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Does environmental or local labeling can help to manage an invasive species through consumption?

The case of Silurus Glanis in the Alpine Lakes

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Introduction

Wels catfish (Silure Glane):

- A non-endogenous species in France, observed since the late 20th century in many rivers and lakes (including Lac du Bourget) (Cucherousset et al., 2018)
- Has environmental impacts through its predation on endogenous species (Vagnon, 2021)
- Economic impacts on both recreational and professional fishing activities

Mainly positive, trophy species

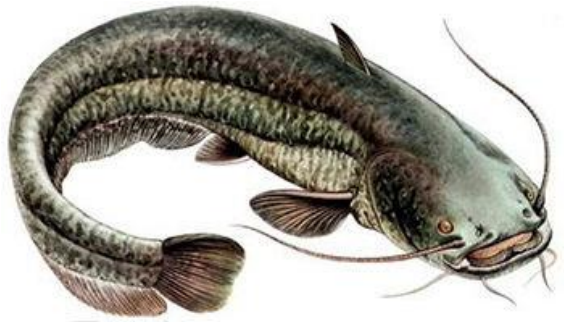
Market issues, no consumers

How to support a new species consumption to mitigate environmental and economic impacts ?

Région Savoie and *Lac du Bourget*

Source: Google maps; ville.fr

Silure Glane



Source: https://www.cpalb.fr/les-poissons-le-silure

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Introduction

Production and consumption of wels catfish :

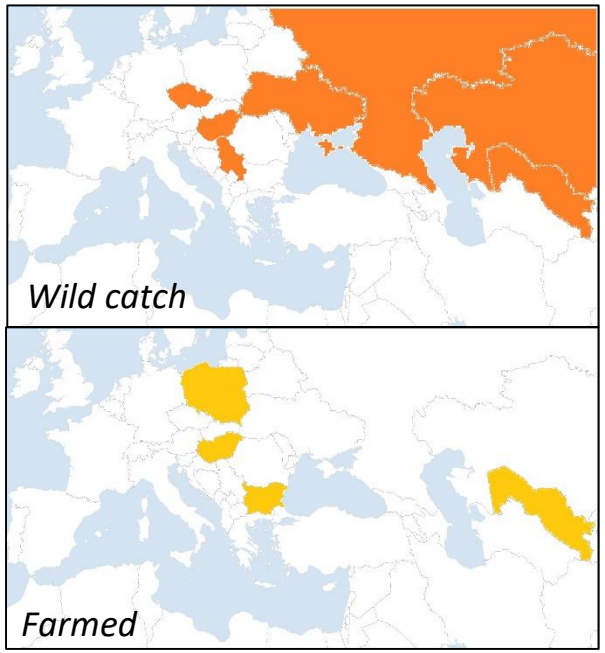
- Traditionally consumed in Eastern Europe and western Asia
- Both issues from catch and farmed production (11,285 and 2,026 tons respectively in 2018 - estimation, FAO, 2020)

  ⟶ New food product in France

Factors influencing the acceptance of a food product:

- Availability, cost, consumer preferences, and/or nutritional values;
- Knowledge, previous experiences, testing (Caparros et *al*. 2016; Hartman and Siegrist, 2016; Piha et *al*., 2018; Van Loo et *al*., 2020);
- Dimensions relative to the environmental and health attributes (Mennozi et *al*. 2017) ;
- Desire to improve social and economic conditions of a region (Yang et al. 2020).

Producing countries of wels catfish



Map source: http://www.cmap.comersis.com/carte-fond-Europe-et-Moyen-Orient-gratuit-cmhc5165602.html ; Database source: FAO, 2020)

Influence of economic and environmental labels on wels catfhis consumption

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Methodology and database

Survey to evaluate consumer perception of wels catfish:

- Online by Kantar in May 2020 with 451 respondants in Savoy county (*"Savoie and Haute Savoie département"*)
- Six sections on freshwater and wels catfish consumption habits, perception of freshwater species and of wels catfish, respondants knowledge, perception of activities on Bourget Lake, sociodemographics….
- Seventh section on scenario for labelled wels catfish in order to estimated WTP:
  - Scenario 1 presents a wels catfish labelled « environmentally friendly fishing » (Environmental label) – 1/3 of respondants
  - Scenario 2 presents a wels catfish labelled « locally product» (Local label) – 1/3 of respondants
  - Scenario 3 presents a wels catfish labelled « environmentally friendly fishing » & « locally product » (Environmental & Local label) – 1/3 of respondants

For each label: estimation of the WTP using a double auction methods

1€, ↑2€, ↓0.5€

1.5€, ↑3€, ↓0.75€

2€, ↑4€, ↓1€

Methodology and database

Objectif 1:

- Determinants of wels catfish consumption and potential consumption

Four types of individuals:

1. PNC (Potential Non Consumer): individuals that do not agree to consume or to buy wels catfish – 15.46% of the sample
2. OPC (Opportunistic Potential Consumer): individuals that do agree to consume but not to buy wels catfish – 29.64% of the sample
3. PC (Potential Consumer-Buyer): individuals that do agree to consume and to buy wels catfish – 39.95% of the sample
4. CB (Consumer-Buyer): individuals that do agree to consume, to buy wels catfish and who already consumed it – 14.95% of the sample

→ Multinomial Probit Model

Methodology and database

Objectif 2:

- Determinants of WTP for labeled wels catfish

$$W_{it}^{*} = 1 \; if \;\; W_{it}^{*} > b_{it} \;\; ; \;\; W_{it}^{*} = 0 \; otherwise$$

$$W_{i1}^{*} = X_i'\beta + u_i$$

$$W_{i2}^{*} = \big(1 - \gamma(E_i)\big)W_{i1}^{*} + \gamma(E_i)b_{i1} + \delta$$

$$P(W_{it} = 1) = P(W_{it}^{*} > b_{it}) = \; \Phi\left[\frac{X_i\beta + \gamma(E_i)b_{i1}I_t + \varphi_\delta I_t - b_{it}}{\sigma_\eta}\right]$$

→ Random effect probit models with structural shift and heterogenous anchoring

→ Estimation of the average-treatment of the treated (ATT) to differenciate scenario using PSM

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Results

Determinants of wels catfish consumption and potential consumption

Four types of individuals: PNC (ref), OPC, PC and CB

Variable to explain:

Fish consumption and purchase criteria	Socio-demographic	Others
Frequency of fish consumption	Age (ref. 60+)	Knowledge of wels catfish (ref Know a little)
Freshwater fish consumption (wels catfish excluded)	- 35 or less	- Does not know at all
Production importance*	- 3-to 60	- Knows wels catfish
Freshwater fish perception*	Children at home (ref. no)	Recreational fisherman
Freshwater fish consumption at home	Household Income (ref. less than 2000€)	Negative perception of the environmental impact of professional freshwater fishing
Freshwater fish consumption out-of-home	- 2000€-4000€	Positive perception of the environmental impact of professional freshwater fishing
Place of purchase (PP) Direct sales	- More than 4000€	Perception of professional fishing*
PP Large market shop	Gender (ref. men)	
PP fishmongers	Subregion (ref. Haute-Savoie)	
PP farm market		
PP Self-production		

*constructed on factors analyses

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Four types of individuals: PNC (ref), OPC, PC and CB

Fish consumption and purchase criteria	Socio-demographic	Others
Frequency of fish consumption	**Age (ref. 60+)**	**Knowledge of wels catfish (ref Know a little)**
Freshwater fish consumption (wels catfish excluded) PC(-)* CB(+)*** **	- **35 or less CB(+)*** **	- **Does not know at all OPC(-)*** **
Production importance OPC(-)* PC(+)** **	- 3-to 60	- **Knows wels catfish PC (-)* CB(+)*** **
Freshwater fish perception PC(+)* CB(-)** **	**Children at home (ref. no) PC(-)** CB(+)*** **	Recreational fisherman
Freshwater fish consumption at home	Household Income (ref. less than 2000€)	Negative perception of the environmental impact of professional freshwater fishing
Freshwater fish consumption out-of-home OPC(-)* PC(+)*** **	- 2000€-4000€	Positive perception of the environmental impact of professional freshwater fishing
Place of purchase (PP) Direct sales OPC(-) CB(+)*** **	- More than 4000€	**Perception of professional fishing CB(+)** **
PP Large market shop PC(+)* CB(-) **	Gender (ref. men)	
PP fishmongers OPC(-) PC(+)*** **	Subregion (ref. Haute-Savoie)	
PP farm market		
PP Self-production		

Nb. Obs: 356. Marginals effects were estimated. Significant level: 1%***, 5%**, 10%*

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Results

Estimate results of WTP for labeled wels catfish

Variable to explain:

Label and purchase dimensions	Socio-demographic	Others
Bid amount	Age (ref. 60+) - 35 or less - 3-to 60	Knowledge of wels catfish (ref Know a little) - Does not know at all - Knows wels catfish
Freshwater fish consumption (wels catfish excluded)		
Production importance	Children at home (ref. no)	Negative perception of the environmental impact of professional freshwater fishing
Freshwater fish perception	Household Income (ref. less than 2000€) - 2000€-4000€ - More than 4000€	Perception of professional fishing
Freshwater fish consumption at home		Constant
Freshwater fish consumption out-of-home		
Local label effectiveness		**Controls**
Local label knowledge		Order
Organic label knowledge		Structural shift
Organic label trust		Heterogeneous Anchoring
Organic label importance		

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Freshwater fish consumption (wels catfish excluded)	- 35 or less	- Does not know at all
	- 3-to 60	- Knows wels catfish
Production importance	Children at home (ref. no)	Negative perception of the environmental impact of professional freshwater fishing
Freshwater fish perception	**Household Income (ref. less than 2000€)**	Perception of professional fishing
Freshwater fish consumption at home	- 2000€-4000€	**Constant (-)*** **
Freshwater fish consumption out-of-home (+)*	- **More than 4000€ (+)****	
Local label effectiveness		**Controls**
Local label knowledge		Order
Organic label knowledge		**Structural shift (+)*** **
Organic label trust (+)**		**Heterogeneous Anchoring (+)*** **
Organic label importance		

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Results

Estimate results of WTP for labeled wels catfish

- Average treatment effect postestimation in regards of the three scenario:

  No difference in the probability to accept the bid between the scenario

- *Estimation of WTP (start price 17€/kg):*

Scenario	WTP	LB-UB	Nb of observations
All together	1.23€	1.07-1.36	356
Local labelling	0.99€	0.60-1.28	112
Environmental labelling	1.46€	1.23-1.64	125
Local and environmental labelling	1.22€	0.95-1.45	119

Conclusion

Consumption and potential consumption of wels catfish

- *Importance to remove the barriers to consumption of a new species depending of the type of consumer;*
- *Wels catfhish can be an alternative to others consumed species;*
- *Role of knowledge on wels catfish and freshwater fisheries;*
- *Place of purchase as a way to help consumer to consume wels catfish.*

WTP for labelled products

- *Price and income dimension always important in estimation of WTP;*
- *Trust in existing label;*
- *Consumer value the environmental and the local label similarly and there is no benefit to use both.*

Do label promote the consumption of a new species? Not so sur….

La Région Auvergne-Rhône-Alpes

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Thank you – Trugarez - Merci