OECD report from 2013 found that the very structure of the fishing sector exposes it to a variety of different tax crimes, ranging from custom duty fraud to evasion of profit, income or earning taxes (OECD 2013). The report highlights all the key mechanisms through which tax crimes are likely to arise, which present many similarities with tax evasion from multinational corporations. However, it is particularly scarce on data, and very little on the topic has been published since. Witbooi et al (2020), which also touch upon this issue in the wider context of the connection between fisheries and organised crime, only reports one concrete example of fishery tax crime from Indonesia, where the Tax Directorate General audited 187 fishing companies and found approximately USD16 million of unpaid tax revenue. Other recent work on the nexus between organised crime and the fishery sector, including papers published in a special section in of the 2019 issues of the Marine Policy journal, simply referred to the existence of many avenues for tax crimes in the fishery sector, but did not provide any further elaboration on the topic than those of the original OECD report (Vrancken et al. 2019).

What did receive much more attention in the literature is instead the practice of IUUF, a term used to encompass fish poaching and harvesting from marine protected areas (both of which illegal), unreported, misreported or under-reported catches from allowed operators as well as fishing in areas not subjected to any kind of management (Bray 2000, FAO 2001, Pitcher et al. 2002). Although issues connected with these practices had long been under scrutiny from the FAO and fish managers, they were brought to the international fore in 2009, when it was estimated that in 54 countries alone this practice accounts for losses between USD10 and USD23.5 billion (Agnew et al. 2009). This latter figure was to become the official estimate used for FAO reports (FAO-IMO 2015). The practice of IUUF has been linked to a variety of different detrimental outcomes, including overfishing and depletion of marine habitats, worsening of

food security, loss of fiscal revenue and money laundering (Bray 2000, FAO 2001, Pitcher et al. 2002, UNODC 2011, OECD 2013, ODI 2016, Doumbouya et al. 2017, Vrancken et al. 2019, Okafor-Yarwood 2019, Okafor-Yarwood and Belhabib 2020, Witbooi et al. 2020).

IUUF, and fishery crime in general, is a global phenomenon, and studies directed to assess its impact have started arising for many regions in the world. However, particular attention has been dedicated to its impact in Western Africa, due to the magnitude of the phenomenon in the area. Illegal catches have been estimated to represent 37% of all catches in the region (Phelps Bondaroff et al. 2015), accounting for anything between 10% and 20% of the value of global illegal fishing (Doumbouya et al. 2017). Resulting revenue losses are substantial at USD 2.3 billion annually (Belhabib et al. 2015b, Doumbouya et al. 2017), and, while interesting the whole region, are mostly concentrated in Guinea, Guinea Bissau, The Gambia, Togo and Morocco[34], with the first three countries also suffering from a deterioration of food security (Petrossian and Clarke 2020). The strong presence of vessels from DWFNs is also strongly connected with this trend (ODI 2016, Okafor-Yarwood 2019, Okafor-Yarwood and Belhabib 2020), as it has been estimated that vessels from EU only reports about 29% of their catch while Chinese ones only a meagre 8% (Belhabib et al. 2015b).

The poor capacity of these coastal state to monitor their EEZs has been individuated as one of the chief reasons behind the concentration of IUUF activities in the area, especially given the lack of an international system to track fishing vessels and a blacklist of vessels involved in IUUF (ODI 2016, Doumbouya et al. 2017). Establishing the last two, as well as proceeding with establishing IUUF as a transnational crime, is seen as a first necessary step to reduce the impact of this practice, not only in the region but globally (Phelps Bondaroff et al 2015, ODI 2016, Belhabib et al. 2019, Witbooi et al. 2020). Other suggestions include increasing scrutiny on containerships, pushing for all African countries to ratify the Agreement on Port State Measures to Prevent, Deter and Eliminate IUU Fishing, as well as banning the transhipment of fish in EEZ and introducing a "flag of convenience tax" (ODI 2016). More attention should also be dedicated to monitoring capacity of coastal African states, with special support to this activity becoming an important part of future FAs and of technical and development assistance (ODI 2016, Belhabib et al. 2019, Okafor-Yarwood 2019, Okafor-Yarwood and Belhabib 2020).

1.6. Conclusions of the literature review.

Recovery from the COVID pandemic has put even more pressure on LICs to increase the mobilisation of domestic resources, and many calls have arisen for them to do so by paying special attention to how new fiscal measures will impact the sustainability of their development trajectory. While much of the current focus is being directed towards the introduction of carbon taxes and a rationalisation of forestry management practices, little attention has been paid to the potential role of fisheries. This review is meant to provide a starting point for an

[34] To put this in perspective, it is estimated that Senegal lost around USD 300 million from IUUF in 2012, while Sierra Leone loses USD 29 Million per year (ODI 2016), which is impressive if one considers that neither of this country makes it to the top-5.

interested reader into what role taxes play in fishery management, what HICs experiences with different instruments have been and what are the main debates about fisheries management in LICs in general and in SSA in particular.

As it was shown in the second section, economics theory suggests that taxes on fishing effort or catch are one of the efficient mechanisms to ensure that fishing harvest remains at its MSY or MEY. However, taxes on effort are unlikely to be comprehensive enough to force fishermen to behave sustainably, and the rate at which taxes on catch will do so has long been seen as politically complex to justify. This has led many to support the introduction of ITQs as the preferred solution, as this instrument will lead to an efficient management of fisheries, and over time to the creation of a resource rent, which could then become the objective of a dedicated tax. Before a resource rent is created, there is no theoretical justification to charge the sector with any dedicated tax – excluding fees to cover some part of the management cost – so that fisheries are subjected to the same taxes of any other economic activity, such as CIT and VAT.

Examples from HICs, presented in the third section, show that ITQs have contributed to improvements of both the economic performance and the fish stock of fisheries in which they have been introduced, although they are not many. However, these improvements have been achieved at the cost of a concentration of fishing right in the hands of fewer economic actors and of an impoverishment of some coastal communities. This seems though to be the general trade-off facing policymakers, regardless of which instrument they might prefer - given that most open-access are overcapitalised, moving to a more efficient management equates to a reducing their employment contribution. As a review of selected experiences from HICs shows, this trade-off has always been hard to navigate, and introduction of new management practices was usually connected with fish stocks approaching a severely depleted state. Even in these cases, compensation was usually required for fishermen which were forced out of the industry. While improved management practices might in time lead to the emergence of a resource rent, this will take quite some time.

The fourth section introduced the key statistics about fisheries in LICs, with a special focus on SSA, and due to data scarcity and paucity all of the figures were subject to relevant uncertainties. As it has been shown, between 5.4 and 7.8 million people are engaged in fish harvesting in Africa, and between 5.2 and 17.6 million are engaged in post-harvest activities. Its contribution to GDP is also substantial in specific countries, such as Ghana, Sierra Leone or DRC, while negligible in others, and its contribution to the balance of trade follows a similar logic. What is though a main cause of worry is the status of the fish stock, as the most updated estimates show that catch trends have been steadily declining for over 30 years despite an increase in fishing effort.

What is virtually absent from the literature is a quantification of the sector contribution to domestic revenue mobilisation in the continent, especially outside of payments made within the context of fishing agreements with HICs. This is because, as previously mentioned, no sector specific taxes are generally levied on fisheries, so that much of the sector contribution is subsumed with CIT or VAT statistics. What remains outside of the above are either fees charged for vessels registration and other management activities, or payment accruing within the

context of FAs. The former are negligible in terms of GDP contribution – estimated around 0,002% - but might still represent a substantial source of income for local governments and traditional authorities, which though tend to use them as a revenue source rather than a management tool.

On the other hand, FAs can be a substantial portion of government revenue – as it was the case in Guinea Bissau for a long time – but often comes at a cost of an increase in competition between artisanal local fishermen and commercial fishermen from DWFNs. Most vessels from DWFNs do not subject themselves to much scrutiny and enjoy significant subsidies from their home countries, which have been identified as a major contributor to global overcapacity in global fisheries, so that negotiations on their restriction are proceeding under WTO supervision. While developmental considerations seem to have become more prominent in FAs, at least those entered by the EU, they still leave much to be desired, especially in term of compensation to coastal communities, support for the development of a post-harvest sector, introduction of catch quotas and by-catch regulation. There is also increasing evidence that many of the vessels from DWFNs are involved in IUU, a practice which importantly contributes to overfishing and loss of revenue.

The scarce economic valorisation of fishery resources in the continent has led some to push for wealth-based approach to fishery management – i.e. a widespread adoption of modern management practices, aiming at reducing access and increasing profitability. However, another position has emerged in response, in support of focusing more on the contribution to employment and livelihoods which arises from the common-property characteristic of traditional management – the so-called welfare-based approach. While in theory many African governments have subscribed to the first vision, in practice there seems to be a lack of political incentives to really push through with the required reforms – that is, to start limiting access by small scale artisanal fishermen. The emergence of co-management practices through the 1990s has only made the above conundrum harder to resolve, as local governments now also have an incentive to keep on emitting as many licenses as they can in order to collect more revenue.

To conclude, this review indicates that there are not many straightforward avenues to quickly increase the contribution of fisheries to revenue mobilisation in Africa in the short run, as this depends on improvement in their management and on their successful industrialisation. However, this does not mean that the focus on the topic should wane, rather that the question should be addressed in a longer-term perspective. A few strategies which could be worth considering include: promoting a different approach to FAs from DWFNs, especially with the EU, given the latter commitment to improving the sector performance in LICs and to combat IUUF; a ban on capacity enhancing and fuel subsidies directed towards the fleet of DFWNs; support to increase monitoring capacity of African coastal state with regard to both the operations of DWFNs vessels and fish stock; and a greater appreciation of the number of different functions that the fishery sector plays in the economic life of many African states.

1.7 Expert Interviews.

Following the literature review, this section of the report presents the outcome of 5 expert interviews which were carried out between the last week of July and the second week of August 2021. The experts interviewed are Ms. Alice Tipping (International Institute for Environment and Development), Ms. Eugenia Merayo (Joint Nature Conservation Committee), Dr. Dyhia Belhabib (University of British Columbia), Dr. Ifesinachi Okafor-Yarwood (University of St. Andrews) and Prof. Fiona Nunan (University of Birmingham)[35].

All of them were contacted due to their relevant work on the themes individuated in the preceding literature review as relevant for the development of the fisheries sector of LICs in general and SSA specifically, which constitute a pre-requisite for their capacity to contribute to revenue mobilisation. Namely, these themes were: the connection between subsidies and fishing activities of DWFNs; the positive and negative consequences of FAs between African states and DWFNs; the impact of IUUF on the fisheries sector of West Africa; co-management and the role of the artisanal sector; and the availability of different types of data required for fisheries management. Not all of these topics were covered in all interviews, as not every informant had significant expertise on each. All informants were also given the opportunity to touch on other themes which they felt were relevant for the scope of the project. The following sub-sections report the main outcomes of the interviews according to the above themes, and the various opinions expressed will not be directly assigned to any of the informants, which we will refer to with codes EN13, HG12, ST67, HU82 to KY53.

1.7.1 The role of subsidies.

Subsidies towards the fisheries sector have long been individuated as one of the main contributors to overexploitation of fish resources (Sumaila et al. 2010, 2016, 2019, UNCTAD 2015, Steinbach et al. 2016, Merayo et al. 2019, Arthur et al. 2019), although it has also been recognised that all not subsidies are detrimental (Steinbach et al. 2016, Merayo et al. 2019). As a consequence, discussion over their suspension has been happening under the umbrella of the WTO (Tipping 2016, 2020), and while there still are a few points of contention, they might be closing to an end (Tipping and Irschingler 2021). In fact, one of our informants thought it more likely than not that negotiation would come to a conclusion before the end of the year (EN13), and another also thought that they will conclude at most next year (ST67). However, there was also a feeling that a push for closing the negotiation as soon as possible might have an impact on the fairness of the final agreement (ST67) or on its effectiveness (EN13). While many African countries have been highly involved in the negotiations during the years and received assistance from the donors' community to help support their positions (EN13), there was a feeling that their ability to participate had diminished during the pandemic (ST67). Worries about the agreement's effectiveness were mostly due to concluding the negotiation

[35] Three other experts were contacted for interviews. Dr. Christian Béné declined the interview request; after multiple email exchange it was not possible to find a suitable time within the project deadline to interview Prof. Dirk Zeller; while Prof. Rashid Sumaila never responded to our interview request.

this year becoming a necessity, as "the quickest thing to sign is an agreement that people don't need to do anything about" (EN13). While fairly technical, some of the remaining points of contention will have some relevant bearing on the future of the sector, and therefore they should not be discussed in a rush or without equal capacity for all members to join in the discussion (EN13, ST67).

For the purpose of the current negotiation, subsidies have been divided in three pillars. The first concerns subsidies towards vessels or companies involved in IUUF, the second subsidies towards vessels or companies targeting overfished stock and the third subsidies which contributes to overcapacity (Tipping 2020, Tipping and Irschingler 2021). Discussion about the first two pillars have by now mostly concluded, and the focus has shifted to the third one and to what types of special and differential treatments (SDTs) will be granted to least developed countries (Tipping and Irschingler 2021). Both are especially contentious. With regard to the former, the main question is what subsidies contribute to overcapacity – these are not as obvious as the others to determine, with a few countries proposing to ban specific subsidies only after they are proven harmful, while other pushing for a list to be drawn from current knowledge. With regard to SDTs for least developed countries, it will have to be decided if they should only cover the artisanal sector or also the industrial one, and if they should or not include a phase out period (Tipping 2020, Tipping and Irschingler 2021).

In the opinion of one of the experts, neither of the first two pillars will have a great impact in Africa nor elsewhere, as these subsidies have already decreased importantly over the last period (EN13). Discussions about the third pillar will though be relevant for most African countries, both directly – as they impact their capacity to provide subsidies, depending on which position on SDTs will prevail – and indirectly – as they impact DWFNs operating in their EEZs (EN13). With regard to the indirect impact, removing subsidies to overcapacity will very likely greatly affects the number of vessels from DWFNs which will find fishing in African EEZs profitable, and consequently revenue from foreign fishing licenses could decrease (EN13, ST67, HU82). The situation of direct impacts is more nuanced, and it will vary from country to country according to the relevance of domestic industrial fleets. Given that these are substantial in only a few African countries (South Africa, Mauritania and Seychelles), as long as the artisanal sector will be covered by SDTs, most countries will maintain the required policy space to work with the sector (EN13, KY53). Most informants were in any case of the opinion that subsidies towards the industrial fleets of least developed countries should not be included in the SDTs (EN13, ST67, KY53), and that any such proposal would be strongly opposed by the EU (EN13, ST67).

The importance of allowing continued state support to the artisanal sector, at least in the short term, was actually stressed in most of our interviews (EN13, ST67, HU82, KY53), although with different tones and arguments. One informant stressed that LICs governments do not currently have many policy tools towards the sector, and that fuel subsidies are especially important for the profitability of artisanal fishermen (EN13). However, they are also environmentally harmful, and overcapacity in the artisanal sector does contribute to overfishing, so it will be important to eventually phase them out too, while also investing in alternative livelihood opportunities for artisanal actors (EN13).

The current lack of alternative livelihood opportunities was also mentioned by another informant, who stressed that the strategies for removing subsidies should take into account their potential effect on inequality (KY53). This is because the category of "artisanal fisheries" is actually quite heterogeneous, including more and less disadvantaged actors as well as different social groups, some which might need support for longer periods than other (KY53). However, not enough information is currently available on the artisanal sector to really make these distinctions, so efforts in data collection should be increased, a point which was made in different contexts by all informants (EN13, HG12, ST67, HU82, KY53). Other two informants thought it a good idea to maintain subsidies to the artisanal sector in the short term, but also stressed that these will not be required for long if the competition from DWFNs industrial fleets will diminish (ST67, HU82). As pressure on the fisheries will decrease, stocks biomass will increase more quickly, and artisanal fisheries will return to profitability even without subsidies in a few years, at which point they could be suspended without social consequences (ST67, HU82). However, higher profitability in this sector will not necessarily translate in higher tax revenue, as many artisanal fishermen are unregistered, or will still not make enough to warrant taxation. Hence, the overall impact from subsidy removal on tax revenue is likely to be negative in the short term (ST67), but this could give governments the right incentives to focus on the development of the industrial fleet (ST67).

Various other points were made. One pertained the actual availability of information about subsidies in least developed countries. In many cases, this information is currently absent, but it will become compulsory for all parts to declare national subsidies to the WTO under the term of the agreement. This could make it much easier to actually assess their economic significance and who are the main receptors (EN13). Making this data publicly accessible within the countries themselves was also mentioned as a way to politicise the issue more, which might help to ensure that the accords are actually implemented (EN13). The potential capacity for states to maintain some control over who does receive subsidies was also mentioned. This is both because there is no agreed definition of which actors are artisanal and which are not (KY53), and because it is up to the single state to flag and fine vessels involved in IUUF (EN13), so willing states could still find ways to provide support to specific actors if they so wanted. Two informants also mentioned that the only subsidies discussed in these negotiations are those towards fish harvesting, so African states will still be able to subsidise processing industries (EN13, KY53). This could actually be a good way to redirect more policy focus towards this area rather than simply on catching fish (EN13).

1.7.2 Fishing Agreements.

Fishing Agreements (FAs) are one of the most contentious aspects of fisheries management in LICs. On the one hand, they currently provide significant revenue to many African states (Kaczynski and Fluharty 2002, FAO 2014), at times vital for the state budget. On the other, there is a wide perception that they have historically been quite predatory, as African states did not make nearly enough revenue from them (Kaczynski and Fluharty 2002, FAO 2014, Virdin et al. 2019), and this revenue often does not contribute to the welfare of coastal communities (Okafor-Yarwood 2019). Fleets from DWFNs often compete on unfair grounds with local

artisanal fleets (Belhabib et al. 2017, Okafor-Yarwood 2019, Okafor-Yarwood and Belhabib 2020), are often involved in IUUF (Okafor-Yarwood and Belhabib 2020), and importantly contribute to overexploitation of fisheries (Belhabib et al. 2015, 2019). One of the comparisons often made in the literature is that between West African countries and small islands nations from the Pacific (Virdin et al. 2019). While the former generally negotiate their FAs individually, the latter have opted for joint-negotiation, hence improving their bargaining positions and obtaining better economic terms (Virdin et al. 2019). Therefore, in our interviews we decided to focus on what are the shortcomings in the current FAs and on what different negotiation strategies might be available – if any – to make them more profitable for African states.

To start with, our informants thought that FAs could in theory be financially beneficial for African states (ST67, HU82), and that they are in any case under the obligation of allowing the sustainable exploitation of their maritime resources if they cannot do so themselves (HU82). Regarding the shortcomings of the current agreements, different features were pointed out. First, FAs often target species which are known to be already overexploited (HU82). This is particularly hypocritical when it happens in FAs with the EU, given that they are dubbed "Sustainable Fisheries Partnership Agreement" (HU82). A lack of monitoring on compliance with the terms of the agreements was also mentioned (ST67, HU82), with regards to what species are actually targeted (ST67, HU82), to how willing DWFNs are to take action towards their own fleet (ST67, HU82) and to how funds dedicated to fisheries development are actually spent (HU82).

This latter point is also very much connected to how secretive these negotiations often are (ST67, HU82), as representative from civil society organisations from fishing communities are never invited (HU82). As they are the one who should be enjoying the investments from the fisheries development funds often included in FAs, inviting them would be a key move to increase governments' accountability and ensure that funds are spent accordingly (HU82). In fact, increasing the transparency of negotiations and widening their participation was seen as a key step to improve on the current set of FAs (HU82). This is because no one knows as well as the fishing communities what type of investments they actually require and having them as active members in the negotiation would be important for their empowerment (HU82). While this might also potentially lead to FAs becoming more expensive, it could equally increase their developmental effectiveness (HU82). As fishing is becoming a more prominent political issue in many African countries, increasing the publicity of FAs provisions would also help to incentivise politicians to deliver on their commitments to the fishing communities (HU82).

Another way to improve the financial outcomes of current FAs without altering negotiating strategies per se would be to actually provide more technical skills and data access to the negotiators themselves (ST67, HU82). Negotiators do at time lack information about international reference prices for particular species, as well as average costs of particular technologies (ST67), both of which are important to understand if the conditions offered are advantageous. However, lack of up-to-date data about the biological and socio-economic states of national fisheries is also often a serious limiting factor (ST67, HU82) as collecting this information is costly and often done sporadically (ST67). That is, in some cases African states are not in a condition to properly assess the current value of their fisheries (HU82), which can

also be seen by the price they charge for fishing licenses (HU82). So, price negotiations are based on outdated and incomplete information, and this leads negotiators to accept unfavourable deals (ST67, HU82). More technical training on negotiation strategies could also be useful (ST67, HU82) – many DWFNs are richer and geopolitically more powerful (ST67), but they seek resources which are owned by African countries (ST67, HU82), so it is not always obvious who is in a stronger negotiating position, and there are cases where African countries came up on top (HU82).

Finally, negotiating as a block of countries, for example through ECOWAS, is seen as a potentially useful strategy, but also a very complex one to put in practice (ST67, HU82). As license prices for comparable species and vessels varies widely across the region, ensuring that the best terms are applied uniformly would in many cases increase the value of FAs (ST67). However, this would also require a harmonisation of management practices to really work, and they differ widely across the region, especially between Anglophone and Francophone countries (HU82). Furthermore, many countries are afraid to lose agency in the negotiation if they were to approach them as a block (ST67). Fisheries are not equally relevant across the different economies, so for some countries it will be easier to negotiate for longer or refuse particular terms even if they put a deal at risk (ST67). On the other hand, other countries critically rely on the revenue from FAs, so they will not be willing to risk having a FAs at all in order to get slightly better terms (ST67). What could be an acceptable middle ground is to have a regional negotiating team with advanced technical capacity supporting each country negotiators (ST67). In this way, critical information will be shared, and some capacity will be pulled together, but the final call will remain in the hand of each given country (ST67).

1.7.3 Illegal, Unregulated and Unrecorded Fishing.

Illegal, Unregulated and Unrecorded Fishing (IUUF) represents a blight for the sustainability of the fisheries sector, impacting biological stocks, artisanal fishermen livelihood and state revenue (UNODC 2011, OECD 2013, Vrancken et al. 2019, Witbooi et al. 2020). While this is a global phenomenon, it tends to concentrate in areas where sea monitoring and surveillance (M&S) capacities are scarcer, making West Africa the world hotspot for IUUF (Phelps Bondaroff et al. 2015, Belhabib et al. 2015, Doumbouya et al. 2017, Petrossian and Clarke 2020). We asked our informants to comment on some of the underlying reasons for this phenomenon, on the utility of ring-fencing some fisheries' revenue for M&S and on the proposal which was made a few years ago (ODI 2016) to use a flag of convenience tax to at least partially deter some of the actors involved.

The general opinion was that the problem of maritime security has been taken very seriously by African coastal state, which have ramped up their investment in M&S over the last few years (ST67, HU82). This was facilitated by the signing in 2013 of the "Code of Conduct concerning the repression of piracy, armed robbery against ships, and illicit maritime activity in west and central Africa", which aimed to holistically approach the question of maritime security (HU82). While much progress has been made in the implementation of the agreement, some aspects are yet to be fully operationalized (HU82). What is still lacking is especially functional interagency cooperation. That is, fisheries management agency might know if and where IUUF

is taking place, but do not have the capacity to intervene, while the navy has the boats but does not know where IUUF is taking place (HU82). As a consequence, often the focus of M&S activities has remained on the prevention of piracy rather than of IUUF, but the underlying issue is one of institutional coordination rather than lack of financial investments (HU82).

While it was acknowledged that both industrial and artisanal fleets are involved in IUUF, the former is seen as much more detrimental actor than the latter (ST67, HU82). This is because IUUF from the artisanal sector is seen as a reaction to both the growing competition on increasingly scarce fish resources and to the lack of compliance to fisheries regulation from the industrial fleet (ST67, HU82). That is, as long as artisanal fishermen do not see their government tackling industrial IUUF, they will not have any incentive to abide with the current regulation (HU82). Apart from the abovementioned lack of interagency cooperation, another issue which coastal state might want to tackle to promote compliance by the industrial sector is the level of fines charged for IUUF (HU82). These are not only often too low to represent a serious disincentive, but also very different across countries sharing common resources, which represents a problem for the whole region (HU82). Increasing and harmonising fines could then also be a useful step in combating IUUF (HU82), and vessels should be prohibited to operate in any country as long as they have any outstanding fine left to pay (HU82).

However, it was also noted that is not only coastal state governments which should do more to enforce compliance from the industrial sector, but also, if not especially, DWFNs, as many of the industrial vessels involved in IUUF are part of their fleets (ST67, HU82). The EU was perceived to be especially hypocritical in its management of IUUF (ST67). While there have been multiple cases of EU vessels signalled as in breach of IUUF regulation by coastal states or NGOs, very few actions against them have been taken by the EU, which seems to only move when the information is about to go public (ST67). So, changing the DWFNS' laissez-faire approach towards their own fleet would also be a necessary step to reduce the incidence of IUUF (HU82).

Finally, our informants were rather sceptical about the utility of a "convenience flag tax" (ST67, HU82). This is because they will need to be prohibitively high to really make a dent, otherwise companies will simply pay them and maintain their behaviour (ST67, HU82). Furthermore, even if they were to be charged at these high levels, many companies would simply seek to domesticate in the coastal state, a phenomenon already quite widespread and presenting its own separate sets of issues (ST67). What was seen as a better solution was for DWFNs, and the EU especially, to set up an obligation for all their fishing companies to declare any beneficial ownership scheme they might have in place, as they have a better monitoring capacity that coastal state (ST67). With regard to the EU specifically, it was also suggested that the EU should suspend all subsidisation of companies deciding to domesticate some vessels or opening up local branches in coastal state, as this was also seen as more effective than setting up a new tax (ST67).

1.7.4 Co-management and artisanal fisheries.

In most LICs, including those of SSA, the vast majority of fishermen operates in the artisanal sector (FAO 2014), which is extremely relevant for both employment and food security (Béné et al. 2010, 2016). However, the management of artisanal fisheries presents its own set of challenges. For many of the actors involved, fishing is the only available source of livelihood, as alternative income generating activities are lacking in coastal and rural areas (Béné et al. 2010). As a consequence, governments have been often reluctant to set a limit on artisanal fishing licenses, so that artisanal fisheries have remained open-access, with consequences on their sustainability (Béné et al. 2010, Nunan 2014). Given the high number of artisanal fishermen, and how scattered fishing communities are, it is also hard for central government to really keep track of the sector. Partially in response to this challenge, and partially because it was seen as increasing the democratisation of revenue generated from fish resources, co-management of artisanal fisheries between central and local government is quite widespread (Béné et al. 2003, Béné et al. 2009, Nunan 2014, Nunan et al. 2015, Cinner and McClanahan 2015). However, the topic has not yet received a great deal of attention from scholars, and many governments also fail to dedicate the right amount of attention to the need of artisanal fishermen. In our interviews, we asked our informant to comment on what are some of the challenges usually encountered in co-managed fisheries, as well as what is lacking for a better management of artisanal fleets and what is – if any – their revenue potential.

With regard to fisheries co-management, our informant agreed that this has contributed to increase the revenue available at the local government level, as they have generally the right to keep license fees and other charges (HG12, KY53). However, it is not exactly clear how much of this revenue is actually re-invested in the fishing communities, so that moving taxing rights from the central government to local ones does not necessarily increase the amount or quality of services available to artisanal fishers (HG12). Furthermore, new institutions are often created in the process of establishing co-management strategies, and they also require funding to operate, which might create local competition for taxing rights, although this is not necessarily the case and co-operation is also a potential outcome (HG12). One of the consequences of creating local level management committees, which take different names in different countries, is that they usually co-opt traditional authorities, formalising pre-existing charges on fisheries access in the process (HG12). When co-operation amongst all local actors is established, then this can indeed lead to better managed fisheries. On the other hand, when they start competing on revenue generating opportunities, the outcome is often a lack of sufficient funds for any one institution to actually carry out management activities (HG12). Overall, the outcome of co-management strategies depends by how the fisheries sector is situated within the national economy and on local political economy mechanism, as some opportunities for political bargaining – as well as corruption – are moved from the central to the local level (HG12).

When it comes more generally to the artisanal sector, a few different things were stressed by our informants. First, there was again a recognition that the sector is quite heterogeneous, as well as diverse across different countries (HG12, KY53). While it is true that in many coastal or rural areas fishing might be the only available livelihood strategy (HU82), there are also cases

in which fishing is only one of the many income generating activities that people are involved in, especially in inland areas with strong fishing seasonality (KY53). In these cases, convincing fishermen to register and pay licence fees might be even more complex, as they will not perceive fishing to be worth it if there are costs associated (KY53). Overall, most informants agreed that revenue potential from the artisanal fishing sector is currently likely to be very low, as artisanal fishermen have very low profit rates and licence fees are probably the only charges they can afford (HG12, HU82, KY53). However, it was also pointed out that some actors within it, such as fish aggregators and fish traders which deal with processing factories, are generally wealthier, so they might be considered for stricter enforcement strategies (HG12, KY53). Nevertheless, it was also stressed that they are often behind the informal credit arrangements which are vital for the sector viability, and that formal finance institutions are unlikely to be interested in providing services to artisanal fishermen, so the potential knock-on effects from stricter enforcement should be considered (HG12).

Something else that was also stressed is how marginalised and neglected most fishing communities currently are (HG12, ST67, HU82), with higher rate of teenage pregnancy and school drop-out than country averages (HU82). Therefore, any thought about increasing fiscal pressure towards them should be preceded by plans to increase the availability of health and educational services, as well as port infrastructure (ST67, HU82). Indeed, one of the reasons for low compliance with fishing regulations by artisanal fishermen was identified in their need to obtain enough income to school their children and pay for services which should be provided by the state (ST67, HU82). So, any potential change in their fiscal treatment should come hand in hand with wide sectoral consultation, in order to understand what their foremost needs currently are, and with ring-fencing of some of the additional revenue to satisfy those (ST67, HU82).

1.7.5 Other themes.

The previous sub-sections reported on all the general themes which we covered systematically with different subsets of our informants. However, as each interview lasted approximately an hour, there were also occasions to touch upon other issues on which each informant had previously worked on, or that they felt could have been useful given the scope of the project. These will be reported below, with each paragraph touching on a different theme.

The discussion with one of the informants also touched upon the role which fish trade plays in the African continent. One of the things which is often holding back the development of a modern processing industry in SSA are the non-tariff barriers imposed on high value commodities by high income countries, especially phytosanitary standards (EN13). There generally are very few African companies which have met EU hygiene standards, so this is an area in which technical assistance might be valuable (EN13). African governments should also consider facilitating access to capital by local processing firms for them to upgrade their processing capacity, as well as incentivise joint-ventures with European companies (EN13). The recent agreement on an African Continental Free Trade Area could also be worth exploring, as there is demand for fish products in the continent and there are less non-tariff barriers to take into account (EN13). Demand is also usually for simpler products, as fish in most African

countries is usually consumed smoked or dried, and the technology to process them in this way is easier to access (EN13). However, it was also noted that there is very little information currently available on the volume of inter-African fish trade, as much of what is taking place is likely to be informal (EN13), something which was also confirmed in another interview (HG12).

One informant was also stressing the need of having more gender-disaggregated data about fisheries, as women are highly involved but mostly in informal post-processing activities, an area which does not receive much policy attention (KY53). Even when they are involved in harvesting activities, these are for particular types of products, such as shellfish or crabs, for which they can represents up to 20% of harvesters (KY53). Therefore, very often they have different needs, and face different challenges, than their male counterparts, and without a clear view of what these are, the support provided might not be able to reach them (KY53). Generally, more feedback from actors involved in artisanal fisheries, be them women or men, was mentioned in quite a few interviews, as in many cases their needs and preferences are simply assumed rather than verified (ST67, HU82, KY53). Another area which was flagged as very much outside the scope of current policies are inland fisheries, especially in countries with coastal fishing communities too (HG12). These are quite always poorly managed, and the state of current knowledge about their exploitation is even less than those about marine fisheries (HG12).

A final warning was also received, and that is that ongoing work is showing that tension about resource access and service availability is increasing in many coastal areas in West Africa (HU82). Fishing communities are getting more and more exasperated about resource depletion, which they feel is mostly caused by industrial actors, and if not much open conflict has yet been observed, this is because they are still operating in different areas (HU82). However, the more artisanal fishermen will have to go offshore to find some catch, the more the likelihood of incidents will increase, and it was one of our informant beliefs that if nothing were to change in the next decade, access to fish could be at the base of social revolts (HU82). However, it was also stressed that it would not necessarily take much to defuse these tensions – fishing communities simply feel ignored and left behind, and they would be more than willing to contribute their share if they saw something in return (HU82).

Part 2. The Status of Global Fisheries and their Economic and Revenue Contribution in 5 selected African Countries.

Part 2 of the report presents a significant portion of the analysis conducted during the second stage of the project. This part starts in section 2.1 by providing a brief introduction on the global state of fisheries and aquaculture as per the most recently available data. Subsequently, section 2.2 presents more detailed information of the characteristics and relevance of the fisheries sector in each of the 5 selected countries. This section also includes the presentation of all revenue data obtained, as well as some comparative considerations. Finally, section 2.3 presents the methodology and the results of the estimation of the VAT potential of the sector in the selected countries.

2.1 State of world fisheries and their employment and economic contribution.

This section presents the most up-to-date information available on the status of global fisheries. This includes production and consumption levels; the sustainability of the current catch level; the status of the global fleet and the employment contribution of fisheries; and the amount of fish traded. The information presented is drawn from the Food and Agriculture Organisation (FAO) "The State of World Fishery and Aquaculture 2020" (FAO 2020). This is the FAO fisheries division flagship publication, considered the most authoritative and representative yearly report on the sector, providing an in-depth overview of all the above-mentioned themes. Figures are available up to 2018 and will be presented at a global scale, but particular attention will be dedicated to developments in LICs in general and in SSA in particular. However, due to the FAO statistical reporting structure, data about the exploitation status of fish stocks will be presented for major fishing areas rather than attributed to a specific land mass or country, according to Figure.2.1 below. Due to the focus of this report, particular attention will be dedicated to the areas 34 ("Eastern Central Atlantic"), 47 ("Southeast Atlantic") and 51 ("Western Indian Ocean").

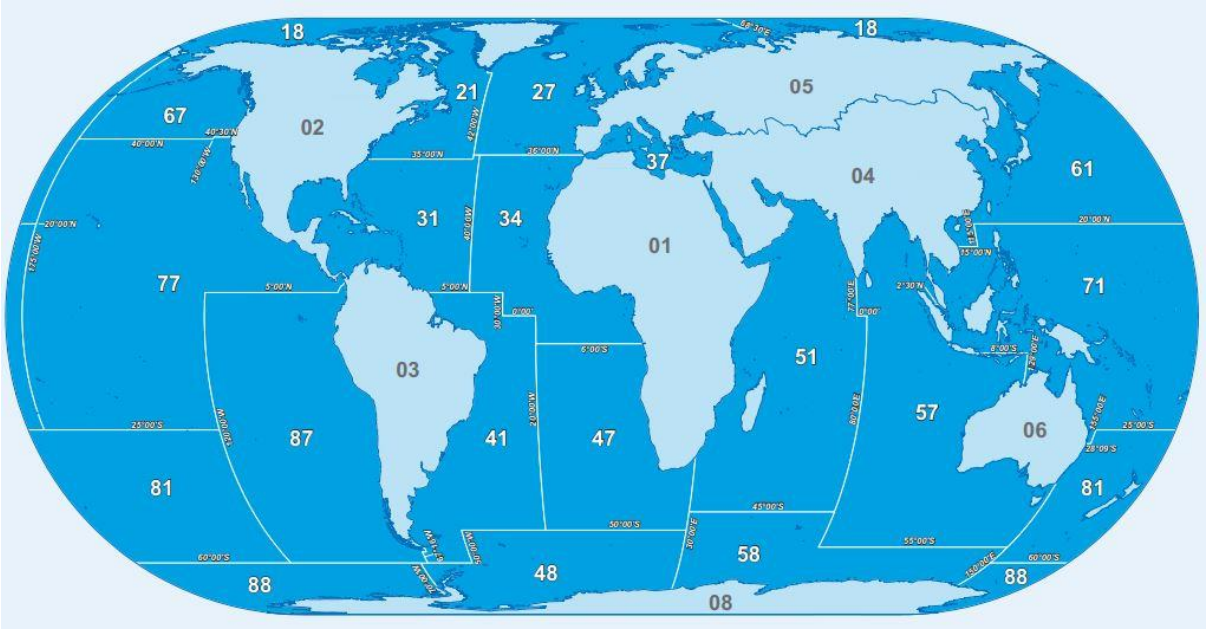
2.1.1 Global fish production and consumption.

In 2018, global fish production has reached approximately 179 million tonnes, of which 156 million tonnes (87.15%) were destined for human consumption, with a total estimated first sale value of USD401 billion. Aquaculture production accounted for 45.8% of total quantity, 62.3% of total value and 52% of fish directed to human consumption.

Most fish production is taking place in Asia (ca. 69%) – China alone accounts for around 35% – followed by the Americas (14%), Europe (10%), Africa (7%) and Oceania (1%). While global fish production has been on an upward trend for the last few decades, there are important regional

differences. Specifically, production in Asia and Africa has almost doubled over the last 20 years, while it has decreased in Europe since the 1980s and experienced an unsteady decline in the Americas over the same period. In 2018, production from global capture fisheries increased by 5.4% over the average of the previous 3 years, mostly driven by marine capture.

Figure.2.1. FAO Major Fishing Areas for Statistical Purposes.



18	Arctic Sea
21	Atlantic, Northwest
27	Atlantic, Northeast
31	Atlantic, Western Central
34	Atlantic, Eastern Central
37	Mediterranean and Black Sea
41	Atlantic, Southwest
47	Atlantic, Southeast
48	Atlantic, Antarctic
51	Indian Ocean, Western
57	Indian Ocean, Eastern
58	Indian Ocean, Antarctic and Southern
61	Pacific, Northwest
67	Pacific, Northeast
71	Pacific, Western Central
77	Pacific, Eastern Central
81	Pacific, Southwest
87	Pacific, Southeast
88	Pacific, Antarctic

Source: FAO (2015)

Of the top-25 countries for marine capture, shown in Table.2.1 and jointly accounting for 80% of it, 2 are African, 12 are Asian and 4 are from Central and Southern America. It is also worth noting that the share of catches from distant water fishing fleets in national production varies greatly across countries, and it is particularly important for China, in which it accounts for more

than 20% of marine catches. Inland catches reached a record 12 million tonnes in 2018, accounting for 12.5% of global fish produced. The growth of this sector, which has been steady since the 1990s, is particularly important, as it contributes to offset decreased capture catches in marine environments[36]. As it can be seen in Table2.2., even in this case there are great regional variations, and global production is even more concentrated than in marine capture fisheries. Specifically, Asia accounts for 66% of total inland catches[37], with the top-6 producers accounting for 57% alone, and Africa for another 25%. In both of these regions inland catches are extremely important in terms of food-security, especially for the poorest segments of the population.

Table.2.1. Top-25 countries for marine capture.

	2015	2016	2017	2018	2018 (Share)
China	14.39	13.78	13.19	12.68	15.02%
Peru	4.79	3.77	4.13	7.15	8.47%
Indonesia	6.22	6.11	6.31	6.71	7.95%
Russia	4.17	4.47	4.59	4.84	5.73%
USA	5.02	4.88	5.02	4.72	5.59%
India	3.5	3.71	3.94	3.62	4.29%
Viet Nam	2.71	2.93	3.15	3.19	3.78%
Japan	3.37	3.17	3.18	3.1	3.67%
Norway	2.29	2.03	2.38	2.49	2.95%
Chile	1.79	1.5	1.92	2.12	2.51%
Philippines	1.95	1.87	1.72	1.89	2.24%
Thailand	1.32	1.34	1.31	1.51	1.79%
Mexico	1.32	1.31	1.46	1.47	1.74%
Malaysia	1.49	1.57	1.47	1.45	1.72%
Morocco	1.35	1.43	1.36	1.36	1.61%
Korea, Republic	1.64	1.35	1.35	1.33	1.58%
Iceland	1.32	1.07	1.18	1.26	1.49%
Myanmar	1.11	1.19	1.27	1.14	1.35%
Mauritania	0.39	0.59	0.78	0.95	1.13%
Spain,	0.97	0.91	0.94	0.92	1.09%
Argentina	0.8	0.74	0.81	0.82	0.97%
Taiwan, China	0.99	0.75	0.75	0.81	0.96%
Denmark	0.87	0.67	0.9	0.79	0.94%
Canada	0.82	0.84	0.81	0.78	0.92%
Iran	0.54	0.59	0.69	0.72	0.85%
World	80.51	78.27	81.21	84.41	

Source: FAO (2020). Data in million tonnes of live weight.

[36] However, it must be also kept in mind that the capacity of properly capturing inland catches is particularly low, if not inexistent, in many of the LICs for which this sector is particularly relevant.

[37] And within particular countries, such as Myanmar and Bangladesh, inland catches are almost or more significant than marine catches, standing at 44% for the former and 65% for the latter.

Aquaculture is also becoming an increasingly important source of fish, accounting for 46% of global production in 2018, up from 25.7% in 2000. With the exclusion of China, the top aquaculture producer worldwide, production from the sector experienced sustained growth rate in both 2017 (6.7%) and 2018 (5.5%). Once again, there are important regional differences. Aquaculture accounts for almost 80% of fish production in China, 42% of fish production in the rest of Asia and 18% in Africa.

Table.2.2. Top-25 countries for inland capture.

	2015	2016	2017	2018	2018 Share
China	1.99	2	2.18	1.96	16.31%
India	1.35	1.46	1.59	1.7	14.14%
Bangladesh	1.02	1.05	1.16	1.22	10.15%
Myanmar	0.86	0.89	0.89	0.89	7.40%
Cambodia	0.49	0.51	0.53	0.54	4.49%
Indonesia	0.47	0.43	0.43	0.51	4.24%
Uganda	0.4	0.39	0.39	0.44	3.66%
Nigeria	0.34	0.38	0.42	0.39	3.24%
Tanzania	0.31	0.31	0.33	0.31	2.58%
Russia	0.29	0.29	0.27	0.27	2.25%
Egypt	0.24	0.23	0.26	0.27	2.25%
Congo, Dem Rep	0.23	0.23	0.23	0.23	1.91%
Brazil	0.23	0.22	0.22	0.22	1.83%
Mexico	0.15	0.2	0.17	0.22	1.83%
Malawi	0.14	0.15	0.2	0.22	1.83%
Thailand	0.18	0.19	0.19	0.2	1.66%
Philippines	0.2	0.16	0.16	0.16	1.33%
Viet Nam	0.15	0.15	0.16	0.16	1.33%
Pakistan	0.13	0.14	0.14	0.14	1.16%
Chad	0.1	0.11	0.11	0.11	0.92%
Iran	0.09	0.09	0.1	0.11	0.92%
Kenya	0.16	0.13	0.1	0.1	0.83%
Mozambique	0.09	0.1	0.1	0.1	0.83%
Mali	0.09	0.1	0.11	0.09	0.75%
Ghana	0.09	0.09	0.09	0.09	0.75%
World	11.15	11.37	11.91	12.02	

Source: FAO (2020). Data in million tonnes of live weight.

While many LICs have high aspiration for their aquaculture sectors, global production shares have not changed much in the last 25 years. In many LICs, the growth of this sector is held back by a combination of insufficient public and private investment and a lack of policy settings helping coordination amongst its different actors. Nevertheless, some positive stories exist, such as that of Indonesia and Viet Nam – both of which tripled their share in global production between 1995 and 2018 – or Egypt and Nigeria – in which production increased about twenty-fold over the same time.

Currently, fish products contribute to at least 20% of daily average protein intake for more than 3.3 billion people, and to at least 50% in countries such as Bangladesh, Cambodia, Sri Lanka, Ghana and Sierra Leone. Global fish consumption has experienced an important increase between the 1960s and the 2010s, with an annual growth rate almost twice as high as that of global population – respectively 3.1% and 1.6%. The proportion of total catch destined to human consumption has also grown significantly, increasing from 67% in the 1960s to 87% in 2018. While this growth has been a global phenomenon, there are huge differences in trends between developed and developing countries, as per capita consumption almost quadrupled in the latter and only grew of 40% in the former. However, even amongst developing countries there are significant differences in per capita consumption. Taking Africa, the continent with the lowest per capita consumption[38], as an example, consumption ranges from 14.7kg/per year/per capita in Northern Africa to 5kg/per year/per capita in Eastern Africa. A series of different factors affects the relatively low fish consumption in SSA, including high population growth rate, increasing pressure on fish stocks, a slow development of aquaculture and inadequate landing and processing facilities[39].

Indeed, available infrastructures also significantly impact the form and quality in which fish is consumed by the population. As of 2018, the majority of humanly consumed fish was sold, alive, fresh or chilled (44%), with frozen fish accounting for another 35%, and the reminder divided between preserved (11%) and cured fish (10%). Fish processing and preservation methods vary significantly amongst continents and countries, and are highly impacted by geographical, infrastructural and cultural factors. In Europe, the majority of fish consumed is frozen or preserved, while in Asia live and fresh fish dominate the market. Finally, in Africa the proportions of fish sold in smoked or cured forms are higher than the world averages, as these processes allow for longer preservation periods in the absence of cold chains.

2.1.2 Sustainability of fish production.

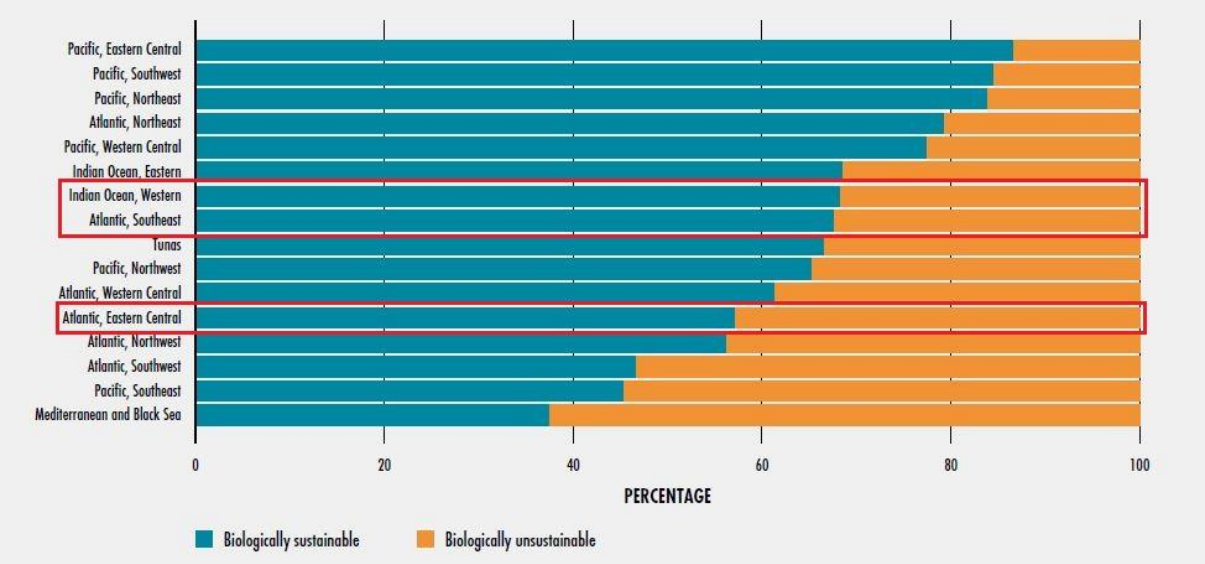
According to the long-term data gathered by the FAO, the status of monitored marine fish stocks continues to decline. In 1974, 90% of marine fish stocks was exploited within its biological boundaries. By 2015, this proportion had declined to 66.9%, and between 2015 and 2017 it further shrunk to 65.8%, of which 59.6% is fished at its maximum sustainable yield. That is, currently only 6.2% of global fish stock is considered under-exploited. The Mediterranean and Black Sea have the highest share of stocks fished at unsustainable level (62.5%), followed by the Southeast Pacific (54.5%) and the Southwest Atlantic (53.3%)[40]. Conversely, most other major fishing areas within the Pacific Ocean only exhibit between 13% and 22% of stocks fished at unsustainable level[41]. A summary of the balance across all of FAO major fishing areas can be found in Figure.2.2, with highlighting of the areas surrounding the African continent. As it can

[38] The continental average is 9.9 kg/per capita/per year.
[39] However, it must also be noted that the capacity of African countries to properly record the contribution of subsistence and artisanal small scale fisheries is low, which is likely to bias these figures downward.
[40] In Figure.1, these are respectively zones 37, 87 and 41.
[41] Again in Figure.1, these are zones 67, 71, 77 and 81.

be seen, all of the major fishing areas surrounding the continent have a prevalence of sustainably fished stocks, although more than a third in each area is already overexploited.

While climate and habitat changes are contributing to stocks deterioration everywhere, what has become abundantly clear is that fisheries subjected to more intense management levels are showing a constant decrease in fishing pressure. This has led to slow but steady increases in stocks' biomass, with many fisheries first reaching and then maintaining biologically sustainable stock levels. On the other hand, fisheries subjected to less advanced management strategies – unfortunately the majority of them – continue to experience a steady deterioration in stocks biomass due to continued overfishing. Far from only impacting biodiversity and ecosystem services, overfishing also leads to important negative consequences for coastal countries' economies and societies, which lose important revenue due to degraded stocks. A study by Ye at al. (2013) estimates that allowing global fisheries to reach their maximum sustainable yields could increase their production to up to 16.5 million tonnes per year, generating a further USD32 billion in economic rent.

Figure2.2. Percentage of fished exploited at biologically sustainable and unsustainable level, 2017



Source: FAO (2020)

These diverging trends stress once again the necessity of assessing which fisheries' management strategies have proven effective in particular situations, so to adapt them to the contexts of more poorly managed fisheries with comparable characteristics. This exercise should also interest inland fisheries. Half of total inland catches arise from just 7 basins[42], many of which are facing multiple threats from climate and land use change. As very little is known about the state of inland fish stocks, with limited or no routine monitoring exercises in place in

[42] These are, in order of importance, the Mekong Basin (15.18%), the Nile Basin (9.7%), the Ayeyarwady Basin (7.82%), the Yangtze Basin (6.82%), the Brahmaputra River and floodplains (5.52%), the Amazon (4.26%), and the Ganges Basin (3.51%).

the majority of global basins, quickly acquiring a better picture of their development is paramount to maintain current fish consumption level.

2.1.3 Status of the global fleet and fisheries' employment contribution.

Somehow positively, the total number of fishing vessels decreased by 2.6% between 2016 and 2018, reaching 4.56 million units in that year. 68% of the global fleet (3.1 million vessels) flies an Asian flag, with another 20% from Africa and 10% from the Americas. The majority of these vessels is motorised (63%), but there are marked regional differences in these proportions. Figure.2.3 reports the regional shares of motorised and non-motorised vessels, with total summing to a 100% by type of vessel and not by region. As it can be seen, the majority of both motorised and non-motorised vessels is located in Asia, which evidence the diversity of fishing practices in the region. However, motorised vessels represent roughly 75% of the Asian fleet, with Africa being the only region in which the majority of the fleet (roughly 70%) is non-motorised.

However, there also are significant differences amongst motorised vessels. Roughly 82% of them are classified as less than-12 meters long, with only around 3% reaching a length of 24 meters of more. Small vessels represent the majority of all regional fleets, with large vessels present in higher proportions in the fleets of Oceania, Europe and North America, partially explaining the smaller absolute sizes of these fleets. However, data about fleet size, dimension and motorisation status is still very patchy for the majority of countries in the world, and especially so for LICs. This mostly due to the very different – if any – registration requirements that are applied to small and non-motorised vessels, which even when registered might not be accounted for in national statistics. Distinguishing between marine and inland water fleets is similarly complex, as this information is also often not reported. While these figures might seem dull, understanding fleets' compositions and size is particularly important to estimate fishing overcapacity and the best strategy to reduce it, as retiring small artisanal vessels requires drastically different policies than large industrial ones.

Table.2.3 Top-25 Countries for the dimension of motorised and non-motorised fleets in 2010.[43]

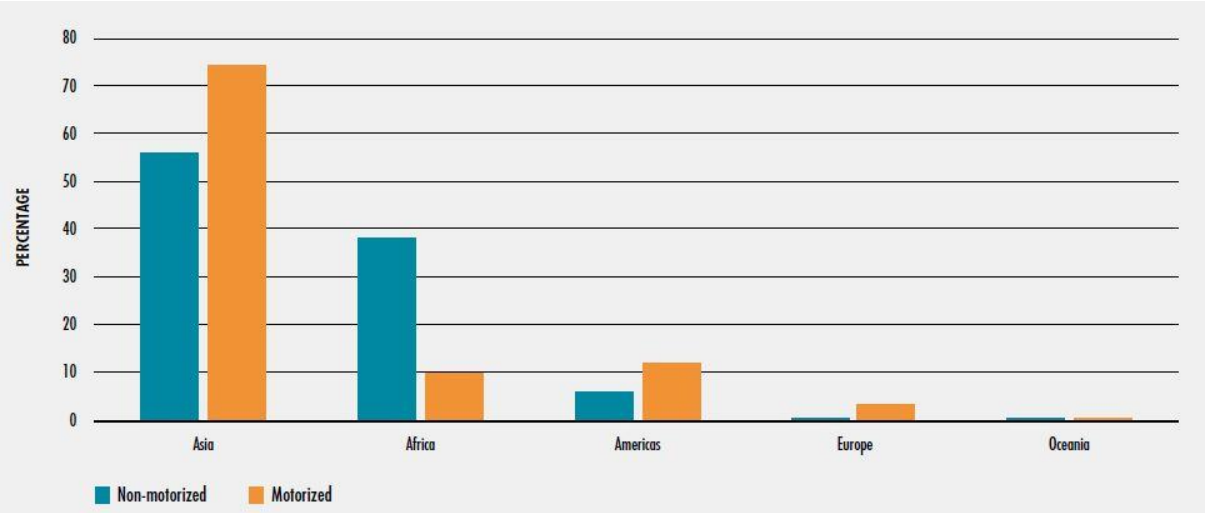
Motorised Fleet			Non-motorised Fleet		
Country	2010	2017	Country	2010	2017
China	675,170	599,331	China	390,475	346,829
Indonesia	392,920	460,567	Philippines	292,180	NA
Japan	283,925	224,575	Indonesia	172,907	345,066
Philippines	183,998	NA	Brazil	54,205	NA
Cambodia	172,810	NA	India	52,982	50,567
India	146,159	143,020	Congo Dem Rep	52,136	NA
Mexico	94,111	76,306	Tanzania	45,355	NA
Korea, Republic	74,669	65,846	Cambodia	39,514	NA
Malaysia	46,228	55,436	Uganda	34,315	NA
Venezuela	34,141	40,000	Nigeria	30,522	NA
Brazil	32,594	NA	Egypt	30,248	25,952
Nigeria	30,613	NA	Sri Lanka	28,155	17,347
Viet Nam	26,446	32,878	Bangladesh	22,120	34,810
Sri Lanka	25,973	41,793	Pakistan	17,957	NA
Bangladesh	21,097	35,032	Myanmar	17,054	10,704
China, Taiwan	20,327	21,974	Venezuela	10,815	6,177
Turkey	20,200	NA	Japan	8,897	3,735
Ecuador	20,112	16,680	Angola	5,034	5,515
Canada	19,906	17,522	Cameroon	4,062	NA
Ghana	19,669	17,497	Peru	3,708	NA
Morocco	19,207	NA	Oman	3,446	4,860
Pakistan	17,205	NA	Malaysia	2,830	3,051
Myanmar	15,865	19,180	Korea, Republic	2,305	890
Thailand	15,381	25,002	Senegal	1,812	NA
Oman	15,352	24,050	Thailand	NA	436,594
World	2,625,300	2,812,100	World	1,730,200	1,685,900

Source: Author elaboration from FAO (2019). All figures are in number of vessels.

Differently from vessels' number, total employment in the fisheries and aquaculture sectors is still growing, although slowly. As of 2018, circa 59.5 million people worked in fish production, roughly 14% of whom women, with around 39 million employed in fisheries and about 20.5 million in aquaculture.

[43] The ranking of the fleets has been calculated with reference to the year 2010 as this was the last year for which data was available for the majority of countries included in FAO (2019). Thailand has been added at the bottom of the ranking for non-motorised fleet as the country had the biggest non-motorised fleet for the last year for which data was available, i.e. 2017.

Figure.2.3 – Proportion of motorised and non-motorised vessels by region, 2018.



Source: FAO (2020)

The vast majority of this employment is concentrated in Asia (78.9% for fisheries and 95.5% for aquaculture), with Africa being a distant second (12.89% for fisheries and 1.88% for aquaculture).Up-to-date country estimates produced by the FAO currently only arrive to 2017 (FAO 2019), and the last year for which the coverage was relatively complete is 2014. The ranking of the top-25 countries for employment in the fisheries sector based on this data, shown in Table2.4, indicates that 13 are in Asia, 8 are in Africa and 4 are in the Americas. What can be nonetheless said, is that the African continent has experienced a steady growth in employment in both the fisheries and aquaculture sectors over the last decade, although the number of those occupied in the latter is still small in absolute term. In both Asia and Africa, the majority of workers in both fisheries and aquaculture is employed in the artisanal sector. Aggregate employment figures also mask some big differences across types of employment, which could be full- or part-time, as well as seasonal or temporary. In many instances, workers in the fisheries and aquaculture sectors are engaged in very precarious employment, occasionally including indentured labour or slavery.

Recently, more gender disaggregated data for these sectors has also started to become available, with regional breakdowns reported in Figure.2.4a for aquaculture and Figure.2.4b for fisheries. While women are employed all throughout the value chains of both commercial and artisanal fisheries, they provide a more critical contribution to post-harvest than to harvest activities. This is because, in many instances, there remains a strong cultural resistance to having women on board of fishing vessels, a fact which partially explains higher female employment shares in the aquaculture sector (19% of total employment against 12% in fisheries). While FAO has not routinely collected statistics about employment in the secondary sector, this is slowly starting to change, as its role is becoming increasingly important. Although initial data collection efforts will be directed towards OECD countries and not LICs, it would be equally relevant to quickly acquire a better picture of the sector employment contribution in the latter too.

2.1.4 Global trade in fish.

Both unprocessed and processed fish remain amongst the most globally traded food commodities, accounting for 11% of traded agricultural products in 2018[44]. The value of traded fish has steadily grown from USD 7.8 billion in 1976 to USD 164 billion in 2018, equivalent to 38% of the fish produced in that year (67 million tonnes).

Table.2.3 Top-25 Countries for number of people employed in the fisheries sector in 2014.

Country	2014	2017	2014 (Share)
India	9,790,197	NA	25.85%
China	9,165,990	8,692,055	24.20%
Myanmar	2,981,000	2,262,000	7.87%
Indonesia	2,667,440	2,601,638	7.04%
Bangladesh	1,712,000	1,726,420	4.52%
Nigeria	1,477,651	1,190,497	3.90%
Brazil	1,041,967	1,041,967	2.75%
Cambodia	578,468	NA	1.53%
Congo, Dem Republic	440,088	440,088	1.16%
Pakistan	385,497	432,117	1.02%
Sri Lanka	276,537	278,178	0.73%
Ghana	253,826	NA	0.67%
Egypt	252,647	253,871	0.67%
China, Taiwan	244,084	235,830	0.64%
Cameroon	240,728	NA	0.64%
Mexico	214,669	NA	0.57%
Mozambique	201,584	NA	0.53%
USA	185,263	NA	0.49%
Tanzania	183,800	203,529	0.49%
Japan	173,040	153,490	0.46%
Thailand	160,000	NA	0.42%
Iran	149,062	149,366	0.39%
Ecuador	148,177	151,850	0.39%
Malaysia	143,421	135,752	0.38%
Uganda	115,842	118,884	0.31%
World	37,879,000	40,422,000	

Source: Author elaboration from FAO (2019). Figures are in number of people when not differently indicated.

Both the value and the volume of fish exported by developing countries has also constantly increased over time. Between 1976 and 2018, their share of the former increased from 38% to 54% of global trade, while that of the latter grew from 34% to 60%. Developed countries still represent the biggest markets in terms of import value – with Europe accounting for 34% of it and the US for another 14% - but demand in China has grown significantly, making it the 3rd import market since 2011. However, this is not a purely Chinese phenomenon, as the expansion

[44] Excluding forestry products.

of the middle class, coupled with strong urbanisation rates, have led the demand from developing countries to grow quicker than that of developed countries for a while.

China has also been the main fish exporting country since 2014 (14% of global value), followed by Norway (7%), which maintains the second position since 2004, and by Viet Nam (5%), which holds the third position since 2014. For all of these three countries, aquaculture represents an important sector for high-value export, as it does for India, Chile and Thailand, which occupy the next three places in the ranking. The quick growth rates of developing countries exports mentioned earlier can in fact be linked to strong and sustained investments in export-oriented aquaculture in East and South Asia, as well as in different Latin American countries.

Figure.2.4a –Sex-disaggregated data on employment in aquaculture, 2018.

Source: FAO (2020)

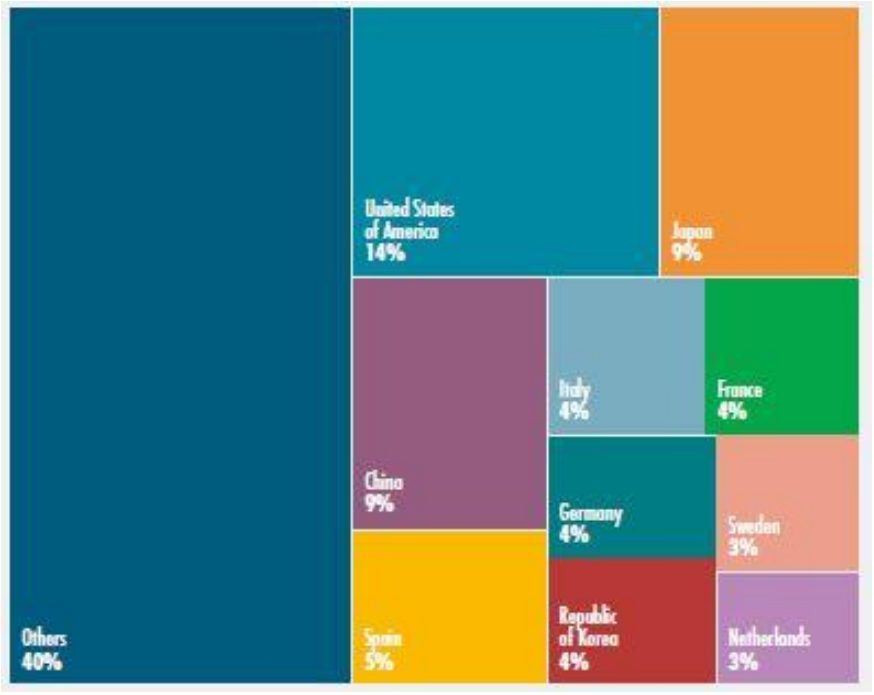
Figure.2.4b –Sex-disaggregated data on employment in fisheries, 2018.

Source: FAO (2020)

Regarding Africa, the continent is a net importer in terms of fish volume but a net exporter in term of fish value, as it exports high value species destined to European markets while

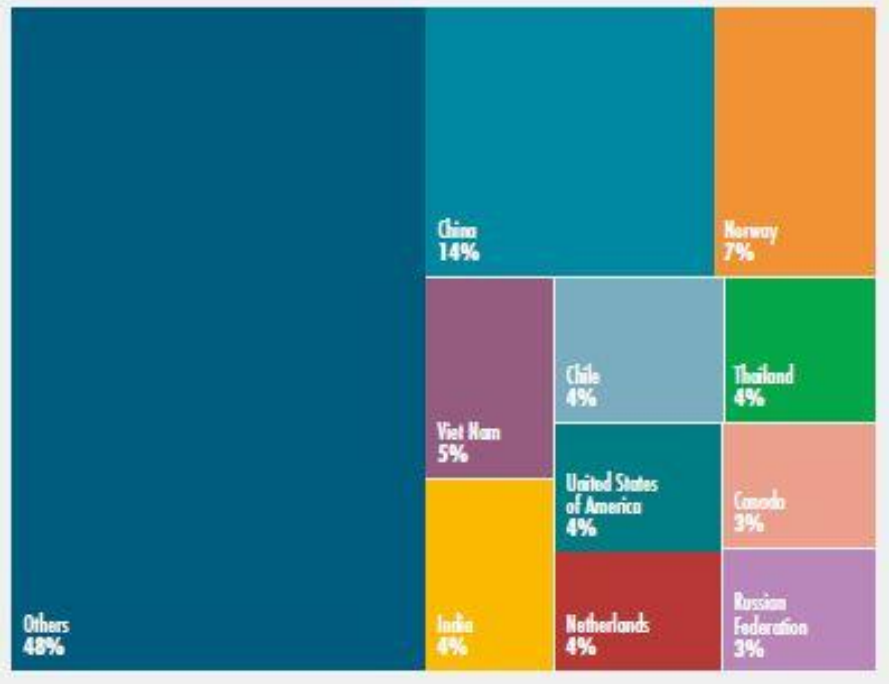
importing high volumes of cheap species, important for dietary diversification of its population. The top-10 countries for import and export values of fish products are shown in Figure2.5a and Figure2.5b respectively

Figure.2.5a –Top-10 countries for import value of fish products, 2018.



Source: FAO (2020)

Figure.2.5b –Top-10 countries for export value of fish products, 2018.



Source: FAO (2020)

While international tariffs on imports of fish and fish products are still common, they tend to be higher in LICs than HICs, as the latter generally grants preferential access to the former.

Anyway, many LICs are mostly exporting raw fish, which is subjected to the lowest tariff level, although processed fish from Southeast Asia is becoming increasingly competitive. While it is unlikely that the long downward trend in tariffs' value will reverse, phytosanitary standards and other non-tariff barriers – such as rules of origin or conformity assessments – are becoming much more common. Obtaining these certifications – which are at times enforced by big private fish retailers rather than states – is a lengthy, technically complex and costly process, and it has proven to be a major obstacle in many LICs' quest of increasing their market shares of high value products.

2.2 Country profiles.

After providing a general overview of the global status of fisheries, in this section we present a brief profile for each of the five countries included in the study. These have been prepared based on a series of different documents, including the FAO Fishery and Aquaculture division country profiles[45], legislative information available from FAOLEX[46] and FISHLEX[47] and information from the Sub-Regional Fishery Commission (SRFC) of West Africa[48]. Data about the dimension of the labour force, used to put in perspective the role of the sector from the point of view of employment, comes from the International Labour Organisation Department of Statistics (ILOSTAT). Figures about the relevance of trade in fish come instead from the United Nation Commodity Trade Statistics Database (COMTRADE). When available, we also include the data communicated to the study team by each country revenue body, either directly or through France Expertise, as well as country reports from different agencies and published academic material. The last sub-section presents some comparative considerations.

2.2.1 Guinea.

Up-to-date figures of the economic contribution of the fisheries sector in Guinea are hard to come by. The most recent, produced by the Ministère de la Pêche et de l'Aquaculture et de l'Economie Maritime (MPAEM) and reported in a study from the World Bank, is that the sector accounts for 2.5% of GDP (Meredith 2017). This is in line with a previous World Bank document (WB 2015), which reports that, in 2010, primary catch from the sector accounted for 3% of GDP and 12% of agricultural GDP, with post-harvest activities accounting respectively for 0.7% and 3% (WB 2015). However, the country profile on the SRFC website, using data from 2015, states that the sector accounts for 0.43% of GDP and 2% of agricultural GDP, which is substantially lower. The FAO data from FIshStat, reported in section 4.2, indicates that the amount and value of processed catch hardly changed amongst these two periods. Therefore, these changes in GDP shares are more likely due to overall changes in the country economic structure rather than in the fisheries sector. Although little is known about the relevance of fish exports from

[45] These are available from http://www.fao.org/fishery/countryprofiles/search/en . They are not all updated at the same year, so the year to which the information refers is specified in each profile.
[46] Available at http://www.fao.org/faolex/results/en/#querystring=JmVuZHN0cmluZz0x
[47] Available at http://extwprlegs1.fao.org/fishery/index.htm
[48] Available at https://spcsrp.org/en/presentation#History

the literature, data from COMTRADE seem to indicate that the economic relevance of sector is slowly growing, as the share of fish commodities in total export grew from 0.37% in 2013 to 1.42% in 2016. The vast majority of these exports is caught by the industrial fleet, while artisanal catches, consumed locally, are very significant for food security, accounting for between 40% and 60% of national protein intake (Belhabib et al. 2013, Meredith 2017).

Estimates of the sector's employment contribution vary from 60,707 individuals (Meredith 2017), to 150,000 (FAO country profile), with the SRFC providing a lower estimate of 84,200 (SRFC country profile). To put this in perspective, given an average labour force of 3.89 million people between 2010 and 2019, the above figures implies that fisheries sector contributes between 1.56% and 3.85% of overall employment. The size of the artisanal fleet is estimated at between 6,025 (SRFC) and 7,538 (Meredith 2017), with the second figure being consistent with the numbers communicated by the MPAEM in the data request form. However, figures differ about the fleet motorisation status, as Meredith (2017) reports that 43% of the 7,538 vessels are motorised, while the MPAEM data only includes 70 motorised artisanal vessels. Estimates of the size of the industrial fleet varies from 81 vessels in WB (2015) and 34 vessels in Meredith (2017), while the list of valid fishing licenses from the MPAEM reports 102 industrial vessels licensed as of March 2020.

The licenses list obtained by the study team does not report the actual payments submitted. However, the information reported about the nationality of the ship-owners, the type of license and the ship gross tonnage, combined with the schedule published in the "Plan d'aménagement et de gestion des pêcheries (PAGP) pour l'année 2021" (MPAEM 2020) allows for its calculation. This is reported in Table.2.4 below. As it can be seen, the total revenue from the 102 licenses should be USD8.7 million[49], to which one must add USD543,150 for the various miscellaneous contributions described in table 16 of PAGP 2021 (MPAEM 2020) and a further USD750,000 towards surveillance fees. The total of these three figures is roughly equal to 0.53% of total revenue collected by the Guinean state in 2020[50].

The Guinean Direction Nationale des Impôts also shared with the study team a figure for the overall revenue contributions of the fishery sector. The companies' names reported in the list of contributing taxpayers cannot be exactly matched with those of the ship-owners' companies, although this is not in itself surprising, as they might have incorporated in Guinea under a different name. This could actually be the case, as there are 17 different ship-owning companies in the license list and 17 companies remitting some tax revenue in the information provided, some of which have similar names. Although this revenue was not broken down by tax handle and was only reported as yearly totals, it appears to be only a fraction of the revenue accruing from licenses, as it was equal to GNF565.57 million (USD57.7 thousands) in 2020, to GNF580.38 million (USD59.2 thousands) in 2019 and to GNF485.14 million (USD49.5 thousands) in 2018. Whichever tax handle these figures refer to, their values seem rather low,

[49] As the information reported was not enough to establish if the correct schedule for pelagic and demersal fishing vessel was the one reported in table.12 or table.13 of PAGP 2021 (MPAEM 2020), we used the lower contribution per gross tonnage of table.13 of that document in order not to overestimate the potential contribution.

[50] The total revenue collection figure for 2020 was obtained from UNU-WIDER Government Revenue Dataset, Version 2021. Total revenue collected excluding grant and social contribution was used to calculate the shares.

as the total sector contribution is lower than the average license cost for a single vessel (USD85.5 thousand), and the total ranges from 0.003% of total revenue collection in 2020 to 0.0034% of total revenue collection in 2018 and 2019[51]. Without further information, it is hard to determine why this might be the case, but it seems plausible that this contribution could be increased with more enforcement effort.

Low tax compliance is not the only issue with the sector, as Guinea has long been a hotspot for IUUF and one of the worst cases of illegal fishing globally (Gorez and Bours 2005, Belhabib et al. 2013, ODI 2016, Meredith 2017, Okafor-Yarwood 2019, Okafor-Yarwood and Belhabib 2020). The size of the illegal fleet operating in the Guinean EEZ was estimated as 13% of the legal fleet in 2006, with catches equal to 63% of legal ones in that year (Belhabib et al. 2013).

Table.2.4 Calculation of license contribution for Guinea in 2020.

	Number	TJB, International	TJB, national	License fees (USD)
Thonnier senneur	39			1,560,000
Tonnier canneur	1			30,000
Demersal	47	9778.7	4675	4,242,610
Pelagique	5	317	6007	1,046,710
Crevettier	4	1474		884,400
Gasteropodier	3	821		476,180
Cephalopodier	3	834		483,720
Grand Total	102	13,224.7	10,682.0	8,723,620

Source: author calculation from MPAEP (2021) and licensing list shared by MPAEP.

The situation does not seem to have improved much over time, as Meredith (2017) reports that between 35% and 70% of artisanal landings are done illegally without a license. Furthermore, there is no limit on the number of artisanal licenses that can be emitted, implying de-facto open access fisheries and low overseen capacity (Meredith 2017). The issue of illegal and unreported catch is also very relevant for the industrial demersal fleet, as most landing are done at sea in form of transhipment and fishing at night is very common, hence making observation from authorities rather complex (Meredith 2017). The problem is perceived to be much smaller for the pelagic fleet, which always have observers on board (Meredith 2017). As a consequence of these various factors, only between 5% and 35% of total catch is landed by licensed vessels operating under limited access management strategies (Meredith 2017). Falling revenues for fisheries operators, which has been observed especially in demersal fisheries (Meredith 2017), is then likely connected to the overfishing of demersal stocks.

[51] As for the previous case, total revenue collection figures for the period 2018-2020 were obtained from UNU-WIDER Government Revenue Dataset, Version 2021. Total revenue collected excluding grant and social contribution were used to calculate the shares.

Issues with illegal fishing have also led Guinea to be included in EU fish-export blacklist between 2014 and 2016, as well as delaying the start of negotiations for a new Sustainable Fishing Partnership Agreement (SFPA), which only started in January 2019 and are due to conclude by the end of 2021. The EU commission has recently prompted a round of feedback on the draft agreement from various European stakeholders, some of which stressed the need of following a precautionary approach in the decision of which species to target (Gorez 2020). This is necessary to both ensure that EU actions does not contribute to either overfishing or an increased pressure on the fish stocks on the artisanal fleet particularly relies (Gorez 2020). The future agreement should also strive to increase the country fisheries research capacity, given how limited the data about biological stocks remains, as well as contributing to boost surveillance capacity, especially with the participation of community stakeholders (Gorez 2020). Finally, more attention should be dedicated to the development of processing capacity in the artisanal sector, which is at the moment almost completely lacking, undermining its potential economic contribution (Meredith 2017, Gorez 2020).

Although somehow limited, the analysis of the available information indicates that the main issues with the fisheries sector in Guinea are connected with a lack of institutional capacity to oversee and monitor activities the sector. First, the lack of monitoring directly influences the amount of IUUF taking place in the country, in which both artisanal and demersal fleet are engaged. In turn, IUUF impacts both the profitability and the sustainability of fishing activities for both of these actors, as well as having influenced the capacity of Guinean export to penetrate the EU market. Both the lack of profitability and the pervasiveness of IUUF are also likely connected with the reported low revenue contribution. However, given the extremely low contribution, it also seems likely that targeted enforcement activities could play some role in increasing tax compliance in the sector.

2.2.2 Mauritania.

The Mauritanian coastline, spanning 720 km, hosts more than 600 species, of which 200 have been identified as commercially relevant. The fisheries sector is strategic for the national economy (Trouillet et al. 2011, Belhabib et al. 2012), contributing 7% of GDP in 2013 and to 27% of export value between 2008 and 2011 (SRFC country profile). Other available estimates for the sector economic relevance are pretty much in line. Nagel and Gray (2012) reports a contribution of 10% of GDP, 25% of government budget and 40% of foreign currency. These figures are roughly in line with recent research for the PECH committee of the EU, which reports a contribution to GDP ranging between 4% and 10%, to the national budget of 29% and to total exports between 35% and 50% (EU 2018). These export figures are however somehow higher than those available from COMTRADE, which suggest a range between 16% and 44% of total export. The literature does not report much information about the state of the fish stock. However, a new fishing management strategy, implemented by the Ministère des Pêches et de l'Économie Maritime (MPEM) in January 2016, has introduced a series of total allowable catch quotas for different species, suggesting an increased focus on stock preservation. Particular attention has been dedicated to the stocks of octopus, cuttlefish and squid, which are all of particular economic relevance as high-value exports (EU 2018).

Estimates about the artisanal and industrial fleets' size vary significantly. Nagel and Gray (2012) reports 140 industrial vessels and about 4,000 artisanal ones, while the SRFC country profile (updated in 2016) reports approximately 7,000 vessels in the artisanal fleet alone. The most recent figure, coming from the FAO country profile and updated to April 2020, sets the total fleet at 3,800 vessels, without specifying the division. Estimates about the employment contribution are also similarly spread, ranging from 45,000 for 2010 in Nagel and Gray (2012) to 550,000 in the SRFC country profile (updated at 2016) and 55,000 in EU (2018). Given a population of roughly 4 million and an average labour force participation of 1.08 million people between 2010 and 2019, the 550,000 estimate from SFRC seems rather excessive, as it would imply that 50.95% of the labour force is employed in the sector. The FAO estimates of 180,400, reported in the country profile, provide a more realistic upper boundary of 16.71% of the labour force, while the figures from Nagel and Gray (2012) and EU (2018), respectively equal to 4.17% and 5.1% of the labour force, can be considered lower boundaries.

In the mid-2000s, only about 12% of catches from Mauritanian waters were processed in the country, and the sector was thought to be locked in a position of raw material supplier (UNDP 2006). However, form the early 2010s, the country experienced an important growth of the fishmeal sector, with the number of plants quickly growing to more than 20 (Corten, Braham and Sadegh 2017). As this development was in line with the government policy of creating a shore-based processing sector, no particular restrictions were originally placed on the expanding fishmeal industry. As a consequence, demand for small pelagic species for fishmeal production grew quickly, at a moment in which changes in the government management strategies had led many foreign operators to suspend their activity in the country (Corten, Braham and Sadegh 2017). Their place was quickly taken by local and Senegalese fishermen, who started supplying the growing industry, which quickly consumed as much, if not more, small pelagic catch as that previously caught by DWFNs (Corten, Braham and Sadegh 2017). However, as for the previous extraction from DWFNs, there were doubts about the sustainability of such intense exploitation levels. As of 2017, it became clear that the fishmeal industry had become dependent on a regional stock of migrating fish shared with Morocco and Senegal showing potential signs of overexploitation, so that its unchecked development could have had regional impacts (Corten, Braham and Sadegh 2017). The Government hence pledged to dedicate more attention to the development of this industry, as well as to stop the use of fish fit for human consumption by fishmeal factories. However, neither of these developments seem to have happened, as production of fishmeal has tripled since 2017 (Greenpeace Africa 2020). While this makes Mauritania the regional leader in fishmeal production, there are increasing concerns about the impacts of the expansion of this industry on food security and its potential contribution to stock overexploitation.

Other types of fish processors are also present, with around 80 facilities involved in fish freezing and storing in the country (EU 2018). However, given the amount of raw fish caught, they are definitely under-utilised, generally operating at around 30% capacity (EU 2018). Some of the reasons for this lack of activity are a general lack of maintenance and issues with sanitation levels, which are fundamental for their product to be allowed in the EU. While high value processing plants are also present, their competitiveness suffer from a lack of port

infrastructure, which limits landing opportunities, and from the high cost and low reliability of air transport (EU 2018).

From the point of view of the sector revenue contribution, the most important component is the SFPA with the EU, the most expensive ever signed by the block. EU financial contributions are set at EUR59.13 million per year, of which EUR4.13 million are earmarked for the development of the domestic fisheries sector. Up to a further EUR60 million could also be paid by EU ship-owners for fishing licenses over the course of the agreement, depending on their yearly demand (EU 2018). While these are relevant sums, previous versions of this agreement, which included similar level of compensation, had come under scrutiny from academic and civil society (Corten 2014). This was due to both the discrepancy between the economic compensation originally asked by the Mauritanian government and the one eventually agreed by the EU and to the way in which earmarked funds were actually spent (Corten 2014). Criticism was also directed to how transparent and inclusive the negotiations had been, as participants from CSOs had been considered as lobbyists rather than partners, and their demands side-lined (Corten 2014). From the available material, it is not clear how much of these criticisms had been resolved by the agreement which spanned from 2015 to 2019, and that was eventually renewed in July 2021 for a very similar sum.[52]

While we could not obtain a direct response to our data request form, the minute of an October 2020 meeting of the Comité Technique des Statistiques (CTS) of the MPEM was shared with the research team. This included the contribution to general revenue from the fisheries sector, as well as all contributions from vessel licensing and management fees for both the national and the foreign fleets, for the period of January to September 2020. Assuming that the contribution is stable in each quarter of the years, we extrapolated yearly figures for the whole of 2020, which are reported in Table.2.5, Table.2.6 and Table.2.7 respectively. As it can be seen, the total contribution over the course of the year is roughly similar between general taxes and levies (which totalled EUR70.62 million, Table.2.5) and royalties and payments made by the foreign fleet (which totalled EUR69.08 million, Table.2.7), with the national fleet contributing a further EUR5.06 million, of which EUR4.37 from the industrial fleet (Table.2.6). While it would have been ideal to have a longer time coverage and some indication of the revenue levied under domestic taxes, these figures demonstrate the importance of the sector – the total of the three voices (EUR144.76 million) is equal to 10.6% of total government revenue for the year 2020.[53]

The review of the available literature and data confirms that fisheries play a significant role in the Mauritanian economy. Although somehow wide, the range of their contribution to GDP, government budget and foreign earnings is consistent across different sources.

[52] See https://ec.europa.eu/oceans-and-fisheries/news/eu-and-mauritania-announce-conclusion-negotiations-new-fisheries-agreement-2021-07-29_en

[53] Excluding grants and social contribution, as reported in the Government Revenue Dataset, Version 2021, UNU-WIDER

Table.2.5 Contribution of the fisheries sector to general revenue in Mauritania in 2020.

Retenue sur le exportations	MRU	EUR
MF-Douane (Droit à l'exportation + Taxe statistique)	485,968,405	11,663,242
Redevences pêche (DAl)	1,136,987,010	27,287,688
Taxe commercialisation SMGP	280,253,015	6,726,072
Contribution Formation (Académie Navale)	31,714,571	761,150
Taxe portuaire (PAN)	44,451,106	1,066,827
Taxe ART	5,502,484	132,060
MF-DGI(TVA sur la commission Commercialisation)	44,838,870	1,076,133
Subvention Section Artisanale NDB (FNP)	634,283	15,223
Taxe municipale NDB	12,313,426	295,522
Taxe portuaire (EPBR)	74,857,630	1,796,583
Marché des poissons Nouakchott (MPN)	25,662,868	615,909
Subvention IMROP	17,052,241	409,254
Subvention ONISPA	10,734,811	257,635
Subvention artisanale FMEDC	4,083,349	98,000
Taxe portuaire (tanit)	714,399,283	17,145,583
Subvention SECTION FARINE	28,444,841	682,676
Retenues sur nouveaux produits (Petits Peèlagiques)	MRU	EUR
MF-Douane (Droit à l'exportation + Taxe statistique)	3,935,894	94,461
Redevences pêche (DAl)	17,351,676	416,440
Taxe commercialisation SMCP	1,967,921	47,230
MF-DGI(TVA sur la commission Commercialisation)	314,778	7,555
Subvention ONISPA	1,011,879	24,285
Grand Total	2,942,480,340	70,619,528

Source: Author extrapolation from the minute of the CTS of the MEMP on October 2020

Table.2.6 Revenue from licensing and royalties of national vessels in Mauritania in 2020

PECHE HAUTURIERE ET COTIERE	MRU	EUR
DROIT D'ACCES DIRECT	102,179,588	2,452,310
DROIT D'ACCES FORFAITAIRE	23,625,003	567,000
TAXE A LA SURVEILLANCE	12,031,250	288,750
CONTRIBUTION ACADEMIE	44,424,489	1,066,188
PECHE ARTISANALE	MRU	EUR
DROIT D'ACCES FORFAITAIRE	25,308,125	607,395
TAXE A LA SURVEILLANCE	3,183,125	76,395
GRAND TOTAL	210,751,579	5,058,038

Source: Author extrapolation from the minute of the CTS of the MEMP on October 2020

This is less the case for the number of people employed in the sector and for the dimension of the fleet, both of which are subject to much wider estimate ranges. Combined with the fact the vast majority of information provided to the study team referred to revenue from licensing and export levies, this might suggest that more attention could be dedicated to the monitoring of domestic activities, especially in the post-harvest sector. While the Government has shown awareness of the relevance of processing activities, especially with referral to fishmeal, there are increasing concerns about the sustainability of current production levels.

Table.2.7 Revenue from licensing and royalties of foreign vessels in Mauritania in 2020

REGIME ETRANGER	
LIBRES PETAGIQUES	EUR
Redevance	9,000,163
Decompte	46,837,471
THONS LIBRES	EUR
Redevance	2,521,487
UE	EUR
Redevance	164,063
Decompte	9,249,283
ACCORD AVEC LE SENEGAL	EUR
Redevance	312,500
FRAIS GESTION LICENCE	EUR
Frais gestion licence	562,500
TAXE A LA SURVELLAINCE	EUR
Taxe a la survellaince	437,150
GRAND TOTAL	69,084,616

Source: Author extrapolation from the minute of the CTS of the MEMP on October 2020

Given the under-utilisation of processing capacity in freezing and storing of fish for human consumption, there could be scope to support the development of dedicated policies, which could contribute to both increasing the economic and employment contribution of the sector.

2.2.3 Senegal.

The fisheries sector has always been culturally relevant for Senegal, and its economic relevance has been steadily growing since its independence from France in 1960 (Diedhiou and Yang 2018). The current economic contribution from the sector is estimated in the range of 1.8% (FAO country profile, updated to 2017) and 3.2% (SRFC country profile, updated to 2016) of GDP for the year 2015. Estimates of its employment contribution similarly range from 53,100 direct jobs and 540,000 indirect ones (FAO country profile) to 63,000 direct jobs and 600,000 indirect ones. Given an average labour force between 2010 and 2019 equal to 3.79 million people, direct employment will then be between 1.4% and 1.7% of labour force, and indirect employment between 14.2% and 15.8%. The size of the artisanal fleet is estimated between 9,483 vessels, of which 8,053 motorised and 1,430 non-motorised (FAO country profile), and 12,624 boats, of which 85% motorised (SRFC country profile). However, Thiao et al. (2016) puts the figure for the artisanal fleet at more than 30,000 vessels, clearly indicating the dearth of decisive information about the sector. On the other hand, there is much more agreement on the size of the industrial fleet, reported as 147 vessels and as 151 vessels in the FAO and SRFC country profiles respectively. Finally, fisheries products represent the largest export items, reaching a total value of CFA194.61 billion (EUR296.85 million) in 2015 (MPEM/MEDD 2016). This figure, roughly in line with what reported in COMTRADE (EUR309.44 million), represented 13.14% of total export for the year, close to the average share of fish commodities in total export over the period 2010-2019 (12.74%).

Fishing agreements with DWFNs have always been important for the country, and Senegal was the signatory of the first ever fishing agreement of the EU in 1979 (Witbooi 2008). By that time, the sector had already experienced 16 years of constant growth, as its total economic value grew from USD273.64 million in 1960 to USD1.01 billion in 1976 (Diedhiou and Yang 2018). However, due to multiple agreements with different DWFNs, competition on fishing resources between industrial and artisanal fleets increased throughout the 1980s (DuBois and Zografos 2012, Belhabib et al. 2014), contributing to a decline in artisanal fishermen's income (Diedhiou and Yang 2018). The latter, combined with increasing evidence of fish stocks' deterioration through the 1990s, led to a change in management strategies in 1998. The objective was to increase the sector sustainability through the increased participation of fishing communities in the management of fisheries resources, a trend which was taking place more widely in the region (Béné et al. 2009, Diedhiou and Yang 2018). The Fishery Act 1998 was however not particularly successful in arresting the deterioration of fish stocks, as catch for many species continued to decline in the following years, leading to a further policy change in the early 2000s (Diedhiou and Yang 2018). First, a series of annual closures for industrial fisheries of different species took place between 2000 and 2004, followed by the establishment of marine protected areas in 2003 (Poteete 2018) and by the introduction of compulsory licensing for artisanal fishermen in 2005 (Diedhiou and Yang 2018). As a final measure, the decision not to renew the EU fishing agreement was taken in 2006, de facto ending EU access to Senegalese water after 27 years (Poteete 2018, Johnson et al. 2020).

However, in a few years different European vessels returned to the Senegalese EEZ thanks to a series of secret ministerial authorisations, which were not backed by any bilateral agreement

(Poteete 2018). When these authorisations came to light in 2010, they sparked strong public opposition, leading to their complete cancellation by the first minister, a decision which was however overturned by the President (Poteete 2018). In fact, in 2011 the Fisheries Code was amended to legalise the concession of temporary fishing authorisations by the responsible minister, de facto legalising the practice of granting discretionary access to selected vessels in exchange for below market-rate sums (Poteete 2018). This practice was eventually suspended, following the election of a new president in 2012, who decided to restart negotiation with the EU for a new fishing agreement in 2014. Said negotiations led to the signing of the first ever SFPA in the same year (Poteete 2018, Diedhiou and Yang 2018). Under this agreement, the EU would obtain access for both trawlers and tuna vessels in exchange for an amount of up to EUR3.05 million per year, of which EUR800,000 as financial compensation to access the resource, EUR900,000 as support to the development of the domestic fisheries sector and up to EUR1.35 million in license fees. The agreement run between 2014 and 2019, and while it provided important revenue contribution to the government, it was also deemed to cause increased attrition between the artisanal and the industrial sector (Belhabib et al. 2017, Okafor-Yarwood and Belhabib 2020). Reduced catches and revenue for the former led the Senegalese government to negotiate a fishing agreement with Mauritania, at the cost of EUR250,000 per year, in order to provide artisanal fishermen with more fishing opportunities, thereby reducing political and social tension (USAID 2017).

Despite this continuing pressure on fisheries resources, in November 2020 the agreement was renewed for another 5 years, maintaining the same level of remuneration as the previous one. This latest agreement does although include a series of further provisions, especially on combating IUUF, which has long taken place in the country and of which EU vessels have been accused in the past (USAID 2017, Belhabib et al. 2014, 2017, Okafor-Yarwood and Belhabib 2020). The 2019-2024 SPFA includes increased commitments to compliance monitoring, including joint monitoring of the status of fish stocks, as well as a provision prohibiting the reflagging of EU vessels (Kadfak and Antonova 2021). Furthermore, EU vessels are now also explicitly prohibited to seek direct authorisation for activities other than those covered in the agreement (Kadfak and Antonova 2021), a provision included to avoid the repetition of issues encountered in the early 2010s (Poteete 2018). While these are all positive developments, showing a growing awareness from the EU of the claimed impacts of its previous fishing activities, some old criticisms, such as little participation of CSOs in negotiations, have remained (Kadfak and Antonova 2021).

Unfortunately, no data about the revenue contribution of fisheries in Senegal was provided to the study team. However, a review of the publicly available policies provided some indication of the existing fiscal legislation towards the sector. The last iteration of the fishing code (Arrêté ministériel n° 5308 en date du 07 avril 2015) establish the obligation for all artisanal vessels to seek registration before conducting fishing activities, with the cost for a yearly license ranging from FCFA5,000 (EUR7,63) to FCFA25,000 (EUR38,13) per year. However, these licenses do not constitute a form of access regulation per se, as no limit on their number has ever been fixed. No clear information could be recovered on the fees applied to foreign fleets. Fishing activities are covered by Corporate Income Tax, although the Décret n° 201690 du 19 janvier 2016 establish that new Octopus fishing corporation will enjoy a reduction of 50% of their CIT

liabilities. Finally, as per the Arrêté 003517, Ministere der l'economie et des finances 2012, only filleted fish is subject to VAT, thereby excluding from this tax handle almost the entirety of fish consumed domestically.

The review of the published literature confirms the cultural, social and economic significance of fisheries in Senegal, which provide employment to more than 15% of the labour force and accounts for close to 13% of total exports. Furthermore, its long exposure to the activities of international actor provides a textbook example of the potential trade-off between economic and sustainability considerations Senegal was the first country to subscribe a FA with the EU, and revenue from this and other agreements contributed to the sector growth. However, the increasing presence of vessels from DWFNs also led to their growing competition with artisanal actors and to an important decrease in fish stocks. Numerous policy interventions did not seem to slow quickly enough the deterioration of fish resources, so that the decision to suspend the FA with EU was eventually taken, only to be reversed a few years afterwards despite oppositions from local fishermen. While the last version of the agreement includes new clauses which should decrease some the negative impacts from DWFNs activities, only time will tell how effective these will prove to be.

2.2.4 Sierra Leone.

Most figures on the fisheries sector in Sierra Leone are subjected to some uncertainties. Recent estimates of its economic contribution are scarce, with the FAO country profile, updated in 2019, still reporting figures for 2010, when it accounted for 9.1% of GDP. Similar figures are also reported in the literature - Neiland et al. (2016) and Okeke-Ogbuafor et al. (2020) both refer to a report from the Sierra Leone Audit service which sets the sector contribution at 10.2% of GDP in 2013, while Seto et al. (2017) reports a figure equal to 9.4% of GDP from an older FAO country profile. Employment estimates are also similarly wide, ranging from 71,000 in the FAO country profile, of which 44,000 and 27,000 in marine and inland fisheries respectively, to 125,000 in the SFRC country profile. Estimates published in the academic literature are much wider, as Okeke-Ogbuafor et al. (2020) sets it at 8% of the working population, equivalent to roughly 340,000 individuals, while also stating that accounting indirect employment the figure could be as high as 550,000 individuals. Given an average labour force of 2.41 million people between 2010 and 2019, the latter figure would be roughly equivalent to 22.8% of those in employment, while the FAO figure would give a lower boundary of 2.94%.

Estimates of fleet's size in the available country profiles are less wide, with the SFRC setting it at 7,000 vessels, of which 3% motorised, and the FAO country profile at 7,395. However, a recent report from the Ministry of Fisheries and Marine Resources (MFMR) reports a significant higher figure, reporting an increase in the total number of artisanal vessels from 10,000 in 2012 to 12,000 in 2018 (MFMR 2018). Difficulties in estimating artisanal fleet size are probably connected to the fact that the 2004 Local Government Act assigns the right to manage artisanal fisheries, including vessels' licensing, to local councils, so that the data is hard to aggregate (Daboh 2020, Okeke-Ogbuafor et al. 2020). Finally, value of fish exports are reported to be in the range of USD10.4 million (FAO country profile, updated to 2017) and USD18.4 million (SCRF country profile, updated 2015). However, figures reported in COMTRADE are significantly

different, as the value of total fish export for 2016 is reported as USD186.6 million (or 40.08% of total exports) and for 2018 as USD43.45 million (or 21.16% of total export).

Regardless of the precise economic figures, it is undoubted that the fishery sector is very important for the livelihood and food security of the Sierra Leonean population, providing up to 75% of the animal proteins consumed in the country (Nieland et al. 2016, Seto et al. 2017, Okeke-Ogbuafor et al. 2021, Okeke-Ogbuafor and Gray 2021). While very little information is available on the status of inland fisheries, it is generally assumed that marine fisheries are of greater strategic importance, with more than 450 landing sites scattered around the country's coast (Thorpe et al. 2009). Industrial fishing vessels have been present in Sierra Leone since before its independence, as there are records of Italian trawlers operating in the country's water at least since 1955. The number of industrial vessels increased rapidly after a fishing agreement was signed with the Soviet Union and peaked in 1987 with 288 vessels licensed (Thorpe et al. 2009). Industrial fishing – at least the legal one – all but stopped during the civil war which raged the country from 1991 to 2002, with the number of industrial vessels slowly growing back after the peace agreements signed in 2002, with 43 licensed vessels in 2006 (Thorpe et al. 2009). Consulting the available statistics from the MFMR, it becomes clear that the number has kept on growing since, as there were 122 industrial vessels licensed in 2019 (MFMR 2019) and 102 were licensed as of April 2021 (MFMR 2021).

The first general policy towards the fishery sector dates back to 1963, and was subsequently amended in 1988 and 1994, although the latter policy mostly remained a dead letter due to the civil war that was taking place at the moment (Thorpe et al. 2009). Restoring control over the sector was seen as priority after signing the peace agreement, so that a new Fisheries Policy was passed in 2003 (Thorpe et al. 2009, Daboh 2020), and later amended in 2010 and 2016 (Daboh 2020). The current policy governing the sector is the Fisheries and Aquaculture Management Act from 2018, which establishes a series of restriction on fishing areas; a closed season for different fisheries; a limit on the number of industrial licenses and different inputs and gears control measure (Daboh 2020). A "National Plan of Action to Deter, Prevent, Eliminate, Illegal Unreported and Unregulated" has also been developed, given that IUUF has been steadily rising in the country since 2014 (Seito et al. 2017), costing its economy up to USD30 million per year (Okeke-Ogbuafor et al. 2020). Sierra Leone still has a fairly weak control and surveillance system in place (Okeke-Ogbuafor et al. 2020), and could do more with the data from the Vessel Monitoring System which has been installed in the country since 2011 (Coker 2019).

The current policy setting has also been ineffective in curbing the growth of the artisanal sector, which remains de facto open access and where many actors use fishing gear which is often environmentally damaging (Mawundu and Thorisson 2011). Part of the problems with the management of the sub-sector stem from the Local Government Act 2004, which assigns to local council the right to issue artisanal fishing licenses. While the establishment of co-management in artisanal fisheries was aimed at promoting their sustainability, the economic rent accruing from licensing is vital for local councils, which hence have little incentive to limit the number of licenses issued (Okeke-Ogbuafor and Gray 2021). Two case studies from important fishing communities in the country seem to indicate that, without increased financial

support from the central government, the co-management structure in place since 2004 is unlikely to yield any improvement in sustainability (Okeke-Ogbuafor and Gray 2021).

Revenue data for the sector is not available at a granular level, as no indication about sectoral activity is asked at the moment of tax registration for taxes other than the Good and Service Tax (GST), the national equivalent to VAT. However, it was confirmed that fishing companies are subjected to normal rates of CIT, and that GST applies to all processed fish commodities, but not to raw fish. A variety of fishing charges are set out in the Fisheries and Aquaculture Act of 2018, reported in Table.2.8, while the costs for foreign licensing, together with the required royalties, are set out in the Fisheries Fees Regulation 2006. Information on the total contribution to national revenue of fishing royalties from 2016 to 2020 is reported in Table.2.9, while the total contribution from licensing, transhipment charges and import and export charges, only available for 2018, is reported in Table.2.10. As it can be seen from this last table, the various charges applied to the fisheries sector, other than those included in the normal fiscal legislation (i.e. excluding CIT and GST), have ranged from 1.96% to 2.27% of total revenue collected between 2016 and 2020, averaging at 2.01% over the period. This is a non-negligible amount, especially considering the aforementioned lack of CIT and GST from these figures. If the contribution in 2018 are in anyway representative, then fishing licenses from foreign vessels account for almost two-thirds of the total, with royalties from first sale accounting for about a fifth.

A few things emerge from the material reviewed. First, most figures about the actual economic and social contribution of the sector in the country are particularly outdated and subjected to a great degree of uncertainty. The only aspects for which this consideration does not apply are the size of the industrial fleet – as information about industrial licenses are publicly available – and fisheries contribution to food security – for which there is substantial agreement in the literature. The decentralisation of artisanal fleet management to local councils has also been signalled as problematic, as they lack the financial capacity to properly monitor their activities and have little incentives to curb the growth of a sector which provides significant local revenue through licensing. As a consequence, it is highly likely that many artisanal actors will be involved in IUUF, which is though a much wider problem given the overall lack of surveillance capacity in the country.

2.2.5 Uganda.

Uganda represents the only landlocked country included in the analysis, where all fishing activities take place inland. However, as the country holds exclusive rights over 45% of Lake Victoria, the second largest freshwater body in the world, as well as hosting a variety of other large freshwater bodies, the fisheries sector still holds a particular relevance. In the FY 2006/07, fisheries accounted for 1.9% of GDP, a share which declined to 1.6% in FY2014/15 and to 1.5% in FY2017/2018 (NEMA 2021).

Nevertheless, the sector still dominates agricultural exports, accounting for 12% of agricultural GDP, and fish commodities are the second highest earner of foreign exchange, with exports valued at USD153 million in 2018 (NEMA 2021). Furthermore, fisheries provide employment to

between 1 and 1.5 million Ugandan, including 20,000 involved in aquacultures, as Uganda is the third country in the continent for aquaculture production (NEMA 2021). However, FAO employment estimates for the capture sector (140,377) in 2015 are significantly lower than those reported by the National Environment Management Authority (NEMA 2021), although they are very much in line for aquaculture (24,434). Given an average labour force between 2010 and 2019 of 13.96 million people[54], estimates from NEMA (2021) implies that 7.16% and 10.74% of Ugandan in the labour market are involved in fisheries or aquaculture, while FAO estimates give a lower boundary of 1.18%. Recent estimates of vessels number are lacking – a study from 2001 puts them at roughly 17,000 (Keizire 2001), while the FAO country profile, updated in 2017, puts them at 6,800 in 2011 (FAO Country profile).

Table.2.8 Various charges set out in the Fisheries and Aquaculture Act of 2017.

DESCRIPTION	UNIT	AMOUNT
Export	20kg/ctn	Le 3,000.00
Import	20kg/ctn	Le 500.00
Local Discharge	20kg/ctn	Le 300.00
Fish Bladder	kg	Le 500.00
Sea Cucumber	kg	Le 3,000.00
Entry Clearance	Vessel	Le 25,000.00
Carrier Vessel Transshipment	6 months	US$ 18,750.00 Per Vessel
B4 Transshipment	12 months	US$ 22,500.00 Per Vessel
Sierra Leone Fishing License		US$ 562.50 Per Vessel Transshipment
Foreign Fishing License		US$ 1,125.00 Per Vessel Transshipment
Supply Vesssel (local Carriers)		US$ 3,750.00 Per Vessel

Source: Fisheries and Aquaculture Act of 2018

[54] Given the most recent figures from the ILO.

Table.2.9 Total Revenue and Revenue from Fisheries' royalties and other sectoral charges, 2016-2020

	2016	2017	2018	2019	2020
Total Revenue	2,799,704	3,199,024	4,374,264	5,417,105	5,366,418
Royalties from fisheries and other sectoral charges	54,652	72,303	94,919	108,016	90,622
Share of total revenue	1.95%	2.26%	2.17%	1.99%	1.69%

Source: Author compilation from National Budget Speeches 2017 to 2021.

Table.2.10 Composition of Fisheries Revenue, 2018

Handle	USD (2018)	SLL Billion (2018)	Share
Licences	5,862,620	46.50	64.67%
Royalties	1,646,775	13.06	18.17%
Fisheries protection	7,000	0.06	0.08%
Fisheries statistics and research	3,500	0.03	0.04%
Fisheries Observers fees	42,000	0.33	0.46%
Fines	560,000	4.44	6.18%
Clearance	12,500	0.10	0.14%
Transhipment	483,474	3.83	5.33%
Import/Export	447,776	3.55	4.94%
Total	9,065,645	71.91	

Source: MFMR 2018

Fisheries in Lake Victoria have been commercially oriented since the 1920s, but it was only in the late 1970s and early 1980s that they properly took off (Kentel 2019), leading to a great increase in the number of fishermen and boats (Nunan 2014). The Nile Perch, introduced in the lake in the 1960s and responsible for the destruction of much of the original lake biodiversity, was to become the main export fishery, while Nile Tilapia became the backbone of regional trade (Pringle 2005, Nunan 2014). Catches grew constantly from the 1970s, but, starting in the early 2000s, various signs of stock depletion led to a discussion about the prevailing management strategies (Nunan 2006, 2007, 2014). The EU and the FAO funded various scientific research and monitoring missions, while also supporting the development of a Fisheries Management Plan which aimed at rationalising fisheries revenue and at recycling more of it in fisheries management (Nunan 2014). One of the ways to support such rationalisation was to establish the co-management of fisheries resources between central and local governments, which was introduced by the 2004 National Fisheries Policy (NFP). Amongst many, the policy had the objectives of improving fisheries productivity and livelihood potential,

while also democratising resource use and increasing fisheries contribution to local communities' welfare (Nunan 2007, 2014).

The operationalization of co-management hinged on the establishment of Beach Management Units (BMUs), formed by a democratically elected committee including boat owners, boat crew and various other stakeholders involved in the sector. BMUs were charged to register every fisherman and vessel working at the beach, while also collaborating in monitoring activities in the lakes with neighbouring BMUs (Nunan 2014). They could also retain part of the revenue collected through licensing in order to fund their own operation, as well as applying to become the collector of fish landing fees and market fees for the local councils, which often outsourced these functions. Private companies were also allowed to apply to the local revenue collection tenders from local councils, and it has been estimated that they at time remitted as little as 6% of the funds collected (Nunan 2014), and that competition between private collectors and BMUs over collection rights deprived the latter of important resources (Lawrence 2013). Fishing Movement Permits, paid by traders who wanted to move fish around the country, were also established, with 25% of their revenue accruing to BMUs. To ensure that some of this revenue would flow back into the fishery sector, the Fish (Amendment) Act 2011 established the Fisheries Fund, in which all of fees collected by the Department of Fisheries had to be redirected.

One of the key challenges that the establishment of BMUs was supposed to tackle was the pervasiveness of illegal fishing (Nunan 2014, Cepić and Nunan 2017, Nunan et al 2018). In theory, by giving revenue raising power to local communities, they would have gained a strong incentive to combat illegal fishing practices, as these would encroach on their revenue. However, this objective seems to have been only very partially achieved for a variety of different reasons (Cepić and Nunan 2017, Nunan et al 2018). To start with, BMUs have lacked appropriate capacity to carry out monitoring activities since their inception, mostly due to the scarce number of available vessels, importantly limiting their ability to act on illegal fishing (Barratt et al. 2015, Nunan et al. 2018). However, even more than capacity, what has been lacking is the appropriate set of incentives for enforcement, as a theoretical loss of revenue from illegal fishing has to be balanced again the actual possibility of private gains from non-compliance (Barratt et al. 2015). In fact, all actors involved in fisheries management, from staff of the Department of Fisheries to police, from judiciary to local politicians, have been involved in corruption scandals, indicating that the latter incentive seems to be stronger (Nunan et al. 2018).

As BMUs were perceived to be at the base of these corruption opportunities, they were dissolved by presidential decree in 2015, and dedicated army units were brought in to carb illegal fishing activities (Kentel 2019). However, it eventually became clear that corruption issues spanned much more widely than BMUs, and that intermediate management bodies were needed, so they were re-established in 2016. Recent research highlights how varied the reasons for illegal fishing are, ranging from lack of alternative livelihood opportunities to lack of trust in the management capacity of BMUs and the fishery department (Cepić and Nunan 2017). Importantly, this research shows that only illegal fishing due to the necessity of survival is found to be morally justifiable by fishermen, and that most illegal activities actually take place due to

a held belief that is futile to follow the rule when so much illegality is taking place (Cepić and Nunan 2017). While this seems as a vicious cycle, it could also be made into a virtuous one with greater enforcement effort. Finding a way to bring this change about is one of the objectives of the Fisheries and Aquaculture Bill 2020, which was put in front of Parliament in March 2021, and which generally aim to bring more order to the sector after its breakdown in the mid-2010s.

While we cannot know how the proposed bill will affect the revenue generation capacity of the sector, the Ugandan Revenue Authority (URA) has agreed to share with the study team the breakdown of its current contribution. As of June 2021, there were 15,557 taxpayers registered as working in the capture fisheries sector, with the breakdown provided in Table.2.11. As it can be seen, the vast majority works in the fisheries sector, with a significant minority involved in aquaculture and only a handful in processing and in sports fishing. Revenue Contribution from the sector, broken down in the different tax handles, is shown instead in Table.2.12, while Table.2.13 reports the breakdown of the contribution to each tax handle amongst the different sub-sectors[55]. As it can be seen in Table.2.12, the revenue contribution from the sector ranged between 0.05% and 0.06% of total revenue collected, with the lion share accruing from export levies and Pay As You Earn (PAYE). Overall contribution towards each tax handle differs across sub-sectors, with capture fisheries contributing the most to CIT, export levies and licence fees in each year, while the aquaculture sub-sector contributed more to PAYE in both 2018 and 2019. Finally, the fishery processing industry is the main contributor to VAT, which is not surprising as all raw fish is exempted from this tax.

A few tax exemption and subsidies are also applied to the aquaculture and fish-processing sub-sectors. First, investors who start a processing factory in an industrial park or a free zone are exempted from personal income tax for 10 years, under the condition that they employ at least 70% of staff from the Eastern African Community and use at least 70% of raw materials form Uganda. All construction materials required to set up the factory are also exempted from import duties and VAT, and all land contracts required are exempted from stamp duties. Entrepreneurs engaged in aquaculture are also exempted from import duties on most inputs (fish eggs, fingerling, incubators, etc.) and on imported materials used in the construction of hatcheries. The tax expenditure connected with import duty exemptions for the aquaculture sector was estimated as equal to UGX2.55 billion in 2018, UGX4.1 billion in 2019 and UGX6.09 billion in 2020. These amounts are equivalent to roughly 75% of all tax revenue from the aquaculture sector in 2018, to 140% of its revenue from 2019 and to 300% of the revenue collected in 2020, indicating that aquaculture is actually a net-revenue receiver.

[55] The categories included in under fees are: Artisanal processor/fish mongers; By-products and processed fish(dried/smoked/) transporters; Fish control permit for citizen; Fish net manufacturing factories/importers; Fish processing control fee for processing factories; Fish sanitary certificate; Large scale artisanal processing (fish maws); Recreational fishing permit; Special license fishing control license for non-citizen. The figures for total Revenue Contribution were obtained from the URA

Table.2.11 Number of taxpayers in different fisheries sub-sectors.

ISIC Code	ISIC Code Description	Number of Taxpayers
31	Capture fisheries	14,098
32	Aquaculture	1,437
1020	Processing and preserving of fish, crustaceans and molluscs	22
9319	Sport fishing activities	98

Source: Uganda Revenue Authority

Table.2.12 Revenue contribution form the fisheries sector 2016-2020, broken down by tax handles.

Tax Handle	2016	2017	2018	2019	2020
CIT	1.38	1.31	1.57	2.3	1.32
PAYE	1.15	1.41	1.78	2.18	3.59
VAT	0.33	0.37	2.75	0.39	1.1
Export Levies	2.65	3.15	4.25	5.48	3.22
License fees	0.15	0.13	0.53	0.6	0.26
Total Revenue	11,294	12,720	14,456	16,618	16,752
Fisheries Share	0.05%	0.05%	0.08%	0.07%	0.06%

Source: Uganda Revenue Authority, all figures in billion UGX.

Table.2.13 Contribution of each fishery sub-sector towards total collection from the fisheries sector of specific tax handles.

Sub Sector	2018	2019	2020
CIT			
Fishing	75.16%	64.35%	49.24%
Aquaculture	23.57%	33.04%	17.42%
Fish Processing	1.27%	2.17%	34.09%
PAYE			
Fishing	37.08%	42.20%	62.95%
Aquaculture	51.12%	45.41%	31.20%
Fish Processing	11.24%	12.39%	5.85%
VAT			
Fishing	49.09%	23.08%	19.70%
Aquaculture	38.18%	0.00%	3.79%
Fish Processing	12.73%	76.92%	59.85%
Export Levies			
Fishing	44.71%	52.92%	53.42%
Aquaculture	23.76%	20.07%	19.25%
License Fees			
Fishing	73.58%	78.33%	76.92%
Aquaculture	11.32%	10.00%	7.69%

Source: Uganda Revenue Authority

An interview with a URA Supervisor of domestic taxes highly engaged with the fisheries sector also revealed a few details of some of the challenges which can be encountered while dealing with fisheries operators. To start with, many artisanal fishermen are illiterate or scarcely educated, so that complying with their administrative obligations is for them a complex task. They have to register with BMUs for their fishing licence, with the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) for their boat license and boat plates and with the URA for their tax due. This implies a very high compliance cost on their side, especially as the diverse responsibilities of these bodies are not always obvious to them, so that a single annual fee covering all of their dues would be preferred. While this solution might be supported by the URA or the MAAIF, it is unlikely that it will get the approval of local governments, for which fisheries represent an important source of revenue. Even if apportioning rules were to be introduced in order to guarantee that a single annual charge would yield the same amount of revenue to local government, this would still create them liquidity issues. Many individual fishermen also fail to register with the URA and given that they mostly operate at night and many are highly mobile, it is rather hard to verify their registration status for the Authority.

While the URA has recently increased its sensitisation activities towards fisher-folk to increase their tax compliance, it is still not very clear how effective these are.

Partially as a consequence of this, most enforcement efforts are directed towards filleting companies, many of which are sizeable economic players managed by the URA Large Taxpayers Office. However, due to the tax incentives directed towards fish processors, tax contribution from the sector is not particularly high. One of the issues encountered is with the interpretation of the available incentives, especially the 10 years tax holiday from CIT which is offered to companies exporting at least 8% of their products. While these incentives are directed towards income accrued from fish exports rather than on the whole of their balance sheet, many filleting companies simply fail to file for CIT for their first ten years of operation. Furthermore, once the tax holiday period ends, many companies simply fail for bankruptcy and start over again in order to enjoy another period of tax holiday. These incentives have never been subjected to a tax expenditure review, and therefore it is not clear if they actually contribute to the growth of the sector or only to revenue leakages. They might though have some impact on the attractiveness of the Ugandan market, as there are many more filleting companies located on their side of Lake Victoria than in the Tanzanian and Kenyan one. Further issues have been encountered with the administration of VAT. As unprocessed fish is treated as an agricultural good and hence exempted from VAT, companies have an incentive to mis-invoice sales to the national market in order to evade their contribution.

The general feeling expressed by our informant was that the fiscal treatment of the fisheries sector does not receive much attention. Its revenue potential is perceived as relatively low, so there has not been much effort in benchmarking the Ugandan fiscal legislation against international best practices. This was however felt to be an issue applicable to the whole of the agricultural sector, rather than specifically to fisheries, as this is generally taxed very little in the country. As a consequence, there could definitely be scope to assess how to improve its current fiscal regulation.

2.2.6 Some comparative considerations.

As it can be seen in the 5 preceding sections, fisheries play a significant role in almost all countries under analysis, which exhibits both similarities and differences. However, the first overarching similarity has to do exactly with the complexity of acquiring of an unequivocal picture of the dimension of the sector. Apart from the size of the industrial fleet, there are wide differences in all figures available from both the literature and international bodies, be them on employment, export or GDP contribution. This can be seen in Table.2.14 below, in which all figures had to be reported as ranges, as there is no clear hierarchy amongst the sources from which information was available, and figures are at times widely differing across them. While the lack of public figures – or the wide range amongst those published – do not necessarily imply that they are not available to policy makers, the literature provides good reasons to believe that this might not be the case at least for the artisanal sector. As this fisheries' segment is very significant, both for its livelihood contribution and potential sustainability impact, better understanding its economic relevance seems a necessary precondition to increase the quality of the sector's management in all countries under considerations.

Again, in relation to artisanal fisheries, it must also be noted that there is a lack of evidence on positive economic or sustainability impacts from their co-management between central and local governments. Although most of the studies published cover the case of Uganda, the little evidence available for Sierra Leone points to similar dynamics to that of the land-locked Eastern African country. That is, local councils lack both the financial means and right set of incentives to ensure that the artisanal sector will grow along sustainable lines, as license fees from artisanal fishermen can quickly become an important source of local revenue. This does not imply that these policies must be reversed, but it calls for a greater focus on their impact on the sector viability.

Accepting that all considerations based on the figures summarised in Table.2.14 will be influenced by their quality, and that the period for which data is available differs from country to country, a few things seem nonetheless to emerge. The first is that the sector seems to be much less relevant in Guinea than in any of the other West African countries assessed, regardless of the metric considered. This is likely due to a combination of the fact that Guinea has been on the EU blacklist for a few years and that the country remains a global hotspot for IUUF, with illegal and unrecorded catches possibly representing the bulk of fish harvested from the country. While the upcoming FA with the EU might help to bring the economic relevance of the sector closer to that of other countries in the region, further measures will likely be needed to tackle the low compliance level with fishing regulation. Although not as relevantly as in the Guinean context, IUUF was also identified as a significant hindrance to an effective management of the sector in Sierra Leone, so there might be scope to foster cooperation across the two countries.

Table.2.14 Fisheries economic contribution in the countries under analysis.

	Guinea	Mauritania	Senegal	Sierra Leone	Uganda
GDP	0.43%-3%	4%-10%	1.8%-3.2%	9.1%-10.2%	1.5%-1.9%
Exports	0.37%-1.42%	16.16%-43.86%	10.41%-14.13%	0.48%-40.08%	4.74%-7.98%
Employment	1.56%-3.85%	4.17%-16.17%	15.6%-17.4%	2.94%-22.77%	1.18%-10.74%
Artisanal Vessels	6,025-7,238	4,000-7,000	9,483-30,000	7,000-12,000	6,800-17,000
Industrial Vessels	70-102	140	147-151	102-122	
License fees	0.53%	5.17%	-	1.40%	0.001%-0.004%
Export levies	0.003%	5.43%	-	0.50%	0.019%-0.033%
Domestic taxes		-	-	-	0.024%-0.042%
Total Revenue	0.53%	10.60%	-	2.17%	0.05%-0.08%

Source: Figures for GDP contribution and the number of artisanal and industrial vessels come from a variety of different sources identified in each country's section. Figures for number of people employed in fisheries are similarly identified in each country's section, and they have all been put in relation to the average labour force over the period 2010-2019 from ILOSTAT. Figures on exports have been calculated from the data available from UN COMTRADE. Data for revenue contribution is reported as communicated to the study team and is expressed as share of total revenue. Figures have been presented over the range of minimum and maximum values reported from different sources or across different periods.

Second, it seems that the significance of fisheries as GDP or exports shares is not a good proxy for their relevance in providing employment opportunities. This can be seen both by an evident lack of correlation between the three abovementioned measures and by the fact that the size of artisanal fleets, although usually subjected to a great uncertainty, is always of an order of magnitude higher than that of industrial fleets. These figures strongly resonate with the arguments made in Part 1 that many governments across the continent seem to still be looking for a balance between a wealth- and a welfare-based approach to fisheries management. It also confirms the necessity of better quantifying the impact that industrial fishing has on artisanal actors, as both the general literature reviewed in Part 1 and many country-specific studies stress that these two segments are often in competition for the same resources.

Regarding the sector revenue contribution, very little emerges from the comparison of available figures, apart from wide differences across countries. However, any detailed comparison is probably best avoided, as only for Uganda were figures available according to the standardised breakdown which would have made a comparative analysis possible. In fact, Uganda is the only country for which clear information about the sector contribution to domestic tax handles such as CIT or VAT was available at all. On the one hand, this is not necessarily surprising: due to its landlocked status, Uganda cannot have access to the FAs with DWFNs, which have widely been identified in the literature as the main source of revenue from the sector for African governments. Consequently, and given that significant fisheries resources are nonetheless available, the Ugandan government is likely to have more incentives to keep track of the sector contribution to normal fiscality. However, the expert interview signals that

the fiscal treatment of the sector has not been identified has a relevant priority, so that the availability of this data might simply be due to a greater tracking capacity from the URA. The lack of data about domestic revenue in other countries might suggest that this is a common view of the sector across the countries considered. Although this could be understandable in Guinea and Sierra Leone, significant incentives to obtain these figures should at least be present in the two countries assessed which possess some domestic processing capacity, namely Mauritania and Senegal. While no figure at all was made available for the latter, the fact that none was communicated for Mauritania might in itself indicate that more attention should be dedicated to the revenue contribution of its many fishmeal and fish processing factories.

2.3 Estimation of potential VAT contribution – methodology and results.

This section presents the author attempts to estimate the potential VAT contribution of fisheries from publicly available data. As it will be seen, the plausibility of the estimates seems to vary from country to country, so they should be taken more as an indication of general trends than of actual revenue potential. Subsections 2.3.1 will also detail an alternative estimation attempt for the Ugandan case, made possible by the availability of additional alternative figures about its fisheries, as well as the comparison of all estimates for the countries and the official statistics made available by the Uganda Revenue Authority. As it was stated in the country profiles, none of the other revenue authorities contacted provided the information covered in the data request form submitted[56], so that no further assessment of the estimates will be possible.

Estimation of potential VAT contribution was based purely on data available through "FishStat", the fishery statistics database of FAO. For each country in the world, "FishStat" contains information about the quantity and value of fish and fishery products imported and exported every year, as well as data on the quantities of processed and preserved fish commodities produced for national consumption. The data includes the species from which the commodities are produced, as well as their form (whole, filleted, etc.) and how they are preserved (frozen, canned, cured, etc.).

This data represents the best available base from which to estimate potential VAT contribution. This is because exports are not subjected to VAT, and raw fish is also exempted from VAT in many LICs, as are many other raw agricultural commodities and staple food items. This is the case in all of the countries under analysis, while Mauritania also exempts all smoked, dried and salted fish (Codes General des Impotes, Art.215), and Senegal exempts the same categories, with the addition of frozen fish (Ministere der l'economie et des finances, arrêté 003517, 2012). Hence, being able to determine the specific processing of each commodity is relevant to understand if it might or not be subjected to VAT. However, the data also has three important limitations given the scope of the analysis.

[56] See Appendix.2 for the Data request form submitted.

The first is that it includes information about production rather than consumption or sales, and VAT is charged at the moment in which a good is exchanged. Hence, estimates should be intended as the upper boundary of VAT potential in any given year, that is they assume no stock is ever maintained. Secondly, for all type of commodities, the dataset includes production from industry, from artisanal sources and from fishermen's families as domestic activity, which is akin to subsistence. Drying, salting and smoking are common way of preserving food across the African continent, fish included (FAO 2020), and they do not require any particular capital investment, so they are commonly performed "informally"[57]. As a consequence, VAT potential for these categories of commodities will be overestimated, as it will also include fish preserved for subsistence, which could be substantial, and that exchanged by actors outside of the tax net. This is unlikely to be an issue for the estimation of VAT potential from frozen or filleted fish, as these processes generally take place in industrial premises.

To account for the potential overestimation of VAT potential for dried, salted, smoked and brined fish due to self-consumption, we also present three sets of modified estimates. In the first set, we reduce the quantity of this commodities exchanged by the average per capita consumption in each country multiplied by the estimated number of people employed in the fisheries sector.[58] To account for the fact that fish consumption might be higher amongst those employed in the fisheries sector, the second set of modified estimates is based on the same principle but uses twice the average per capita consumption. Finally, in the third set of estimates, the assumption is that all of these commodities processed by "informal" actors are exchanged outside of the tax net. The quantity of "informally" processed commodities is calculated by multiplying the total quantity of dried, salted, smoked and brined fish by the share of the agricultural labour force employed informally, as reported by the ILO.[59]

The third limitation is that price data is only available for export and import and not for domestic production. Therefore, to the first step to obtain the estimates was to recover proxy prices for domestic production from exported commodities. For each country, these were obtained by aggregating over quantities and values of the different species which (1) had been processed for both domestic consumption and export, and (2) undergone the same type of processing – that is, "smoked, dried, salted or brined", "frozen" and "filleted" – in both cases. That is, the price used for the calculation, although derived from exported commodities, is constructed on the same type of species-processing of domestically consumed. However, it is highly likely that exported fish is of a higher quality than that kept for domestic consumption, therefore commanding a higher price. The amount of control undergone during processing is

[57] That is, by actors not necessarily registered for tax purposes.

[58] Figures for per capita fish consumption are calculated from the data available from the FAO FishStat dataset as the ratio between each country total fish supply for food consumption and the country population. Over the period 2010-2018, this is equal to 11.07 Kg/pc for Guinea, to 28.31 Kg/pc for Sierra Leone and to 12.89 Kg/pc for Uganda. Regarding the number of people employed in the fisheries sector, we use the median figure amongst the various estimates reported for each country in section 2.2. These are equal to 84,200 people in Guinea, to 340,000 people in Sierra Leone and to 700,000 people in Uganda.

[59] The share of informal labour force in the agricultural sector in the ILO dataset was only available for Mauritania (94.3% in 2017), Senegal (79.4% in 2019) and Uganda (90.6% in 2017). The values for Guinea and Sierra Leone have then been obtained as the average between those in Mauritania and Senegal, i.e. 86.9%. Uganda was excluded from the average due to geographical distance and fundamentally different market structure.

also likely to differ, potentially in a relevant way. Hence, all of the estimates are likely to overshoot potential VAT contribution.

The results, presented in Table.2.15 to Table.2.18 below, are divided by country and by type of processing, with the latter varying according to what is subjected to VAT in each specific country and the types of domestic processing actually taking place. The table includes the reference prices recovered from exports, the quantities processed and their potential VAT contribution, which is also reported as share of VAT collected for ease of comparison[60]. All prices are expressed in thousands of nominal USD dollar. Table.2.15 reports non-modified quantities, Table.2.16 and Table.2.17 only report estimates for "smoked, dried, salted or brined" fish, modified to account for self-consumption by those employed in the fisheries sector, Table.2.18 reports again only estimates for "smoked, dried, salted or brined" fish commodities, this time modified to account for commodities exchanged informally, i.e. by actors outside of the tax net.

As it can be immediately noticed, the type of domestic processing taking place varies greatly amongst the countries considered. The only processed fish commodity for the domestic market in Guinea and Sierra Leone is "smoked, dried, salted or brined" fish, and filleting production takes place for the internal market only in Uganda and Senegal. This has relevant consequences for VAT potential, as the absence of domestic market segments for higher value commodities reduces the potential VAT contribution of the sector. Recovered prices seem to be fairly stable in the majority of cases, although this is not so for "smoked, dried, salted or brined" fish in Guinea and Uganda. In the latter, price per tonne for these commodities increase from USD5.5 thousands/per tonne in 2010 to USD47.9 thousands/per tonne in 2018, with a yearly average growth rate of 43.9%. The quantity processed in 2018 also appears to be an outlier, as it is thrice as high as that of 2017 and twice as high as the second highest quantity processed over the period. On the other hand, in Guinea prices exhibit a downward trend, excluding a jump in 2015, while quantities processed appear more stable. As there is no clear rationale for prices exhibiting this high level of variability, estimates for these categories and countries should be treated with caution.

The VAT potential of the fishery sector seems then to be fairly different across the countries under analysis. This is due to both the type of industrial processing taking place and which types of products are actually subjected to VAT. In Guinea, Sierra Leone and Uganda all fish other than raw one is potentially subjected to VAT, hence the tax base is potentially larger than in Mauritania and Senegal, where particular types of processed fish are also excluded. However, in Guinea and Sierra Leone, the only processing taking place for domestic fish consumption is the traditional kind. This implies that a large proportion of all domestic fish commodities exchanges is likely to be unrecorded for tax purposes or directed to subsistence consumption. The same applies to the exchanges of "smoked, dried, salted or brined" commodities in

[60] Nominal USD estimates were converted in local currency unit using conversion rates from the World Bank World Development Indicator. The GDP series were recovered from the UNU-WIDER "Government Revenue Dataset", Version 2021, from which we also obtained VAT as a percentage of GDP for Senegal and Uganda, as well as Goods and Service Tax as percentage of GDP for Sierra Leone and Guinea. As no comparable information was available in this dataset for Mauritania, total revenue form VAT as share of GDP was instead recovered from the IMF World Revenue Longitudinal Data.

Uganda. The way in which the impact of self-consumption and informal exchanges are accounted for deeply impacts the value of the estimates. If this is not accounted for, the potential contribution from this market segment is on an average of 7.16% of VAT collected in Uganda, 7.52% in Guinea and 19.12% in Sierra Leone (Table.2.15).Accounting for self-consumption by reducing the amount of exchanged commodities by the average per-capita consumption by those employed in the fisheries sector reduces these figures to 3.36% of collected VAT in Uganda, 6.59% in Guinea and 14.44% in Sierra Leone (Table.2.16). Using twice the per-capita consumption – which might be justified on the ground that fishermen are likely to consume more fish than the average citizen – substantially erases the segment contribution in Uganda, and it further reduces it to 6.38% of collected VAT in Guinea and to 9.76% in Sierra Leone (Table.2.17). However, the biggest overall reduction in VAT contribution is obtained when, rather than for self-consumption, we try to account for the share of these commodities which is likely to be exchanged informally (Table.2.18) – in this case, the potential contribution is reduced to 0.63% of collected VAT in Uganda, to 0.87% in Guinea and to 2.37% in Sierra Leone. As it can be seen, the VAT potential of this market segment crucially relies on the amount of economic exchanges which are taking place in the tax net, of which nothing is revealed by production statistics. The administrative complexity of registering agricultural informal processors, as well as the potential political cost of directing enforcement activities towards actors with little access to other livelihood strategies, will then have a deep impact on the sector tax potential.

On the other hand, estimates for the potential contribution of the "frozen" and "filleted" fish cover truly industrial processing, and should therefore be closer to the "true amount". The potential of these market segments also varies significantly across countries, with the lowest contribution in Senegal (an average of 0.1% of actual VAT collection over the period) and the highest in Mauritania (24.83%). The VAT potential in Uganda seems to lie more in the "filleted" than in the "frozen" market segment, and this seems to depend on the quantity processed rather than on the price commanded.

Unfortunately, the only country for which we can compare potential contribution of the sector with actual collection is Uganda, as we could not obtain this data from any of the other countries. The comparison is presented in Table.2.19 below, with actual collection values coming from the data returned by the Ugandan Revenue Authority already presented in the previous section. All values are expressed in billions of nominal Uganda Shillings. As it can be seen, the estimates diverge from actual collection by several order of magnitudes, even when the lowest possible value for "smoked, dried, salted or brined" commodities is considered. While some non-compliance in the sector is to be expected, the size of the estimated gap seems too excessive to be realistic. Due to the lack of other points of comparison, it is hard to say if this is a Ugandan-specific case or an issue with the reliability of the underlying quantity data or of the price-proxies used for the calculation. However, these results stress once more the need to see these estimates more as an indication of potential contributions than as actual collection gaps.

Table.2.19 Comparison between actual VAT collection from the fishery sector from URA and estimates from FAO FishStat.

Tax Handle	2016	2017	2018
VAT - URA	0.33	0.37	2.75
VAT - basic processing, estimate, FAO	134.77	251.20	982.53
VAT - basic processing - self consumption, FAO	58.68	77.61	728.69
VAT - basic processing - inf. exchange, FAO	12.67	23.61	92.36
VAT - frozen, estimate, FAO	17.23	15.04	24.64
VAT - filleted, estimate, FAO	56.02	62.08	64.29

Source: Ugandan Revenue Authority communication for actual collection, author calculation for estimates. All figures are in Billion UGX.

2.3.1 Estimates from the Ugandan "Fisheries Resources Accounts".

In the case of Uganda there also is an alternative source of data on which to base the estimates, namely the "Fisheries Resources Accounts" published in June 2021. These have been developed as a joint collaboration between different Ugandan institutions[61], the UN Environment Programme World Conservation Monitoring Centre, the Institute for International Environment and Development and the Institute for the Development of Environmental-Economic Accounting (NEMA 2021). Through an extensive accounting exercise, this consortium developed thorough accounting tables of the fish resources of the 7 major Ugandan water bodies, as well as its 160 minor lakes. Apart from physical supply and final use, these tables also cover the monetary value of the catch, calculated on beach value prices, as well as the value addition from processing of Nile Perch and the profitability and rents of different fisheries. From this set of information, we could then develop alternative estimates for VAT and basic estimates for CIT, simply by applying statutory tax rates on the reported values.

[61] Namely, the Ugandan National Environment Management Authority, the Ugandan National Planning Authority and the Uganda Bureau of Statistics.

Table.2.15 Potential contribution of fisheries to VAT collection.

Country	Commodity	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2018
Guinea	Dried, Salted, Smoked, Brine	1000USD x ton	20.186	19.551	16.383	13.773	7.906	18.010	8.278	5.616	6.342
Guinea	Dried, Salted, Smoked, Brine	Tonnes	11,000	11,500	12,500	14,800	12,300	12,000	12,000	19,500	17,000
Guinea	Dried, Salted, Smoked, Brine	VAT (thousand USD)	39,968	40,471	36,862	36,692	17,505	38,903	17,881	19,711	19,407
Guinea	Dried, Salted, Smoked, Brine	Share of total VAT	15.00%	14.15%	9.31%	8.61%	3.67%	7.62%	3.00%	3.30%	2.98%
Mauritania	Frozen	1000USD x ton	1.671	1.221	1.133	1.375	1.507	1.419	1.269	1.331	1.718
Mauritania	Frozen	Tonnes	116,840	245,150	273,780	227,850	249,550	278,205	303,550	468,100	728,029
Mauritania	Frozen	VAT (thousand USD)	31,235	47,905	49,637	50,143	60,177	63,142	61,652	99,671	200,171
Mauritania	Frozen	Share of total VAT	13.09%	15.77%	11.98%	11.71%	14.84%	16.95%	16.39%	24.83%	-
Senegal	Fillet	1000USD x ton	5.046	5.463	3.830	3.593	5.046	4.995	4.687	5.822	4.535
Senegal	Fillet	Tonnes	2,100	1,500	1,000	765	1,000	500	250	1,547	1,100
Senegal	Fillet	VAT (thousand USD)	1,907	1,475	689	495	908	450	211	1,621	898
Senegal	Fillet	Share of total VAT	0.20%	0.13%	0.07%	0.05%	0.08%	0.04%	0.02%	0.14%	0.07%
Sierra Leone	Dried, Salted, Smoked, Brine	1000USD x ton	3.016	3.043	3.029	3.036	3.041	3.071	2.922	2.955	3.015
Sierra Leone	Dried, Salted, Smoked, Brine	Tonnes	38,000	40,000	40,000	39,000	41,000	40,000	40,000	40,000	40,000
Sierra Leone	Dried, Salted, Smoked, Brine	VAT (thousand USD)	17,194	18,259	18,175	17,763	18,701	18,424	17,535	17,733	18,092
Sierra Leone	Dried, Salted, Smoked, Brine	Share of total VAT	27.80%	22.62%	18.84%	17.49%	18.43%	15.79%	16.56%	18.34%	16.20%

Source: Author elaboration from FishStat data.

Table.2.15 Potential contribution of fisheries to VAT collection (continued)

Country	Commodity	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2018
Uganda	Dried, Salted, Smoked, Brine	1000USD x ton	5.454	8.492	19.507	32.347	23.682	21.005	15.044	33.845	47.954
Uganda	Dried, Salted, Smoked, Brine	Tonnes	13,800	13,128	12,455	15,501	14,097	12,736	14,551	11,418	30,541
Uganda	Dried, Salted, Smoked, Brine	VAT (thousand USD)	13,547	20,066	43,733	90,254	60,091	48,153	39,404	69,560	263,620
Uganda	Dried, Salted, Smoked, Brine	Share of total VAT	2.22%	3.23%	5.70%	9.92%	6.08%	5.01%	3.76%	6.43%	22.09%
Uganda	Frozen	1000USD x ton	3.410	7.350	5.017	4.498	5.925	4.988	4.699	5.718	5.041
Uganda	Frozen	Tonnes	5,397	5,246	4,924	3,046	2,855	4,526	5,956	4,048	7,285
Uganda	Frozen	VAT (thousand USD)	3,313	6,940	4,447	2,466	3,045	4,064	5,037	4,166	6,611
Uganda	Frozen	Share of total VAT	0.54%	1.12%	0.58%	0.27%	0.31%	0.42%	0.48%	0.39%	0.55%
Uganda	Fillet	1000USD x ton	5.561	6.034	5.314	5.592	6.191	5.170	5.266	5.777	4.641
Uganda	Fillet	Tonnes	16,698	17,332	18,249	16,798	16,036	16,851	17,279	16,532	20,648
Uganda	Fillet	VAT (thousand USD)	16,715	18,824	17,456	16,908	17,869	15,681	16,379	17,190	17,250
Uganda	Fillet	Share of total VAT	2.74%	3.03%	2.28%	1.86%	1.81%	1.63%	1.56%	1.59%	1.45%

Source: Author elaboration from FishStat data.

Table.2.16 Potential contribution of fisheries to VAT collection, first alternative estimation accounting for self-consumption.

Country	Commodity	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2018
Guinea	Dried, Salted, Smoked, Brine	1000USD x ton	20.186	19.551	16.383	13.773	7.906	18.010	8.278	5.616	6.342
Guinea	Dried, Salted, Smoked, Brine	Tonnes	10,112	10,558	11,508	13,648	11,384	11,135	11,145	18,611	16,111
Guinea	Dried, Salted, Smoked, Brine	VAT (thousand USD)	36,740	37,156	33,938	33,837	16,201	36,097	16,606	18,812	18,392
Guinea	Dried, Salted, Smoked, Brine	Share of Total VAT	13.79%	12.99%	8.57%	7.94%	3.40%	7.07%	2.79%	3.15%	2.83%
Sierra Leone	Dried, Salted, Smoked, Brine	1000USD x ton	3.016	3.043	3.029	3.036	3.041	3.071	2.922	2.955	3.015
Sierra Leone	Dried, Salted, Smoked, Brine	Tonnes	27,610	29,724	29,921	29,013	31,133	30,614	30,791	31,290	31,290
Sierra Leone	Dried, Salted, Smoked, Brine	VAT (thousand USD)	12,492	13,568	13,595	13,214	14,201	14,101	13,498	13,871	14,153
Sierra Leone	Dried, Salted, Smoked, Brine	Share of Total VAT	20.20%	16.81%	14.10%	13.01%	14.00%	12.08%	12.75%	14.34%	12.67%
Uganda	Dried, Salted, Smoked, Brine	1000USD x ton	5.454	8.492	19.507	32.347	23.682	21.005	15.044	33.845	47.954
Uganda	Dried, Salted, Smoked, Brine	Tonnes	3,902	3,033	3,247	6,291	3,992	4,050	6,336	3,528	22,651
Uganda	Dried, Salted, Smoked, Brine	VAT (thousand USD)	3,830	4,636	11,400	36,630	17,017	15,311	17,157	21,490	195,512
Uganda	Dried, Salted, Smoked, Brine	Share of Total VAT	0.63%	0.75%	1.49%	4.03%	1.72%	1.59%	1.64%	1.99%	16.38%

Source: Author elaboration from FishStat data. Tonnes of processed commodities for the internal market have been reduced to exclude self-consumption by those employed in the fishery sector. The quantity of self-consumed commodities is set equal to the average per-capita consumption multiplied by the estimated number of people employed in the fisheries sector.

Table.2.17 Potential contribution of fisheries to VAT collection, second alternative estimation accounting for self-consumption.

Country	Commodity	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2018
Guinea	Dried, Salted, Smoked, Brine	1000USD x ton	20.186	19.551	16.383	13.773	7.906	18.010	8.278	5.616	6.342
Guinea	Dried, Salted, Smoked, Brine	Tonnes	9,223	9,616	10,517	12,497	10,467	10,269	10,289	17,722	15,222
Guinea	Dried, Salted, Smoked, Brine	VAT (thousand USD)	33,512	33,842	31,014	30,982	14,897	33,291	15,332	17,913	17,377
Guinea	Dried, Salted, Smoked, Brine	Share of Total VAT	12.57%	11.83%	7.84%	7.27%	3.13%	6.52%	2.57%	3.00%	2.67%
Sierra Leone	Dried, Salted, Smoked, Brine	1000USD x ton	3.016	3.043	3.029	3.036	3.041	3.071	2.922	2.955	3.015
Sierra Leone	Dried, Salted, Smoked, Brine	Tonnes	17,220	19,447	19,842	19,026	21,266	21,228	21,582	22,580	22,580
Sierra Leone	Dried, Salted, Smoked, Brine	VAT (thousand USD)	7,791	8,877	9,016	8,666	9,700	9,777	9,461	10,010	10,213
Sierra Leone	Dried, Salted, Smoked, Brine	Share of Total VAT	12.60%	11.00%	9.35%	8.53%	9.56%	8.38%	8.94%	10.35%	9.14%
Uganda	Dried, Salted, Smoked, Brine	1000USD x ton	5.454	8.492	19.507	32.347	23.682	21.005	15.044	33.845	47.954
Uganda	Dried, Salted, Smoked, Brine	Tonnes	0	0	0	0	0	0	0	0	14,760
Uganda	Dried, Salted, Smoked, Brine	VAT (thousand USD)	0	0	0	0	0	0	0	0	127,405
Uganda	Dried, Salted, Smoked, Brine	Share of Total VAT	-	-	-	-	-	-	-	-	10.68%

Source: Author elaboration from FishStat data. Tonnes of processed commodities for the internal market have been reduced to exclude self-consumption by those employed in the fishery sector. The quantity of self-consumed commodities is set equal to twice the average per-capita consumption multiplied by the estimated number of people employed in the fisheries sector.

Table.2.18 Potential contribution of fisheries to VAT collection, third alternative estimation accounting for informally exchanged commodities.

Country	Commodity	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2018
Guinea	Dried, Salted, Smoked, Brine	1000USD x ton	20.186	19.551	16.383	13.773	7.906	18.010	8.278	5.616	6.342
Guinea	Dried, Salted, Smoked, Brine	Tonnes (excl. Informal)	1,447	1,512	1,644	1,946	1,617	1,578	1,578	2,564	2,236
Guinea	Dried, Salted, Smoked, Brine	VAT (thousand USD)	5,256	5,322	4,847	4,825	2,302	5,116	2,351	2,592	2,552
Guinea	Dried, Salted, Smoked, Brine	Share of total VAT	1.97%	1.86%	1.22%	1.13%	0.48%	1.00%	0.39%	0.43%	0.39%
Sierra Leone	Dried, Salted, Smoked, Brine	1000USD x ton	3.016	3.043	3.029	3.036	3.041	3.071	2.922	2.955	3.015
Sierra Leone	Dried, Salted, Smoked, Brine	Tonnes (excl. Informal)	4,997	5,260	5,260	5,129	5,392	5,260	5,260	5,260	5,260
Sierra Leone	Dried, Salted, Smoked, Brine	VAT (thousand USD)	2,261	2,401	2,390	2,336	2,459	2,423	2,306	2,332	2,379
Sierra Leone	Dried, Salted, Smoked, Brine	Share of total VAT	3.66%	2.97%	2.48%	2.30%	2.42%	2.08%	2.18%	2.41%	2.13%
Uganda	Dried, Salted, Smoked, Brine	1000USD x ton	5.454	8.492	19.507	32.347	23.682	21.005	15.044	33.845	47.954
Uganda	Dried, Salted, Smoked, Brine	Tonnes (excl. Informal)	856	814	772	961	874	1,197	1,368	1,073	2,871
Uganda	Dried, Salted, Smoked, Brine	VAT (thousand USD)	840	1,244	2,711	5,596	3,726	4,526	3,704	6,539	24,780
Uganda	Dried, Salted, Smoked, Brine	Share of total VAT	0.14%	0.20%	0.35%	0.62%	0.38%	0.47%	0.35%	0.60%	2.08%

Source: Author elaboration from FishStat data. Tonnes of processed commodities for the internal market have been reduced to exclude commodities exchanged informally, i.e. by economic actors outside of the tax-net. The proportion of commodities exchanged outside of the tax net is set equal to the share of the labour force in informal employment in the agricultural sector.

While the full set of results, divided by water bodies, are reported in Table.A3 in Appendix.1, Table.2.20 below reports the aggregated estimates, as well as actual collection and estimates from FishStat. Estimates for CIT have been calculated both for what the reports refers to as "normal profit", that is the product of the value of the capital stock invested in the sector by the average return on capital, and on the sum between this and the calculated resource rent. The latter is the difference between total revenue from the fishery and the aggregate costs from intermediate consumption, compensation of employees, capital depreciation and normal profit. All the costs variables above have however been used on their average rather than their marginal value, as actual information on marginal cost could not be obtained by the authors of the report (NEMA 2021). As such, they are not to be intended as representative of supra-normal profit actually realised, but as an indication of the total value of the fish assets. Furthermore, these values ignores if the fish was caught for subsistence or commercial use, as their scope is purely to indicate if the resource is used in an economically efficient way or not. Hence, these estimates represent the upper boundary for CIT, what could be collected if all fish caught was sold at current market prices by formal economic actors.

Table.2.20 Comparison between actual CIT and VAT collection from URA and estimates based on the Ugandan Fisheries Resource Account and FAO.

Tax Handle	2016	2018
CIT - URA	1.38	1.57
CIT - Estimate, normal profit	0.94	1.01
CIT - Estimate, rent + profit	43.26	34.17
VAT - URA	0.33	2.75
VAT - Nile Perch	60.58	8.52
VAT - frozen, estimate, FAO	17.23	24.64
VAT - filleted, estimate, FAO	56.02	64.29

Source: Ugandan Revenue Authority communication for actual collection, author calculation for estimates. All figures are in Billion UGX.

As it can be seen from the table, when normal profit is used as base for the estimates, these are lower than the actual CIT collection from the URA, indicating that compliance by the industrial actor in the sector is likely to be high. However, the difference between these estimates and those based on resource rent give a good approximation of how important non-commercial fish resources are for the country, as they are 20 to 30 times higher than actual collection. Again, given the current institutional structure, these are not to be intended as actual collection gaps, but as an indication of what could be the sector revenue contribution if open access was to be eliminated and all fish caught exchanged commercially. On the other hand, estimates for VAT suggests that there might be compliance issues for that tax handle, as they are several order of magnitudes lower than actual collection in 2016 and around a third of actual collection in 2018. Furthermore, at least for 2016, estimates obtained from this Uganda Fisheries Resource Account are generally in line with the combination of those for "filleted" and "frozen" fish from the FAO, although the two values are substantially different

for 2018. As Nile Perch is a high-value fish mostly produced for export, and hence processed in the two-above ways, this indicates that the estimates for these categories from the previous section might not be too far off the mark.

Part 3. Issues with data availability – A Practical Example and Opinions from Experts Interviews.

Part 3 of the reports only contains two brief sections. Section 3.1 presents the issues which have been encountered in the attempted estimation of fisheries' CIT potential from publicly available data, and why it was decided to abandon the exercise. Section 3.2 presents instead the excerpt of the experts' interviews[62] covering the importance of data for fisheries management.

3.1 CIT estimation attempts – the "Sea around us" project and the "Cost of Fishing" dataset.

One of the original aims of the project was to obtain an estimate of the potential CIT contribution of the fisheries sector combining different data sources available from the "Sea around us" project and the Fisheries Economics Research Unit of the University of British Columbia.

The "Sea Around Us" project is a joint initiative between the University of British Columbia and the University of Western Australia, aiming at updating the currently available data on global marine catches over the last 70 years. Many of its authors have dedicated particular attention to reconstructing and updating data from LICs in general and Africa in particular, publishing a variety of papers on the topic (Belhabib et al. 2012, 2013, 2014, 2017, Seto et al. 2017 just to mention the one already cited in this report). One of their main aims is to provide information about catches from IUUF, normally excluded from the official statistics reported by the FAO but necessary to understand the status of fish stocks, and there is by now a general recognition of the usefulness of this information (Pauly and Zeller 2019). Furthermore, a significant amount of work has also been dedicated to the construction of a global dataset of ex-vessel fish prices (Sumaila et al. 2007), and a dataset on global fishing cost has also been produced (Lam et al. 2011).

The original aim for this report was to rely on these different datasets to obtain a detailed picture of the economic contribution of different segments of the fishing sectors and fleets of four of the five countries under analysis. This is because the "Sea Around Us" project only covers coastal countries, so information about Uganda was to be obtained through different sources. The official website of the project[63] offers free access to the main database produced by the researcher. For each year between 1950 and 2018 and for each coastal country in the world, the dataset should provide information about catch quantity and value broken down,

[62] The remainder of the experts' interviews are presented in section 1.7.
[63] http://www.seaaroundus.org/

amongst many, by fish taxonomy, vessel's country flag, fishing sector[64], reporting status[65] and gear type. The last information was to be the key to obtain the measure of profitability to be used in calculation of CIT potential, as the information available on fishing cost in Lam et al. (2011) was categorised over the same gear-types of the main project database. Unfortunately, different issues were encountered in getting access to, or verifying the information in, both of these datasets.

To start with, upon downloading the data from the "Sea Around Us" project, it became apparent that detailed[66] information about catch value was not available for any of the countries under analysis. Upon further investigation, it became clear that this information was not available for any of the countries included in the database, regardless of their geographical location or development status. As the downloaded data did contain an empty field for "landed vale", we tried contacting the dataset manager both through the feedback form and the dedicated email, in order to understand if this was a glitch in the system, but we never received a reply. Therefore, the only option left was to manually compile a dataset including the information available from the interactive graphs on the website. Rather than detailed information, these graphs only contained the yearly aggregates across one single category at the time – for example, the yearly value of all catches from the industrial fleet, regardless of the flag flew by the vessel, the species targeted, or the gear used. Given that not all foreign vessels are likely to be incorporated in the countries in which they are fishing, this would pose problems to CIT estimation. Nevertheless, in theory we could at least calculate profits – and hence CIT liabilities – across different gear types, and then look for ways to divide them across fleets nationality.

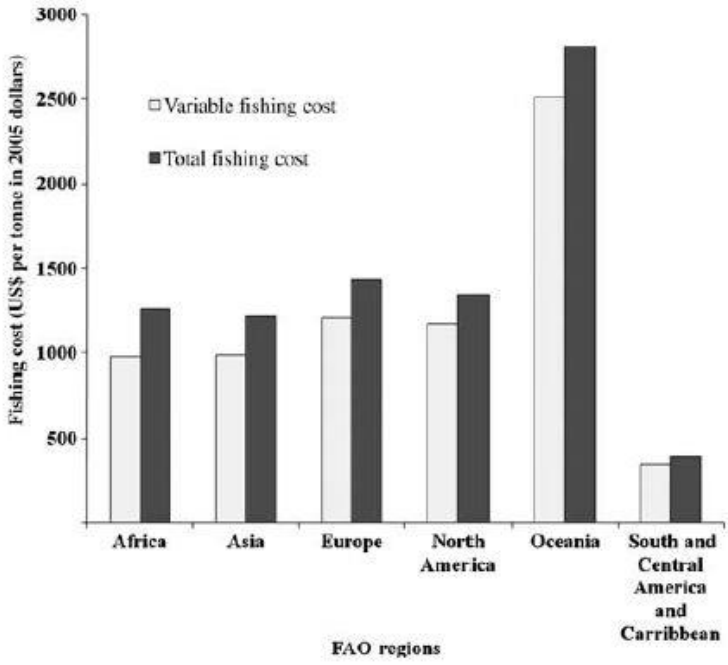
However, getting access to the fishing cost database eventually proved impossible. Despite multiple email contacts, the contacting author of Lam et al. (2011) never responded us about the possibility of using the dataset for the project. The data page of the Fisheries Economic Research Unit of the University of British Columbia[67] states that they intend to make all their data freely available on the web in the near future, and the in the description of the fishing cost dataset, interested parties are invited to get in touch with the author for further information, so the reason for the lack of response is not obvious. Whatever the reason for this, we eventually decided to rely on the information available from the published paper, which could still provide some useful reference point for the estimate. The dataset developed in Lam et al. (2011) relies on 1,006 observations about actual fishing costs, expressed in thousands of USD for tonne of catch, for 14 different fishing technologies which accounted for close to 98% of global catch in 2005. The observed data, which covers both variable[68] and fixed[69] costs,

[64] That is, industrial, artisanal or subsistence.
[65] Reported or unreported
[66] With "detailed information", we intend data in the form of "year – fish group – fishing country – fishing sector – reporting status – gear type – value of catch". That is, we could not, for example, have an estimate for the value of tuna caught with pole and line by French vessels in Mauritanian in 2018. This should represent the most granular form information available from the dataset, hence the best suited for the analysis.
[67] https://feru.oceans.ubc.ca/about-our-work/about-our-work/
[68] These are fuel, running, repair and labour costs.
[69] These are capital depreciation and interest payments.

originates from 45 countries across all 5 continents, jointly responsible for close to 80% of the global catch in the same year. From the basis of these observations, through different interpolation techniques, the authors produced an estimate of the average fishing cost for each gear type in 144 countries.

While the paper does not obviously report all of the estimates, it does include a table, reported as Table.A1 in Appendix.1, reporting the global average cost for each gear type. While far from ideal, other information reported in Lam et al. (2011) led us to believe that these figures could still provide a reasonable proxy for the average fishing cost in the four selected countries. A comparison of average variable and fixed costs across the different continents, included in Lam et al. (2011) and reported in Figure.5 above, demonstrates that both of these are roughly the same for African, Asian, European and North American fleets. As observations from the fleets of the latter three continents make up 88.16% of those used to develop the dataset[70], the global averages reported should actually be close to that for continental Africa. Hence, they could still be considered as a reasonable proxy of the fishing costs encountered by the fleets of the selected countries.

Figure.3.1 Comparison of the average variable and total fishing cost per tonne of catch across FAO region



Source: Lam et al. (2011)

[70] African countries represent 8.7% of the countries included and African cost observations represent 7% of those used to develop the cost dataset.

At this point, we theoretically had all the information required to attempt the estimation of profitability across gear types. First, we associated the gear types available from the dataset from those included in the global averages table of Lam et al. (2011), which we did as per Table.A2 in Appendix.1, and then we inflated cost values from real USD2005 to real USD2010, as this is the currency in which catch values are reported. At this point, we could calculate the value per tonne of catch across different gear types, simply by dividing the reported value of catch – available in million USD2010 – by catch quantity, available in thousand tonnes. However, this last step yields an ex-vessel price per tonne of catch which is completely out of line with any information available about current fish price. An example of the obtained value, expressed in USD2010 per tonne, is reported in Table3.1 below. The total cost by gear type is the one from Lam et al. (2011) after inflation to 2010 values, and ex-vessel price are also from those reported in the same source, which were obtained from Sumaila et al. (2007). Values under each country name are the average ex-vessel price over the period 2010-2018 as obtained from the "Sea Around Us" website by diving catch value by its quantity.

As it can be seen, these are one to two orders of magnitude different from those reported in Lam et al. (2011), a fact which can hardly be explained by differences in the inflation or exchange rates used. If these figures were to be believed, the average profit ratio across the 5 fishing technologies selected would range from 1,308% in Mauritania to 2,900% in Guinea. These are hardly reconcilable with the statement made by Lam et al. (2011) that "As total costs exceed landed values for most gear types (Table 5), it seems clear that some fisheries would not be viable without a subsidy" (Lam et al., 2011, p.2002). Given that we never obtained a response from any of the different individuals contacted at the "Sea Around Us" project, there is no obvious way to understand what the source of these discrepancies might be. What is clear is that, despite the fact that the data that they hold could in theory be used to calculate the profitability of different fishing activities, what has been made publicly available is clearly unfit for this purpose.

Table.3.1 Comparison of ex-vessel price from Lim et al. (2011) with those obtained from the "Sea Around Us" website, USD2010 per tonne of catch.

Gear type	Total cost	Ex-vessel price	Senegal	Mauritania	Guinea	Sierra Leone
Longline tuna	3,252	3,408	52,598	87,818	28,641	30,371
Bottom trawl	1,600	1,364	67,971	13,908	206,334	142,598
Purse-seine tuna	1,254	3,363	97,158	59,287	34,387	36,627
Midwater trawl	1,190	653	64,776	67,061	120,880	-
Gillnet	1,137	950	4,755	860	-	-

Source: Author calculation

3.2 The importance of data availability for fisheries management – experts' interviews.

One of the general themes which was touched during our experts' interviews was how easily available data about fisheries is in LICs in general and in SSA specifically[71]. The lack of data on many biological and economic indicators relevant for fisheries management in SSA was for a long time a relevant obstacle for scholars and managers alike (Pauly and Zeller 2019), although the situation has recently started to improve (Pauly and Zeller 2019). Therefore, given that all our informants had previously carried out different types of research in and about the continent, we asked them about their experiences with data access and for their opinion about the impact that better and more accessible revenue figures could have.

To start with, all confirmed that accessing data is often complex, because it might not exist, it might not be organised or because the authority holding it might be secretive about it (EN13, HG12, ST67, HU82, KY53). Lack of up-to-date and readily accessible information was mentioned with regard to national subsidies, number of and revenue from foreign vessels licensed, inter-African trade, quantity of fish caught, gender-disaggregated figures and almost anything regarding the artisanal sector (EN13, HG12, ST67, HU82, KY53). However, it must also be noted that even in this case the situation is quite heterogeneous, with some countries having invested more in data gathering than others, and others making quite a lot of information publicly available (ST67). This latter trend of increased transparency was also connected to donor support or conditionality, although it was also noted that at time donors ask African countries to make data available even when the same information is not easily accessible in their home countries (ST67).

This lack of information was seen especially detrimental for the capacity of some African states to negotiate profitable FAs (ST67, HU82) and for properly evaluating the contribution, including to revenue, of the artisanal sector (HU82, KY53). Especially when it comes to the latter, it was stressed that much more information would be required before devising dedicated tax policies (HU82, KY53), as focus group revealed that some artisanal actors might be paying proportionally more in fees than industrial ones do in taxes (KY53). However, better quality of data will be needed to simply devise better fisheries management policies, as in many cases what is lacking is basic information (KY53).

Making revenue and subsidies data more easily accessible was seen as potentially useful, although it was also stressed that there usually are political reasons why this is not already the case (EN13, ST67). Even without making it public, simply having revenue contributions better quantified might help relevant ministries to properly assess the economic value of the sector (HU82), which could contribute to its valorisation (HU82). While this could also help in understanding if current FAs are profitable or not (ST67, HU82), actually negotiating more profitable ones would require addressing the power imbalance between DWFNs and African coastal states (ST67). It was also noted that some of the data currently available could allow for

[71] The remainder of the experts' interviews is presented in section 1.7

a rough indication of what the sector contribution could be, but that there was a risk in relying on overestimated figures as these might lead to the wrong policy choices (ST67). Incentivising data production and sharing was then seen as a potentially useful, although lengthy and costly endeavour (EN13, ST67), and something that should first and foremost be done in the interest of the African countries themselves and not of the donor community (ST67).

Part 4. Conclusions and Recommendations.

The scope of this report is to assess the current and potential contribution of the fisheries sector to domestic revenue mobilisation in Sub-Saharan Africa. To this end, the first part of this report presents a thorough review of the theoretical case for the taxation of fisheries, as well as different experiences from HICs and an overview of current issues in LICs.

As it has been shown, while economics theories suggest that sector specific taxes are one of the efficient mechanisms to ensure sustainable harvests, the rate at which they will do so has normally been seen as politically unenforceable in HICs and LICs alike. In HICs, the introduction of individually transferrable quotas has then often been proposed as a solution, as this instrument will also lead to an efficient management of fisheries and presents less complex political problems. Efficiently managed fisheries will over time exhibit the presence of a resource rent, which could then become the objective of a dedicated tax. Before a resource rent is created, there is no theoretical justification for charging fisheries-specific taxes – excluding fees to cover their management cost – so that the sector should only be subjected to general fiscal charges, such as corporate income tax (CIT), value added tax (VAT) or Pay-As-You-Earn (PAYE). Examples of fisheries managed efficiently enough to exhibit a resource rent are very scarce in HICs, and virtually inexistent in LICs in general and in the African continent in particular.

On the contrary, African fisheries are often subjected to scarce economic valorisation, which have led to frequent calls for a wealth-based approach to their management – i.e., a widespread adoption of modern management practices, aiming at closing access and increasing profitability. However, other voices support a stronger valorisation of their contribution to employment and livelihoods, which arises from the open-access characteristic of traditional managements – the so-called welfare-based approach. In theory, many African governments have subscribed to the first vision. In practice, there seem to be a lack of political incentives to really push through with the required reforms – that is, to start limiting access by small scale artisanal fishermen. The emergence of co-management practices through the 1990s has only made the above conundrum harder to resolve, as local governments have also acquired an incentive to emit as many licenses as they can in order to collect more revenue. Due to the complexity of this relation, there is great lack of studies and figures of the revenue contributions of fisheries in Africa. The little that is known regards fishing agreements between African governments and distant water fishing nations. The sums paid by the latter to access African exclusive economic zones can contribute substantially to government revenue, but often comes at the cost of an increase in competition between the domestic artisanal sector and industrial vessels from foreign fleets. International vessels often do not subject themselves to much scrutiny from African authorities, and enjoy significant subsidies from their home countries, which have been identified as a major contributor to the overcapacity in global fisheries. Negotiations on their restriction have been proceeding under WTO supervision since 2001, but a final agreement is yet to be reached.

The last section of Part 1 presents the outcome of 5 experts' interviews, aimed at acquiring a better understanding of the issues which the literature highlighted as more relevant for the management of African fisheries. Regarding sectoral subsidies, WTO negotiations will likely end within the next year, and will probably impact the continent both directly and indirectly. The first set of impacts will regard African states capacity to subsidise their industrial fleet, which will very likely be curtailed, although subsidies towards the artisanal sector will probably still be allowed. Coming to the indirect impacts, these will mostly be felt through a reduction in the profitability of fishing agreements, as the number of foreign vessels founding it profitable to travel to African waters will reduce. The overall revenue impact is almost definitely going to be negative in the short run, although it is not clear what the impact will be in the medium run, as less competition might allow for the growth of the domestic industry. Fishing agreements themselves could be made more profitable regardless of subsidies level, as many African countries are missing out potential revenue due to a lack of up-to-date information for their negotiating teams and of regional coordination. However, distant water fishing nations also need to monitor their fleets more closely, as they have so far seemed reluctant to strictly enforce the terms of the agreements when these require fining of their own fleets. Consequently, some of these vessels are involved in illegal, unregulated and unreported fishing, which remains a blight on the sector in the continent. Stricter controls from distant water fishing nations on their fleet, including a prohibition to domesticate in coastal states and a duty to report all beneficial ownership structure, could help increase the effectiveness of economic sanction against these malpractices. However, coastal states should also increase and harmonise fines across regions, as a low level in anyone country ends up impacting all the others which share a fish stock with it. Greater institutional coordination between fisheries departments and navy could also increase monitoring and surveillance efficacy, helping to better deliver a return on the investments in physical capacity made in the last period. Artisanal actors are also involved in illegal and unregulated fishing, but their malpractices are seen as less detrimental, and more generally connected to poor management of the whole sub-sector, although with differences across countries. A better management of artisanal fisheries would be in the interest of most African states, although this would not necessarily imply a greater contribution to state coffers, as their tax potential is perceived to be generally low. However, the sector is very heterogeneous, and if more investments were to be directed towards it, some actors, such as fish aggregators, could eventually become revenue contributors. However, any fiscal reform of the sub-sector would require much better data, as currently not enough detailed information is available to devise finely tuned policies, and the risk of producing social damage is great. The problem of lack of data is though much wider than simply the artisanal sub-sector, aw information about stock levels, tax expenditure towards subsidies and inter-African trade is also generally lacking.

The second part of the report opens by presenting the most up-to-date figures about fisheries and aquaculture globally, confirming their growing importance for the global economy and for food security in LICs. Both the amount and the value of fish produced every year has been on an upward trend for decades, and so does the number of people employed in the fisheries sector, currently estimated at around 59.5 million people. Both the amount of fish produced and fisheries' employment contribution are geographically very concentrated, with Asia

topping both lists and Africa always a distant second. Proteins from fish products are also becoming increasingly important in both of these regions, as sustained urban and population growths have fuelled their demand. However, this continued growth in fish production and consumption has come at the cost of the sustainability of fishing practices, with only 6.2% of global fish stock considered under-exploited, 59.6% considered fully exploited and 34.2% considered over-exploited. While there is evidence that proper management strategies can reverse this trend, these are still applied in only a minority of fisheries, often concentrated in Europe and in North America. There is hence the need to adapt these management strategies to the context of LICs, while conversely investing more in aquaculture, which already accounts for close to half of fish produced.

The analysis then focuses more specifically to the status of the fisheries sector in 5 selected countries – Guinea, Mauritania, Senegal, Sierra Leone and Uganda. The information presented stresses many similarities and a few differences. In all of them, the fisheries sector is of particular economic relevance, accounting for significant share of total and agricultural GDP, as well as providing employment opportunities for hundreds of thousands. In many countries fish products are also significant exports, hence importantly contributing to foreign exchange earnings. What somehow differs is the availability of data to actually quantifying these contributions, although estimates are widespread for almost all of these countries, especially when it comes to the artisanal sector. This lack of data represents an important obstacle for a better management of the sector and is particularly relevant to understand the sustainability of current fishing practices. Another significant difference is the relevance of processing capacity across the different countries. While there is clearly more potential in each one, Senegal and Uganda have both export and domestic production of high-value products, which is less substantial in Mauritania – where the processing industry has concentrated on fishmeal – and lacking in Guinea and Sierra Leone. The contribution of fishing agreements with distant water fishing nations is also varied, as Mauritania and Senegal have sizeable agreements with the EU, which Guinea and Sierra Leone are currently lacking. While these agreements represent a significant revenue source for the government, there is still quite some criticism directed towards them in the academic literature. These are especially focused on their contribution to resource overexploitation and to the increased tension between the artisanal and the industrial sectors, although more attention has also recently been dedicated to their transparency. While the data about the sector revenue contribution we could access varied greatly from country to country, and was absent in the case of Senegal, this also appears to be very different, ranging from 0.05% of total revenue in Uganda to 10.6% of total revenue in Mauritania. As these figures are only available for a short period of time in most countries, and are furthermore based on different sources, they do not allow for a straight on comparison, but still give a reasonable idea of the different importance of the sector.

The last section of Part 2 presents our estimation of the sector VAT based on the FAO "FishStat" data. The estimates show that this varies significantly across the 5 selected countries, due to both differences in the structure of their fisheries sector – significant processing capacity are only present in Senegal and Uganda, and to a lesser extent in Mauritania – and to what is subjected to VAT – all type of processed fish in Guinea, Sierra Leone and Uganda, only frozen and filleted fish in Mauritania and only filleted fish in Senegal. Consequently, the estimated VAT

potential ranges from an average of 0.79% of total VAT collection in Senegal to 14.44% of total VAT collection in Sierra Leone. However, it must also be noted that, due to the lack of official figures, comparison between the estimated VAT potential and actual collection was only possible for Uganda, for which case the difference between the two figures is of an order of magnitude. Given the absence of alternative points of comparison, is then hard to judge how close to the actual collection gaps is to the produced estimates. Overall, the attempt at estimating revenue contributions from currently available sources suggests that data quality has to improve before these estimates can really be relied upon. In the meanwhile, it might be a better – although lengthier – way to collaborate directly with revenue authorities and fisheries departments, who might have more information. Part 3 of the reports then briefly summarises the difficulties encountered in accessing other data sources from which it originally intended to produce a series of CIT estimates, as well as providing some further insights on the relevance of good quality data for fisheries management.

The literature review in part one of the report revealed that there are no reasons to introduce fisheries-specific levies until it can be proved that they are producing a rent, and that this will only happen when they are properly managed. From part two of the report, it becomes clear that this is far from being the case in any of the countries under analysis, so that the focus should first be in increasing the sector viability and sustainability, in order to favours its development. This could in and of itself increase its revenue contribution, as at least the industrial actors are subjected to normal fiscal charges. From the analysis undertaken, the author thinks that the following recommendations can be made.

- There is a clear need of better data on the biological, social and economic contributions of the fisheries sector to improve the quality of its management. Data is fundamental to devise effective management strategies, plan fiscal reforms or negotiate fishing agreements. However, it is also costly and lengthy to collect, and there are financial and capacity constraints in many African statistical agencies. Hence, data collection could be an important area for donor support, especially when it comes to the artisanal sector, of which very little is known. All data collected should also be gender disaggregated, as female fishermen are likely to face different issues than their male counterpart.
- Negotiating capacity is at times scarce, and this impacts the quality of fishing agreements, currently the main source of revenue for African states. Technical assistance to negotiators team could help some African states to obtain better terms in their fishing agreements, especially if joined with better data access. This support could be directed at the national level or at a regional level. The latter could for example lead to the creation of a negotiating team within ECOWAS, capable of supporting national teams during their own negotiations.
- Promote the participation of CSOs in fishing agreements negotiations to increase the impact of spending through dedicated funds. Increasing the transparency of the current negotiations of fishing agreements is seen as a fundamental step to improve their efficacy to promote domestic fisheries' development. Fishing communities are those more impacted by the activities of industrial vessels from DWFNs, and should

therefore be part of the negotiation, as they know their need better than anyone else and can hold the government accountable for the promises made.

- There needs to be greater focus on the practices of EU vessels, as many have been found in breach of fishing agreements terms with little consequences. Both the literature and the interviews have revealed that the EU is often not coherent with the stated scope of its fisheries policies when it comes to the behaviour of distant water fishing fleets. A more thorough enforcement of fines for breach of the agreements would signal coastal states that there is more than lip-service when it comes to IUUF and decrease the pressure on fish resources which is currently impacting the sector viability.
- Devise a common EU policy towards domestication of fleets in coastal state and beneficial ownership of vessels within the fisheries sector. Both of these practices have been individuated as problematic for coastal states, and it should be well within the commission capacity to provide a legal framework to reduce their impact.
- Support the inclusion of artisanal vessels from least developed countries within the SDTs of the current WTO negotiations, but not that of industrial ones. There currently are different proposals at the WTO when it comes to the treatment of subsidies towards overcapacity in least developed countries. In the opinion of all the experts interviewed, they should be allowed, at least in the short term, towards artisanal actors, but not towards industrial ones. Supporting this position would help maintain sector viability in the short run, while not impacting its sustainability.
- Support tax expenditure studies in the fisheries sector. Currently, very little is known about subsidies towards fisheries in many LICs. However, these will have to be made public in the context of the new WTO agreement. This will represent the ideal moment to assess their cost-effectiveness, as they reduce the sector revenue contribution and might not contribute to its growth.
- Focus on the promotion of processing capacity, in order to increase domestic value addition in fish products. This should help both boosting decent employment in the sector and its capacity to generate tax revenue and foreign exchange earnings. Support could take different forms, as industrial incentives towards the sector will be allowed under the new WTO agreement, but it is not clear if the one used so far have delivered many benefits. Technical assistance on how to deal with EU non-tariff barriers could also be important, as this often represents a significant obstacle for new investments.
- Still very little is known about the impact of co-management practices in most countries, both on the sustainability of fishing practices and on local revenue. Both of these areas should warrant further attention, as it seems unlikely that the policy of decentralising resource management will be reversed. Local governments are often lacking alternative sources of revenue and might therefore be tempted to see fishing licensing purely as revenue generating activities, impacting the sustainability of artisanal fisheries. Examples exist of both cases were co-management led to better environmental and social outcomes and of the opposite situation. Efforts in expanding and systematising this knowledge could be useful to integrate local governments in management strategies.

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Appendix.1 – Further Tables.

Table.A1 Global average variable and total fishing costs and ex-vessel price by gear type from Lam et al. (2011)

Gear type	Variable cost	Total cost	Ex-vessel price
Longline tuna	2,604	2,903	3,042
Trammelnet	2,164	2,292	2,644
Trap	2,040	2,378	3,333
Dredge	1,879	2,099	878
Hook and line	1,636	1,886	1,304
Shrimp trawl	1,582	1,858	3,833
Pole and line tuna	1,255	1,429	3,602
Bottom trawl	1,204	1,428	1,218
Liftnet	1,087	1,261	773
Purse-seine tuna	977	1,119	3,002
Midwater trawl	885	1,062	583
Castnet	851	1,025	1,013
Spear	851	1,025	582
Hand	851	1,025	548
Bomb/chemical	851	1,025	330
Gillnet	747	1,015	848
Seine	472	573	385
Net	180	241	2,655

Note: All figures are in USD2005, average ex-vessel price from Sumaila et al. (2007)

Table.A2 Association between gear types in "Sea Around Us" and those in Lam et al. (2011), with updated USD 2010 total cost.

Gear type in Sea Around Us	Gear equivalence in Lam et al. (2011)	Cost per ton of fish (USD 2010)
Bag-nets	Net	270
Bottom Trawl	Bottom trawl	1,600
Cast Nets	Cast-net	1,148
Encircling Nets	Gillnet	1,137
Gillnet	Gillnet	1,137
Hand Lines	Pole and line tuna	1,601
Hand or Tools	Hand	1,148
Harpoon	Spear	1,148
Lines	Pole and line tuna	1,601
Long-line	Long-line tuna	3,252
Mixed Gear	Average of other	1,557
Other Industrial	Average of other	1,557
Pelagic Trawl	Mid-water trawl	1,190
Pole and Line	Pole and line tuna	1,601
Pots or Traps	Trap	2,664
Purse Seine	Purse-seine tuna	1,254
Shrimp Trawl	Shrimp trawl	2,081
Small Encircling Nets	Gillnet	1,137
Small Scale Encircling nets	Gillnet	1,137
Small Scale Gillnets	Gillnet	1,137
Small Scale Lines	Pole and line tuna	1,601
Small Scale Other Nets	Net	270
Small Scale Pots or Traps	Trap	2,664
Small Scale Seine Nets	Seine	642
Small Scale Trammel Net	Trammel-net	2,568
Small Scale Purse Seine	Purse-seine tuna	1,254
Small Scale Hand Lines	Pole and line tuna	1,601

Note: All figures are in USD2010, updated from the original value in Lam et al. (2011) using inflation rate from the World Bank World Development Indicators.

Table.A3 VAT and CIT estimates for different Ugandan water bodies.

		2010	2011	2015	2016	2018
Value Addition (Nile Perch Only)		136.36	183.10	305.09	336.56	47.32
VAT		24.54	32.96	54.92	60.58	8.52
Victoria	Normal Profit	9.41	9.41	13.43	15.11	15.11
	Rent	9.67	109.93	333.06	341.44	61.97
	Total	19.08	119.34	346.49	356.55	77.08
Albert	Normal Profit	1.19	1.19	1.49	1.49	1.71
	Rent	1.75	112.76	129.67	128.66	117.06
	Total	2.95	113.96	131.16	130.15	118.77
Kyoga	Normal Profit	1.00	1.00	1.28	1.28	1.28
	Rent	-66.19	74.15	0.52	-1.86	-2.63
	Total	-65.20	75.15	1.80	-0.58	-1.35
Edward, George & Kazinga	Normal Profit	0.10	0.10	0.15	0.15	0.15
	Rent	3.04	6.43	11.14	12.02	1.91
	Total	3.15	6.53	11.29	12.17	2.06
Wamala	Normal Profit	0.03	0.03	0.03	0.03	0.03
	Rent	3.02	126.12	3.67	3.17	3.91
	Total	3.04	126.15	3.70	3.20	3.94
Albert Nile	Normal Profit	0.19	0.19	0.19	0.19	0.19
	Rent	-7.65	-6.52	-3.96	-3.32	-9.69
	Total	-7.45	-6.33	-3.76	-3.12	-9.49
Grand Total	Normal Profit	2.51	2.51	3.15	3.15	3.36
	Rent	-66.03	312.94	141.04	138.66	110.55
	Total	-63.52	315.45	144.19	141.81	113.91
CIT	Normal Profit	0.75	0.75	0.94	0.94	1.01
	Rent	-19.81	93.88	42.31	41.60	33.17
	Total	-19.06	94.64	43.26	42.54	34.17

Notes: Author calculation from NEMA (2021), all values in Billions UGX.

Appendix.2 - Fisheries Revenue Data Request Form

The International Centre for Tax and Development (ICTD) is currently conducting a study on the fisheries sector potential for domestic revenue mobilisation in Sub-Saharan Africa, commissioned by the French Ministry for Europe and Foreign Affairs. This data request from will help us to better understand how much the sector is currently contributing to different tax handles, and to potentially devise a strategy for estimating its untapped revenue potential. The outcome of this study will inform the French Government position on official development ad towards the sector in the continent.

To this end, we kindly request for your collaboration in providing the data and information requested in this form, which will be vital to help the research team to meet the objectives of this study. Your responses will be treated with utmost confidentiality and will only be used for the purpose of this study.

1. What is the number of registered taxpayers who operate in the fisheries sector as of 2021?

……
…….

1a. Can you provide us with a breakdown of the above figure across the following ISIC categories (all that applies):

ISIC Code	ISIC Code Description	Number of Taxpayers
031	Fishing	
032	Aquaculture	
1020	Processing and preserving of fish, crustaceans and molluscs	
9319	Sport or recreational fishing activities	

2. Can you tell us what the revenue contribution in LCU of the fisheries sector towards the following tax handles was for the years 2016 to 2020 (all that applies)?

Tax Handle	2016	2017	2018	2019	2020
CIT					
PAYE					
VAT					
Export Royalties					
License fees					

2a. For the period 2018 to 2020, can you provide us with a breakdown of the revenue contribution (in LCU) of the fisheries sector towards the following tax handles across the selected ISIC categories (all that applies)?

ISIC code	2018	2019	2020
CIT			
031			
032			
1020			
9319			
PAYE			
031			
032			
1020			
9319			
VAT			
031			
032			
1020			
9319			
Export Royalties			
031			
032			
License Fees			
031			
032			
9319			

3. Is there any other fishery specific charge levied at the national level which was not covered in the previous questions? If yes, could you please provide us with a brief description of it/them?

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3a. If yes, could you please tell us what its/their revenue contribution (in LCU) was over the period 2018 to 2020?

Tax Handle	2018	2019	2020

4. Are there any specific tax exemption/s or subsidy/ies directed towards the fisheries sector? If yes, could you please provide us with a brief description of it/them?

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4a. If yes, have this/these measure/s ever been subjected to a tax expenditure review? In case it has/they have, could you give us the resulting figure/s for the relevant year/s?

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