Open the door to aquaculture...

Learning Activities (Objective) – WP 1

The case: "Selecting a species for aquaculture"

Exercise: Matching your available conditions with the requirements of an aquaculture-related species

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Which species will I grow?
Selecting a species for aquaculture.

Introduction:

The choice of suitable species for aquaculture often is a balance between biological knowledge and economic necessities. The biological knowledge required to allow a successful culture of a species is manifold and needs thorough considerations of the applicable conditions.

Prior to selecting a species for culture or for a (business) project, it is important to consider the species' biological requirements and the economics and market potential.

The following general factors should be considered when selecting a species for a successful aquaculture venture:

- Knowledge on biology, ecology, and life history
- Knowledge on reproductive culture methods
- Possibility of captive breeding and closing the life cycle under controlled farming conditions
- Ability to culture at high population densities in artificial holding facilities
- Ability to consume and efficiently grow on artificial formulated diets
- Ability to mimic the natural life cycle in a controlled environment
- Attainability of market size within economically feasible period of time
- Low vulnerability to pathogens

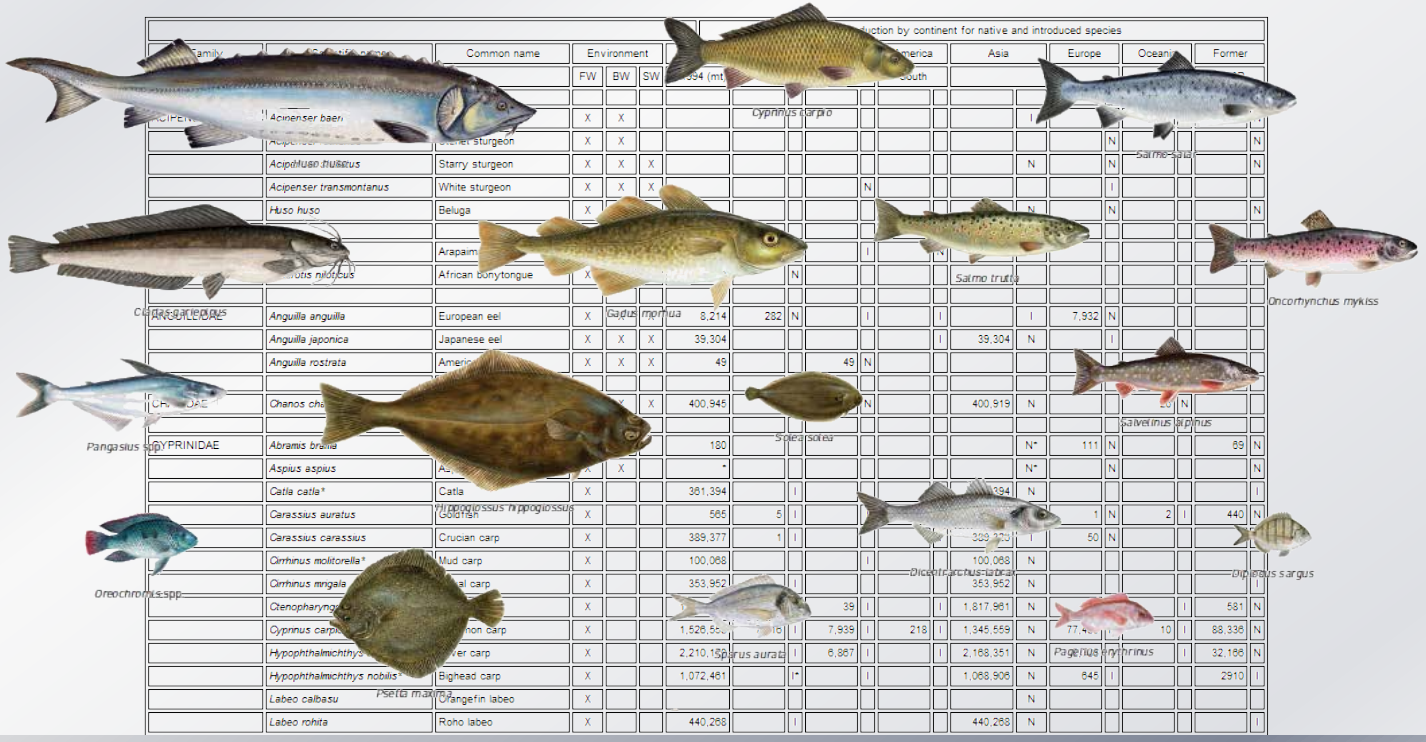
The ideal aquaculture species possesses all the above characteristics. However few if any species are ideal. More often there is some compromise in terms of these characteristics.

Decision Supporting System (DSS): Which species will I grow?

At present, about 240 fish species are reared in aquaculture (among them about 60 marine species). Which species fits to my the (biotic) conditions?

3.1 LIST OF FISH SPECIES N = Native I = Introduced

Family	Scientific name	Common name	Environment			Production by continent for native and introduced species										
			FW	BW	SW	994 (mt		America South		Asia		Europe		Oceania		Former
ACIPENSERIDAE	Acipenser baeri	Siberian sturgeon	X	X							I		N			N
	Acipenser ruthenus	Starry sturgeon	X	X	X						N		N			N
	Acipenser transmontanus	White sturgeon	X	X	X				N				I			
	Huso huso	Beluga	X								N		N			N
		Arapaima	X						I		N					
	otis niloticus	African bonytongue	X					N								
ANGUILLIDAE	Anguilla anguilla	European eel	X			8,214	282	N		I		I	7,932	N			
	Anguilla japonica	Japanese eel	X	X	X	39,304				I	39,304	N		I			
	Anguilla rostrata	Americ	X	X	X	49		49	N								
CHANIDAE	Chanos cha		X		X	400,945			N		400,919	N		26	N		
CYPRINIDAE	Abramis brama		X			180						N*	111	N		69	N
	Aspius aspius	A	X	X		*						N*		N			N
	Catla catla*	Catla	X			381,394		I			381,394	N					I
	Carassius auratus	Goldfish	X			565	5	I					1	N	2	440	N
	Carassius carassius	Crucian carp	X			389,377	1	I			389,376	I	50	N			
	Cirrhinus molitorella*	Mud carp	X			100,068				I	100,068	N					
	Cirrhinus mrigala	al carp	X			353,952		I			353,952	N					
	Ctenopharyngo		X					39	I		I	1,817,961	N			I	581	N
	Cyprinus carpi	non carp	X			1,526,53	16	I	7,939	I	218	I	1,345,559	N	77,4	10	I	88,336	N
	Hypophthalmichthys	ver carp	X			2,210,15		I	6,867	I		I	2,168,351	N			I	32,166	N
	Hypophthalmichthys nobilis*	Bighead carp	X			1,072,461		I*		I		I	1,068,906	N	645	I		2910	I
	Labeo calbasu	Orangefin labeo	X									N							
	Labeo rohita	Roho labeo	X			440,266		I				I	440,266	N					I



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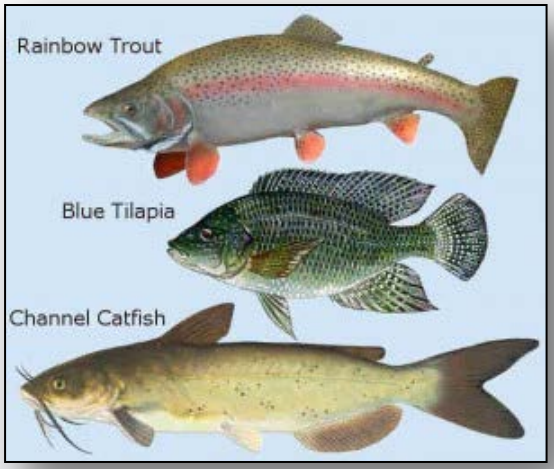
Decision Supporting System (DSS): Which species will I grow?

"You can raise whatever kind of fish you want. You would only be limited by your budget, time, space and climate".

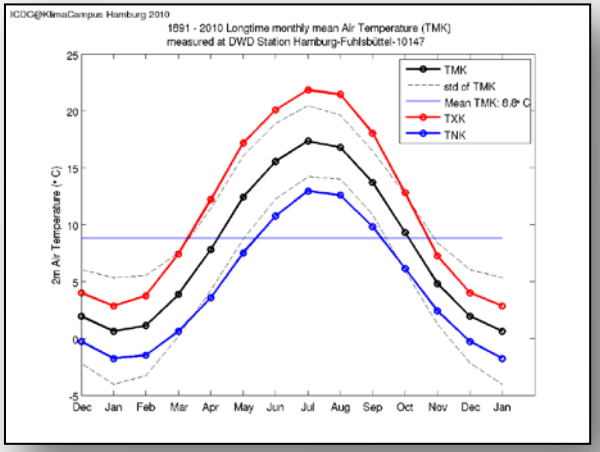


Goals:

- to get familiar with the most fish species which are at present propageted in aquaculture;
- to learn about the biological features of commonly cultured fishes and to select species which fits to certain local conditions;

1st Condition: Temperature Regime

- ✓ Check the annual temperature regime in the area where you want to produce the species (production cycle).
- ✓ Consider deviations in air – water temperature regime (e.g. in case you want to deploy net cages in a lake).



~ 240 Species produced in Aquaculture

x Species meet temperature regime

Sources e.g.

- Meteorological resources of the area;
- „Species summary pages“ in FishBase;
- Aquaculture breeding information

attention…..draft….

2nd Condition: Water Source & Quality

- ✓ Marine conditions (varying salinity) or freshwater
- ✓ Check details available water sources: groundwater, surface water, rain, municipal water sources, seawater, recirculation system.
- ✓ Check if you can heat- or cool the water (Biogas facility..)
- ✓ Check other important features of your water source (e.g. flow through-rate, oxygen, pH, sediment, eutrophic…).

Result: x Species meet temperature regime

x marine Species meet water quality

X freshwater species meet water quality

Sources e.g.

- „Water advisor“ in LarvalBase
- „Species summary pages“ in FishBase;
- Aquaculture breeding information (FAO, Books..);

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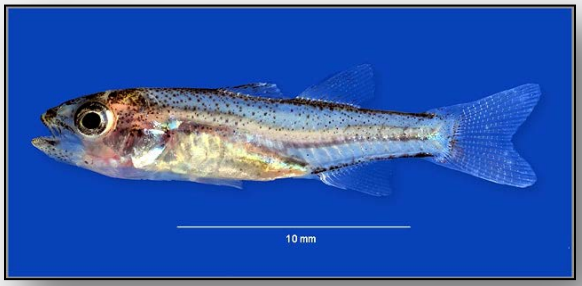
3rd Condition: Fry availabilty (sustainability)

- ✓ Check if the reproduction cycle is mastered artifically
- ✓ Check if offsprings only from natural sources (e.g. eel)
- ✓ Check availability of juveniles throughout the year



Result: x marine Species meet water quality

for x species , fry is available on a sustainable basis

Sources e.g.

- „Water advisor“ in LarvalBase
- „Species summary pages“ in FishBase;
- Aquaculture breeding information;

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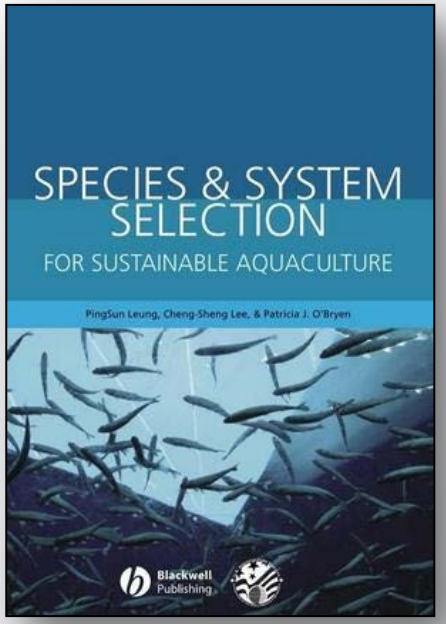
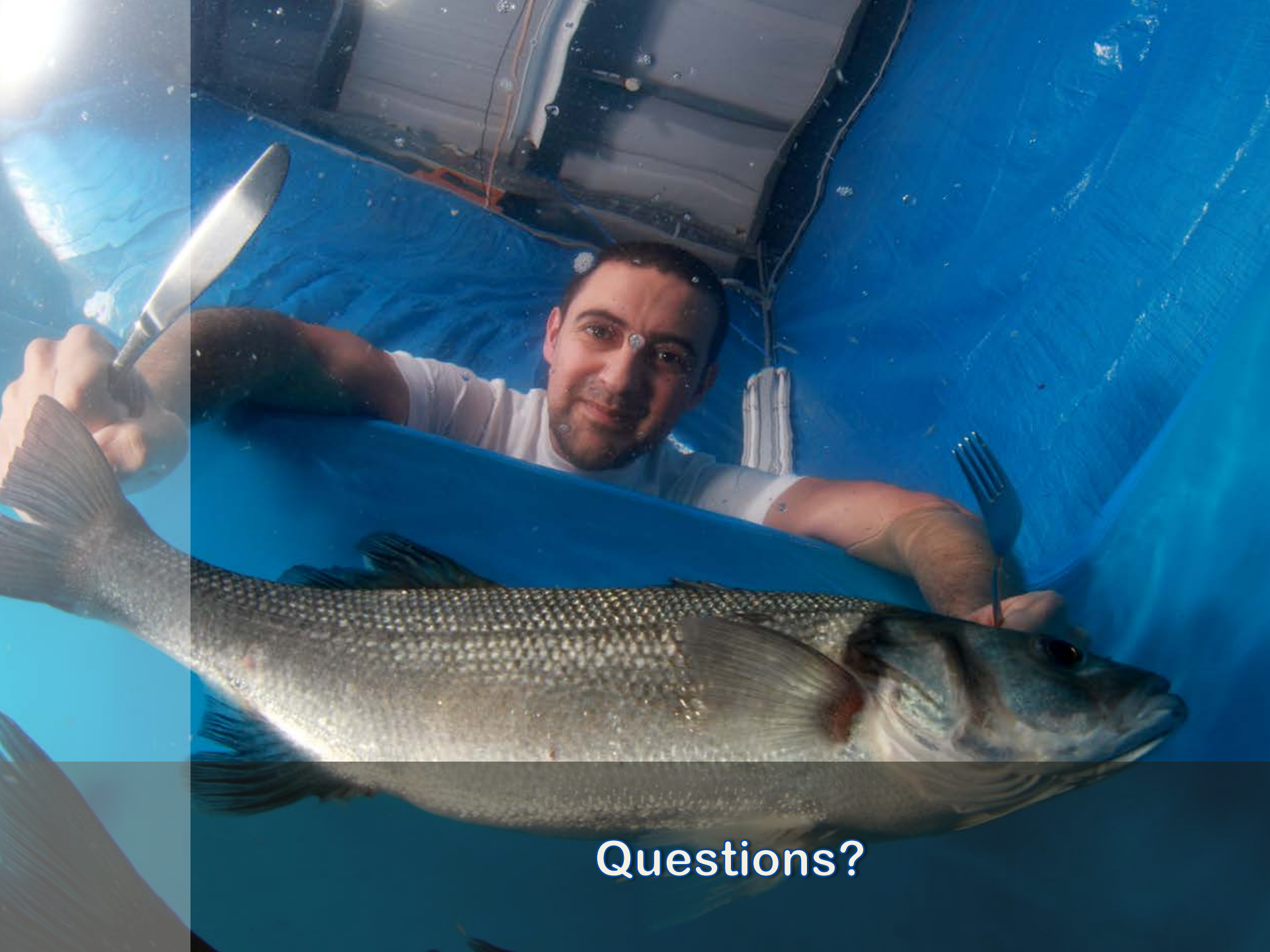
Decision made, but not the end of the story….

✓ Final decision was made: the biological features of x species fits well to the applicable conditions.



Further consideration: regulations

- in case, non-native species are the choice: indigenous versus exotic species (precautions to prevent adverse effects on local fauna and flora);
- fast growth, short food chain, efficient conversion of food, ready acceptance of compounded feeds, good table quality, disease resistance;
- social and environmental sustainability, consumer acceptance and marketability;
- cost of production;
- domestic consumption versus export;


Questions?