

Value chain analyses assist in informing policy dialogue and investment operations. They help the understanding of how agricultural development fits within market dynamics. They permit an assessment of the value chains' impact on smallholders, businesses, society and environment.

The European Commission has developed a standardised methodological framework for analysis (<https://europa.eu/capacity4dev/value-chain-analysis-for-development-vca4d/wiki/1-vca4d-methodology>). It aims to understand to what extent the value chain allows for inclusive growth and whether it is both socially and environmentally sustainable.

Context of the value chain

Mali has strong inland fishery potential. Fishing is essentially an artisanal activity and is practiced on all bodies of water (rivers, lakes, ponds). Production is distributed around three main hubs: the Inner Niger Delta (IND), the Gao district, and the Sikasso district. The IND, with an area of approximately 30,000 km², produces over

50% of the national production. Aquaculture is embryonic and estimated to be around 1% of total production.

Fishing is an important source of income and is essential for the food security of the Malian population. However, for various decades now, changes due to hydro-climatic and security risks have been affecting the fisheries value chain (VC). Although VC actors are adapting to the numerous cyclical or structural shocks, imports of frozen freshwater or marine fish have had to increase over recent decades to supplement the needs of a growing population.

The European Union intervention

The Delegation of the European Union (EUD) to Mali and the French Development Agency (AFD) are financing the 'Projet d'Appui à la Filière Halieutique' (PAFHA) to the sum of €15.5 million, which will be implemented until 2024 by the Belgian Development Agency (Enabel). The project is aligned with the National Policy for the Development of Fisheries and Aquaculture in Mali and the Five-Year Aquaculture Development Plan (2016-2020).

The PAFHA aims to reduce the food and nutritional insecurity in Mali by increasing the volume of fish production in the

regions of Ségou and Mopti, to increase the income of actors (fishermen, fishmongers, processors, collectors and wholesalers), and to improve the distribution of value added between actors of the VC.

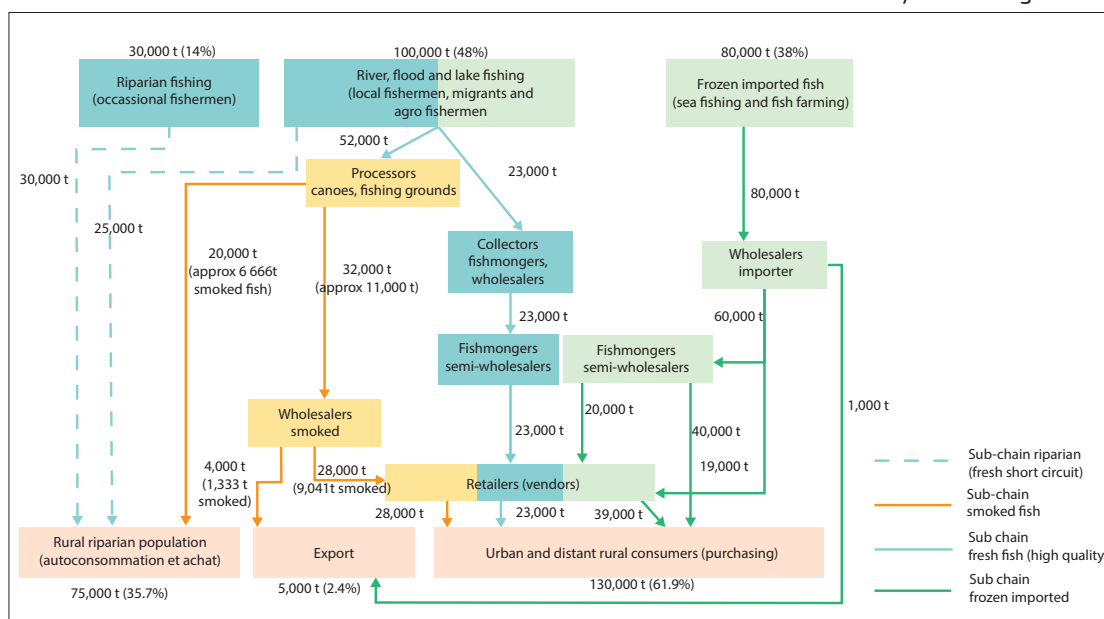


Figure 1 : Main flows and sub-chains of the fisheries value chain in Mali for 2019



Functional analysis

Production and diversity of species

The annual availability of fish in Mali was estimated at **210,000 t, of which 80,000 t is imported**. The IND has the largest potential for production with around 50% of the catch, followed then by the Gao district with 31% of production. The other regions play a supporting role, which is nevertheless important for the food security of local residents notably during the low season in the IND: as the Sikasso region with the Sélingué lake, the region of Koulikoro, the tributaries of the Niger river, the flood zones and secondary lakes.

Among the species, **tilapia** (*Oreochromis* sp.) and **catfish** (*Clarias* sp.) represent around 40% of the annual catch. **Nile perch** (*Lates niloticus*) (high-quality fish) amounts to less than 10% of the total production, but its sale price average per kg is 40% higher than that of tilapia and almost twice that of catfish. Tilapia (carp in Mali) is mainly marketed fresh, while catfish is mainly intended for smoking. Size is another important criterion for differentiating the product for sale.

Import volumes are increasing rapidly towards urban areas, 80% of which consists of fish caught at sea such as **sardinella** (*Sardinella* sp., *Ethmalosa fimbriata*) and **horse mackerel** (*Trachurus trecae* and *Decapterus rhonchus*), while around 20% consists of farmed tilapia, **pangasius** (*Pangasianodon hypophthalmus*) and catfish coming from Asia.

Typology of fishermen and sub-chains

Four types of fishermen can be distinguished according to their level of investment, the time they dedicate to fishing, their mobility, and their sources of income: **occasional fishermen, agro-fishermen** and **local** or **migrant professional fishermen**.

There are four main sub-chains (Figure 1). The **riparian sub-chain** is supplied by occasional fishermen who practice subsistence fishing even if they resell part of the 30,000 t of their catch, by 25,000 t of small fish from other types of fishermen and 20,000 t of smoked fish. In-river catches by agro-fishermen and local or migrant professional fishermen in flooded and lake areas supply the **smoked fish sub-chain** with up to 52,000 t. The **fresh fish sub-chain** destined for urban and rural markets represents 23,000 t. The **imported frozen fish sub-chain** relies on a very small number of importing wholesalers based in Bamako.

Processing: smoked fish

Hot smoking fish is generally practiced by women in camps and fishing grounds.

The washing, scaling and gutting operations not being systematically respected, this can lead to **conservation and food safety problems**. Larva insect infestations can cause serious losses. Sometimes a chemical treatment is applied using pesticides (registered or not) to avoid losses.

Marketing of fresh fish

The main players in marketing are the **fishmongers** (wholesalers/semi-wholesalers), most often women, the **retailers** and **importing wholesalers** (in an oligopoly situation). The transport of fresh fish is done in hand woven baskets and sometimes in polystyrene boxes with a little ice, especially in the hot season. Downgraded fish are sold for processing (smoked or dried) or for quick consumption.

The fishermen's wives are often responsible for selling the fish. The fishmongers sometimes use **collectors** who buy directly from the fishermen in the canoe at a lower price and centralise the fish for transport, thereby reducing the disposable income for the fishing households. The marketing of fish, which traditionally was an activity reserved for women, is seeing the arrival of men in particular in the imported frozen fish sub-chain.

Governance of the VC

The situation of fishermen in the VC is precarious, as they often depend on fishmongers who grant them loans to finance fishing equipment and important household expenses (illness, accident, etc.) and to whom they own exclusivity of the sales in return. The negotiating power of fishermen on prices is therefore non-existent.

Traditional fishing societies are in a crisis because they are poorly regarded despite the knowledge they hold of the environment, species and fishing techniques. The conflicts with other space users are destabilising. Yet fishing is an activity in which the most vulnerable populations can find a source of income and food.

Despite the existence of a sectoral policy, the means given to local public institutions and to technical support staff are insufficient. **Fishing appears as the 'neglected sibling' compared to agriculture** despite its social importance and its role in feeding the population.



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Economic analysis

Financial viability for actors

Activities are **viable for all actors**, but the **Net Operating Profit (NOP) is low for occasional fishermen and agro-fishermen** (Figure 2). The NOP of professional fishermen are well above the minimum wage, in particular for migrant fishermen who are better equipped than local ones. The largest NOP are made by the wholesalers who hold the strongest market power, and by the actors of the imported fish sub-chain, which is much more concentrated than the others.

Contribution to the national economy

The **total value added (VA)** of the fisheries VC amounts to **253 billion FCFA (€386 million)** of which 249 billion FCFA (€380 million) is direct VA. Fishermen create 52% of the direct VA, traders 43% and processors 5%. The smoked and fresh fish sub-chains contribute the most to the direct VA.

The NOP of professional fishermen (38%) (including the value of their labour), frozen fish traders (21%) and fresh fish traders (17%) are the main components of direct VA (Figure 3). The **contribution of the VC to the Gross Domestic Product (GDP) is 2.7%** and **7%** to the **agricultural GDP**.

The **balance of trade of the VC is negative** by 25 billion FCFA (€38 million) due to imports of frozen fish greater than exports of smoked fish and despite low imports of other inputs. The **VC's contribution to public finances is slightly positive**, with the difference between public revenue and expenditure amounting to 1.2 billion FCFA (1.8 Mio €).

Viability in the international economy

The **Nominal Protection Coefficient is well above 1** (6.15) showing that domestic tilapia is less competitive than imported tilapia, with some VC players having higher income than they would have on the international market. Indeed, the market power of a small number of wholesalers induces weak competition in the marketing of fish and pushes prices up.

Imported fish also exerts strong competition on the high-quality fish sub-chain, which is still inefficient in transporting fish while maintaining its quality.

The **Domestic Resource Cost ratio is less than 1** (0.26), meaning that the value of domestic resources used by the VC

is lower than the economic value created by the VC estimated at international prices.

Jobs

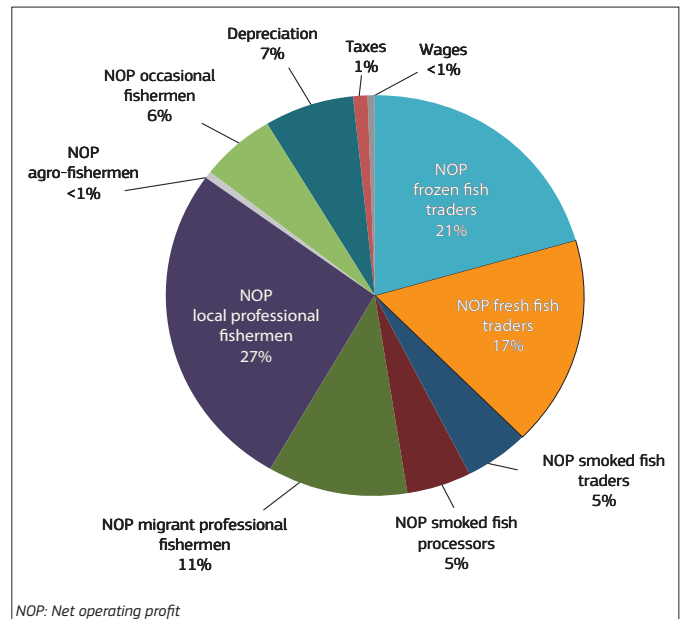
The VC provides employment for around **330,000 full-time equivalent jobs** (i.e 4.5% of Malian jobs) to which occasional fishermen and indirect jobs must be added.

Sub-chain	Riparian	Smoked fish	Fresh fish	Imported fish
OF / agro-fishermen	80,000 / 120			
PF local	700,000/1 070			
PF migrant	1,5 m/2 300			
Wholesaler*		200 m / 305 000	234 m / 357 000	6 bn / 9,1 m
Processor		1,8 m / 2 750		
Semi-wholesaler			25 m / 38 000	1,1 bn / 1,6 m
Trader/ Retailer		1,6 m / 2 500	6 m / 9 150	95 m / 145 000

OF : Occasional fishermen PF : Professional fishermen

*Cost of transport is probably under estimated

Figure 2: Individual annual net operating profits of VC actors (FCFA/€)



NOP: Net operating profit

Figure 3: Distribution of direct value added

WHAT IS THE CONTRIBUTION OF THE VALUE CHAIN TO ECONOMIC GROWTH?

The activities are profitable for all the actors involved. However, fresh fish wholesalers benefiting from an oligopoly which gives them an advantage during price negotiation, obtain high incomes; while occasional fishermen and agro-fishermen remain poor. The contribution of fisheries to GDP is substantial and exceeds that of other value chains with high value added such as cashew nuts. However, it is subject to low levels of investment. This value chain also has the advantage of a high rate of integration into the national economy (87%). However, its dependence on imported frozen fish, which is more competitive, reinforces the country's foreign currency loss.

Social analysis

Figure four and this table present an image of the main social consequences of the VC activities in six strategic domains.

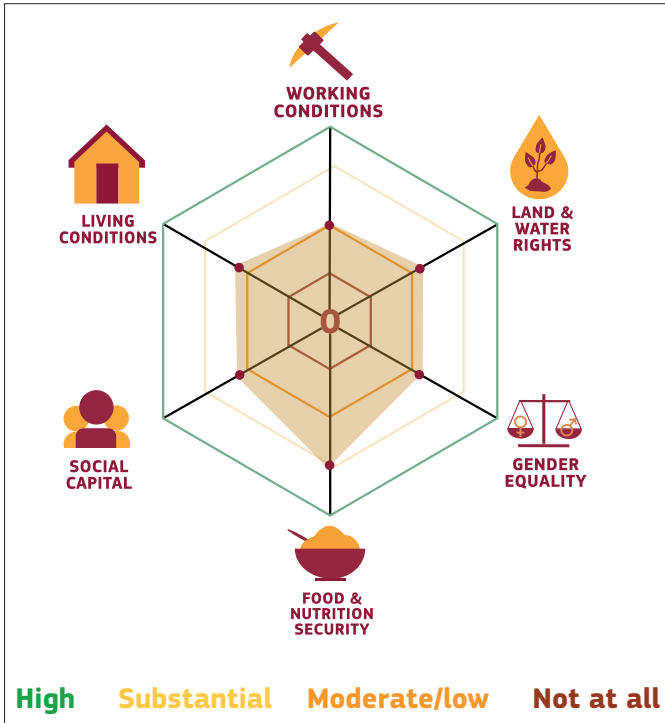


Figure 4: Social profile

Working conditions	<ul style="list-style-type: none"> Lack of regulations and controls of working conditions in the field. Integration of children as family labour. Lower than country average schooling rate in villages and fishing camps. Mainly informal VC, wages declining over time.
Land and water rights	<ul style="list-style-type: none"> Difficult access to some fishing areas which encourages migration, due to the weak consultation opportunities of technical agents, to judges and to the weak strength of fishermen's organisations. Poor access to land and drinking water in the Lake Sélingué area. Low consideration of the interests of fishermen in the management of dams. Water pollution by gold mining activities. No systematic payment of taxes or fishing permits.
Gender equality	<ul style="list-style-type: none"> Strong involvement of women in processing and marketing. Presence of a few female fishermen (generally near the shore with traps). Low discrimination against women in VC activities, strong organisation of fishmongers. Poor contribution of women to economic decision-making (except for market gardening) due to the traditional structure of society.
Food and nutrition security	<ul style="list-style-type: none"> Important role of the IND in the country's food security (15% of cereal production and more than 50% of fishing). Importance of fish for animal protein intake in Mali. Daily intake of fish in the diet of fishermen. Loss of nutritional value linked to the replacement of Malian fish by imported frozen fish.
Social capital	<ul style="list-style-type: none"> Low representation of fishermen nationally. Organisation of fishermen not very functional outside the village network. Uncommon supply cooperatives at village and camp levels. Inter-branch organisation struggling to develop because of the low level of organisation and education of fishermen. Conflicts between seasonal migrants and local fishermen. Calling into question of the right to fish by other users of the water bodies, in most hydro-agricultural systems and in certain conflict zones. Fishermen are discredited in terms of access to agricultural land.
Living conditions	<ul style="list-style-type: none"> Risk of a drop in fishermen's income and their food security in places linked to the intense exploitation of fish stocks. Poor access to housing and water, in particular drinking water in the Lake Sélingué area. Lack of health services in villages and camps. Lack of training for young fishermen and processors.

IS THIS ECONOMIC GROWTH INCLUSIVE?

Women occupy a large proportion of the marketing and processing jobs. Despite the patriarchal system, the value chain allows women to gain some independence without breaking with tradition. It supports many households and allows for the diversification of their activities, ensures a significant source of income and a form of resilience in terms of food security within the country. In case of shocks, fishing and the sale of fish remain accessible activities that provide a small income. However, little reflection exists at the political level to support better governance and the development of inclusive and sustainable fisheries.

IS THIS VALUE CHAIN SOCIALLY SUSTAINABLE?

The value chain makes it possible to include non-professional fishermen, it represents a nutritional and food security safety-net and helps maintain cohesion and national unity. Fishermen are largely present within the most marginalised social classes due to their isolation, to the obligation to travel to fish (seasonal migration) and to the weak governmental support for this sector. A major obstacle to the development of the value chain concerns rights relating to access to water, fishing and land.

Environmental analysis

Damage from fishing and imports

The damage caused by occasional fishermen to the areas of protection (resources, ecosystems, human health) for 1 t of fresh fish is negligible in comparison with other types of fishermen (Figure 5). Boats and equipment are two key components of the environmental impacts of fishing. Nets and traps have a limited impact. Most of the impacts come from the use of an engine and fuel as well as the construction of the canoes with imported wood and their maintenance.

Imports of frozen fish in Mali are the main cause of damage to the three areas of protection for 1 t of frozen fish. At the VC level, human health suffers the greatest potential damage.

Damage by fishing sub-chain

The imported frozen fish and smoked fish sub-chains have the highest potential damage per t of product (Figure 6). The fresh fish sub-chains in riparian areas and in distant markets have the lowest impact. Human health has the most deteriorated impact category, particularly due to emissions from fuel use. For all sub-chains, the most impactful stage is the fishing activity.

For the fresh fish sub-chain, after fishing, the stages that create the most damage are: collecting fish by middlemen, packaging, icing and transport. Concerning the smoked fish sub-chain, the smoking of fish and its transport (to urban markets) have very low impacts compared to fishing. The use of pesticides for conservation in this sub-chain has no visible and direct effect on the areas of protection, but it can increase the impact on the intermediate categories through terrestrial, marine and environmental ecotoxicity. For the imported frozen fish sub-chain, fishing and especially the production of farmed fish generate a large part of the damage. The damage to human health is greater for farmed fish produced in China by about 30% compared to industrial sea fishing, four times higher than artisanal fishing in Mali and almost ten times greater than coastal fishing at sea.

Environmental disturbance and state of fish stocks

The degradation of the environment by economic activities other than fishing (water management by dams, gold and sand extraction) presents a risk of major disruption of the functioning of fishing ecosystems.

Furthermore, the state of exploitation of fish stocks by fishermen in Mali is poorly understood and complex to establish because of the multiple factors that act on stocks and the capacity of the resource to adapt to fishing pressure. However, with the increase in the number of new fishermen, there is a risk of overexploitation of an already weakened system.

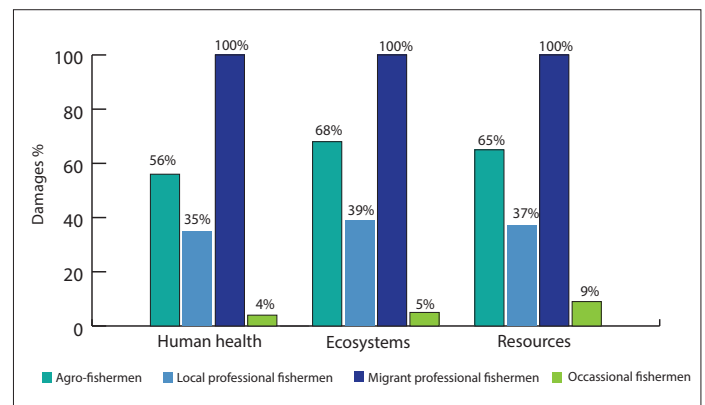


Figure 5 : Damages by 1 t of fish by the type of fishermen

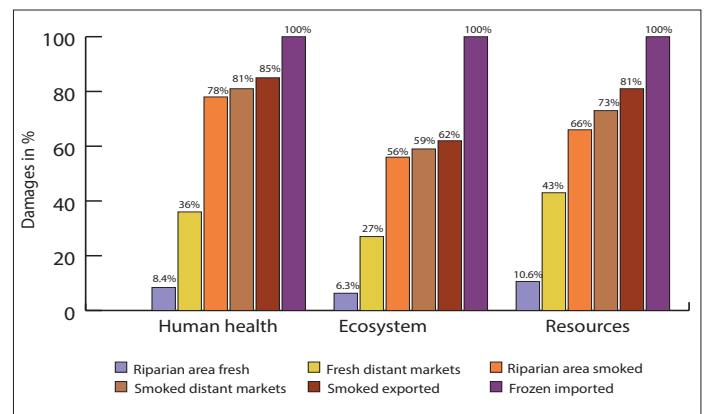


Figure 6: Comparison of the marketing channels by sub-chain

IS THE VC ENVIRONMENTALLY SUSTAINABLE?

The value chain is experiencing environmental non-sustainability due to the significant increase in the volume of imported frozen fish harvested industrially at sea or produced through fish farming in Asia. This sub-chain, which markets 38% of the fish available in the country, is responsible for a large part of the damage to the areas of protection due to the use of fuel for fishing and to the fish production techniques highly consuming concentrated foods and energy. Malian production has little environmental impact given its artisanal nature with very few inputs and a high rate of recycling of fishing materials and equipment. However, an increase in catches will put additional pressure on fishery resources, some of which are already weakened by too intense exploitation or by other economic activities such as gold mining and sand dredging.

Main findings

Strengths, weaknesses, opportunities, threats

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> Traditional knowledge of fishing Proteins for many households, including the most vulnerable Significant number of jobs in the VC Limited losses with processing Diversity of fishing techniques and equipment Easy access to inputs and equipment Interconnection of the different sub-chains 	<ul style="list-style-type: none"> Inland fishery production dependent on climatic variations Poor access to legal remedy in case of conflict Very poor sanitary quality of certain products Insufficient (cold) chain of conservation Strong increase in imports Weak VC structure, no national umbrella structure or organisation Few human resources in central state services Poverty of fishermen
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> Presence of Technical and Financial Partners Important hydrographic network Volunteerism of the Regional Fisheries Department Traditional activity that attracts young people 	<ul style="list-style-type: none"> Construction of dams in the watershed of the Niger River, particularly the Fomi in Guinea Development of gold activities Conflicts over water use (with farmers, breeders, etc.) and risk of overfishing Security risk in the main production areas Weak infrastructure: only an obsolete ice factory, no landing ports, very precarious fish smoking conditions Traditional role of women in marketing threatened by the arrival of men

Main recommendations

The following recommendations are in favour of revitalising the VC and limiting imports.

- Development of a Market Information System** to facilitate access to information for all actors, to be supported by local authorities and government. The dissemination of information on prices by fish and category (smoked, fresh, frozen) could allow fishermen to free themselves from the economic power of fishmongers and limit the current distortion of prices. This system could be coupled with **improved information on catches and monitoring of imports**, useful for thinking about the taxation of imported frozen fish.
- Improvement of the conditions of access to credit for fishermen**, to give them more autonomy in the sale of their products and better negotiating power. This can be done in particular by offering **loans to the wives of fishermen** wishing to improve their activities around the fish marketing and who sometimes finance the equipment of their husbands.
- Relaunch of multidisciplinary research and development programs** to better understand the challenges in terms of resource management and the integration of the various factors of sustainable fisheries management in order to promote integrated resource systems; develop technical support, monitoring indicators of pressure on resources; support initiatives and innovation projects for the creation of fishing equipment with local materials.
- Support for the transition to **a collective management system for fishery resources** taking into account all users. The increase in interactions between fishing (or even integrated aquaculture) in rice fields and fish ponds in the river offers potential for improving production. It would then be possible for occasional fishermen and agro-fishermen to be accompanied for equipment tests with a view to better exploitation of the local resource with the participation of professional fishermen.
- Strengthen local governance** for good management of land and water rights in the current security context.

Value Chain Analysis for Development (VCA4D) is a tool funded by the European Commission / INTPA and is implemented in partnership with Agrinatura.

Agrinatura (<http://agrinatura-eu.eu>) is the European Alliance of Universities and Research Centers involved in agricultural research and capacity building for development.

The information and knowledge produced through the value chain studies are intended to support **the Delegations of the European Union** and their partners in improving policy dialogue, investing in value chains and better understanding the changes linked to their actions. VCA4D uses a systematic methodological framework for analysing value chains in agriculture, livestock, fishery, aquaculture and agroforestry. More information including reports and communication material can be found at: <https://europa.eu/capacity4dev/value-chain-analysis-for-development-vca4d->

This document is based on the report "Analyse de la chaîne de valeur de la pêche au Mali", by Ludovic Andres (ISTOM), Gian Nicolay (FIBL), Ivonne Alba Acosta, Henri Zerbo and Marc Oswald (ISTOM). Only the original report binds the authors.

