





Biodiversity footprint of hydropower : introducing aquatic pressures into the Product Biodiversity Footprint (PBF)

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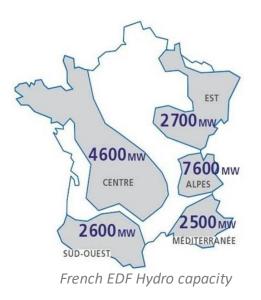


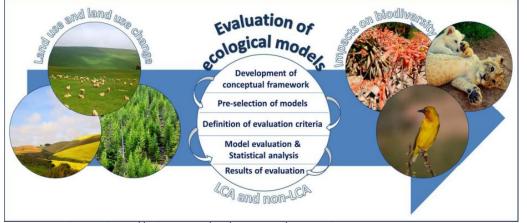
CONTEXT & OBJECTIVES

- EDF hydro : 20 GW ; 450 HPP ; many small units, some big ones; many different environmental contexts
- Hydro : Renewable energy, low carbon footprint, but :
 - Life-cycle HP GHG emissions quite variable depending on many factors
 - LCA approach for biodiversity needs to be improved
 - No available biodiversity footprint method as reference nor standardization

From assessment to action :

- Introducing eco-conception approach in new projects, refurbishment or maintenance of HPP
- Exploring the value of a Life-cycle biodiversity footprint indicator, beyond environmental LCA





Curran et al, 2016, https://pubs.acs.org/doi/10.101021/acs.est.5b04681

COF CORE REPORT

CONTEXT & OBJECTIVES

- I Care : Consulting agency specialised in environmental topics, esp. biodiversity impact assessment and methodology development
 - 10+ biodiversity impact assessment through PBF methodology for corporates
 - Involved in the development of assessment methodologies at site, building, product, commodity and corporate level

PBF (/SBF) : Product (/Site) Biodiversity Footprint

- Based on LCA, solid scientific basis
- www.productbiodiversityfootprint.com (Asselin et al, 2020)
- Mainly terrestrial biodiversity

Introducing aquatic biodiversity into the PBF

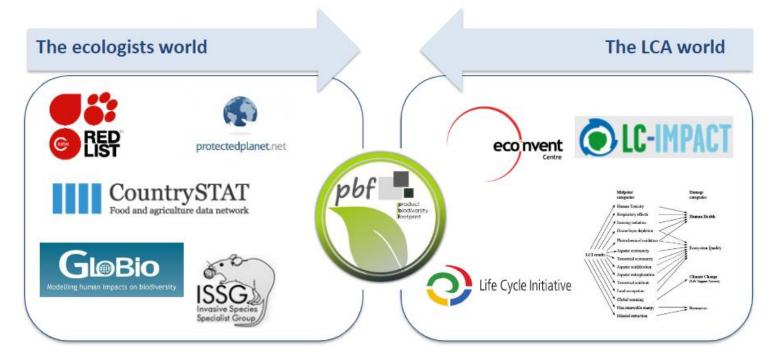
- Via Adaptation to Hydropower specificities
- And test on a dam modification case (work in progress)

Biodiversity diagnosis & strategy	SEPPIC CONSTRUCTION	Analysis of impacts & dependencies Definition of a biodiversity strategy, action plan & roadmaps Support to TNFD analysis & reporting Support in SBTn / ACT4Nature engagements
Product biodiversity footprint Site biodiversity footprint Corporate biodiversity footprint Impacts on ecosystem services	CITEO L'OREAL A A	Biodiversity footprinting and quantification of impacts on ecosystem services
Awareness raising, trainings & workshops		 Training & awareness raising for employees Training & awareness raising for environmenta managers Seminars/ workshops for executive committee
 Benchmarks on best practices Lessons learnt from field work on biodiversity impacts Collaboration with NGOs and with field projects 		Support to field work and collaboration with environmental NGOs

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CHALLENGES

- Speak the language of ecologists and LCA specialists
- Make connections



 Integrate the wide variability of hydropower impacts and environmental types

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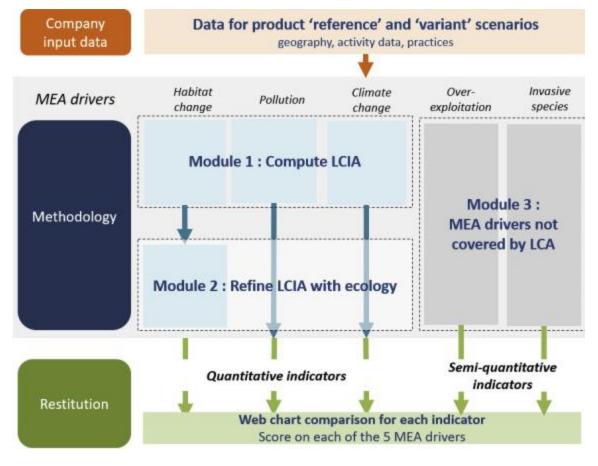
HOW DOES PBF WORK ?

- Considers 5 main drivers on biodiversity identified by IPBES and MEA
- Based on LCA databases/EF whenever possible, and standard qualitative analysis grid if not
- Captures geographical specificities:

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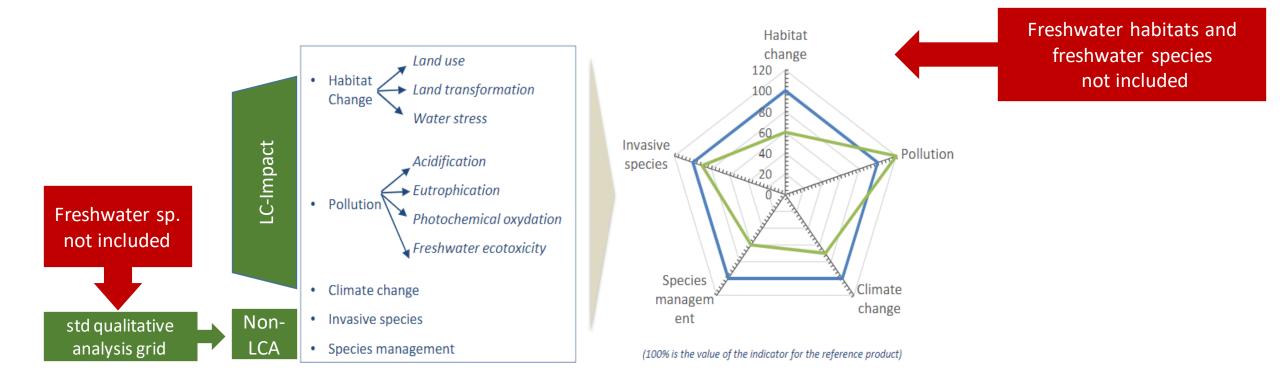
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- Through LCA when chararacterisation factors are available at local scales
- Through ecological literature review to complement LCA characterisation factors to take into account projects' or sites' specificities
- Compares a variant product vs a reference on whole life cycle and value chain
- Is expressed in pdf.yr (Potentially
 Disappeared Fraction of species, over a year)
 and Qualitative indicators



www.productbiodiversityfootprint.com (Asselin et al, 2020)

HOW DOES PBF WORK ?



INTRODUCING FRESHWATER BIODIVERSITY AND HYDROPOWER PRESSURES

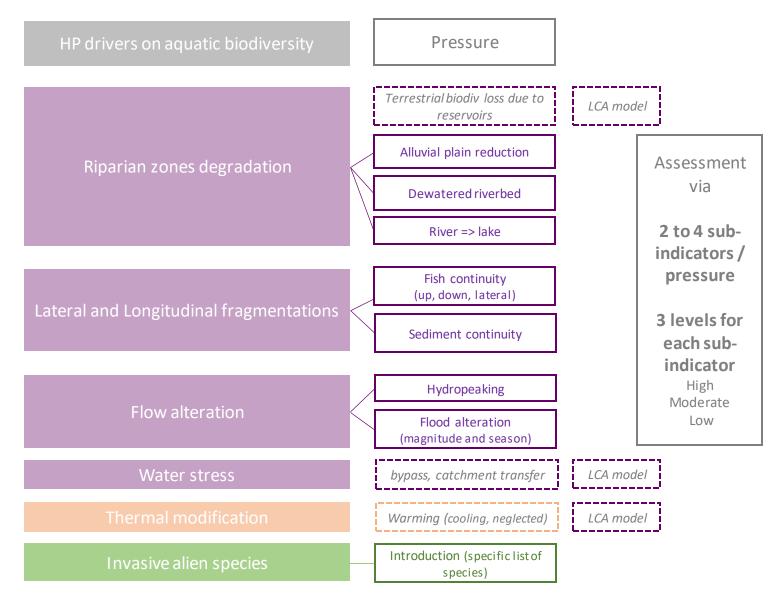
• Literature review to identify :

- Anthropic pressures on <u>aquatic biodiversity</u>
- HP pressures on whole biodiversity (terrestrial and aquatic)
- Available LCA quantification, useful for HP
 - 6 main HP pressure on aquatic biodiversity linked to 3 IPBES drivers
 - 3 HP pressure quantifiable via LCA models

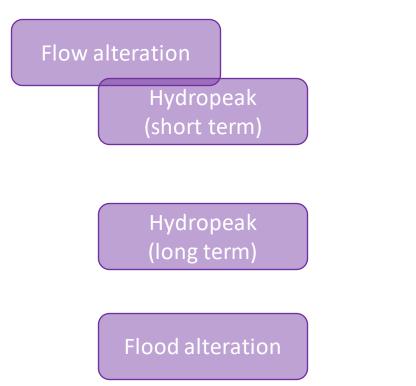
Drivers IPBES	HP drivers on <u>aquatic</u> biodiversity	
Land / sea use change	Riparian zones degradation	LCA model only for reservoir (terr => lake)
	Lateral and Longitudinal fragmentations	
	Flow alteration	
	Water stress	LCA model (water derivation)
Pollutions	Thermal modification	LCA model when T° discharge > T° river
Invasive alien species	Invasive alien species	

INTRODUCING FRESHWATER BIODIVERSITY AND HYDROPOWER PRESSURES

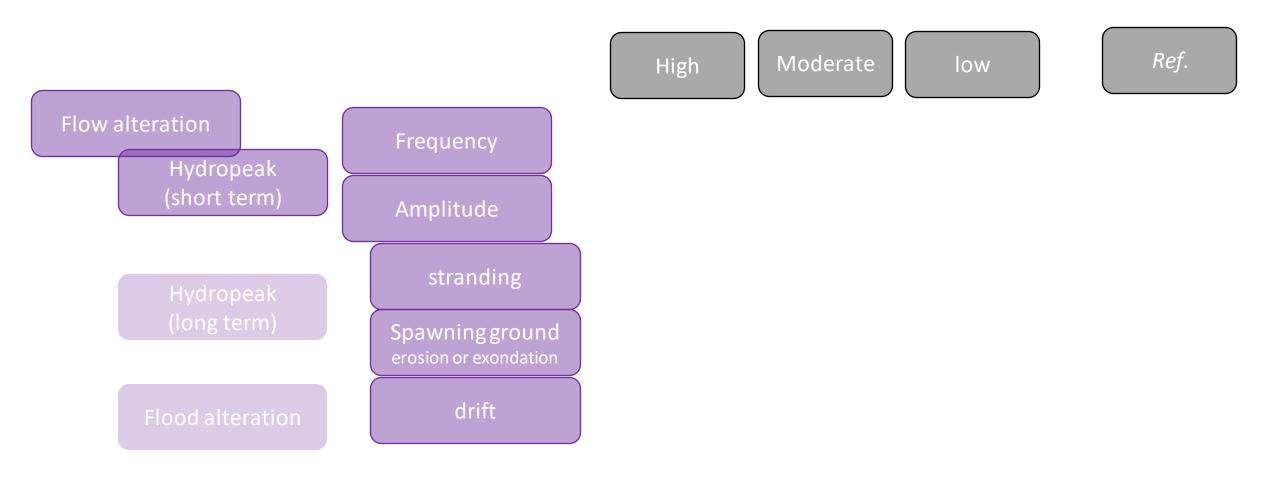
- LCA and HPP experts collaboration to determine
 - A standard analysis grid for the remaining pressures (parameters, indicators)
 - Thresholds (semi-quantitative assessment) – based on literature review and ecologist expertise (for temperate European rivers, at this stage)
 - Combinations of sub-indicators to note the global driver and
 - Local correcting factors for good practices



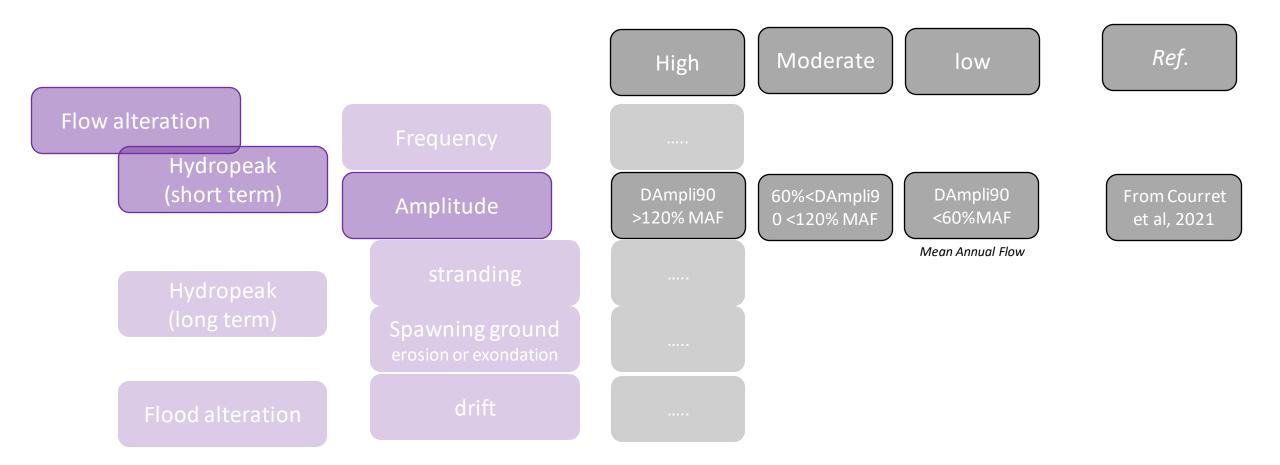
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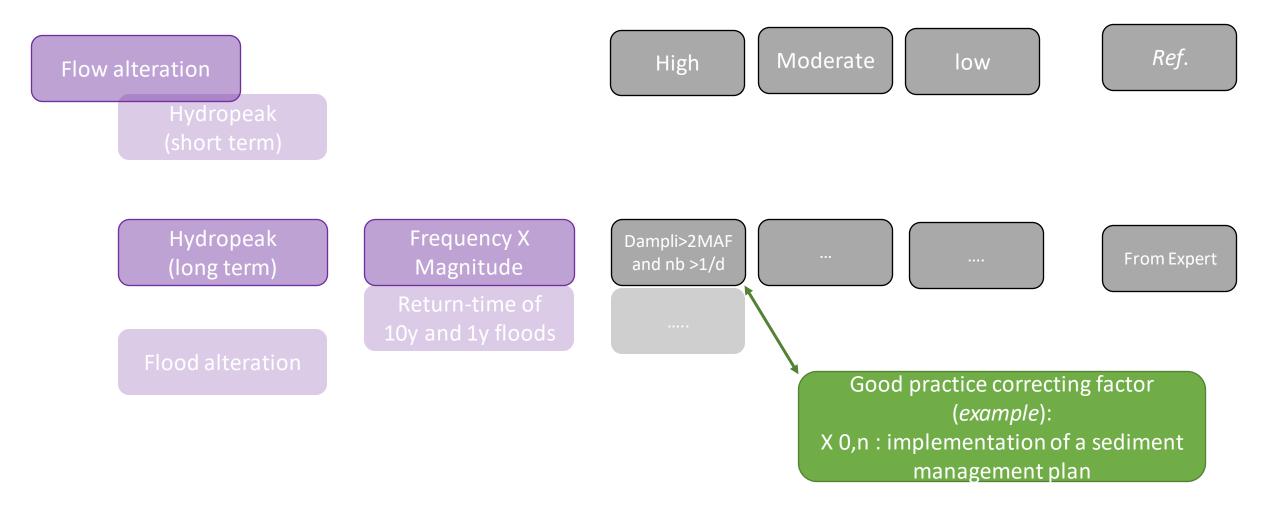








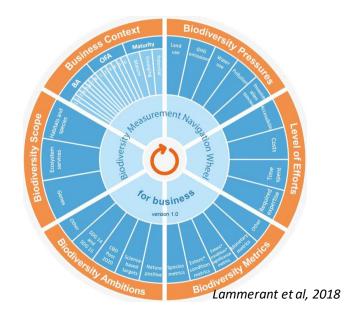


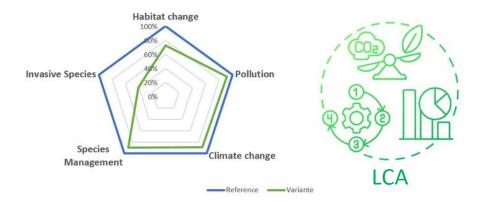


CONCLUSION - PERSPECTIVES

- Many biodiversity footprint methods in development for companies (organizations)
- PBF, based on LCA (robust and standardized approach) and on local ecosystem processes (innovative approach)
- Allows for eco-conception of projects or works or energies (comparison of solutions on the whole life-cycle)
- First integration of aquatic biodiversity combined with LCA (still under development, with prospects for improvement)

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CONCLUSION - PERSPECTIVES

On-going test, adaptation and improvement of PBF_{HP} using Poutes dam case data



Dam and reservoir : 17.7 m; 39 ha; 1.7 millions m³

- Sub-optimal fish continuity (salmon)
- Sub-optimal sediment continuity
- Residual flow and hydropeaking all year
- 33.2 GWh



Dam and reservoir : 8 m; 1 ha; 0.025 millions m³

- fish continuity (salmon) ok fish pass and dam transparency 3 month/y
- Sediment continuity ok
- Increased flow and run-off-river
- 23.6 GWh





