



Life Cycle



Initiative

Water in life cycle
assessment:
Review of methods

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The team

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Goal and scope

- e Performing a systematic qualitative review of existing methods linked to water assessment within a LCA framework (no scoring)
- e Existing methods
 - Inventory methods
 - Scarcity indexes
 - Impact methods: midpoint
 - Impact methods: endpoint
- e Learnings for
 - Scientific community:
 - Guidance on method development
 - Etc.
 - Practitioners:
 - INTERIM guidance:
Which methods address issues?
 - Etc.
 - → *Still to come*





*Complex
assessment !*

How much (m³) / What?

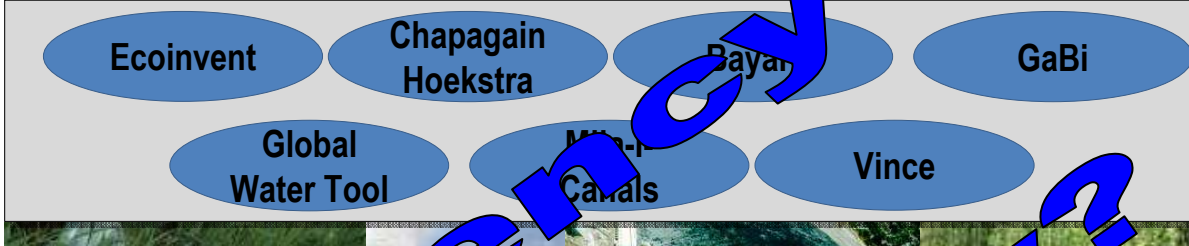


Can it be / Potential problem?

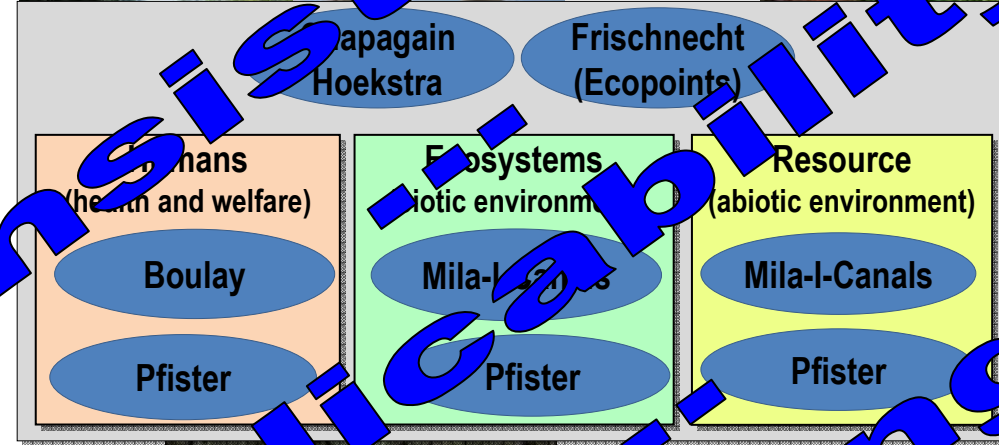


Actual consequences

Inventory (~accounting)



Midpoint (~benchmarking)



Scarcity indexes

Alkenmark

Ohlsson

Gleick

Water Use Per Resource

Seckler

Smakhtin

Alcamo

Pfister

Water Resources Vulnerability Index

Raskin

Water Poverty Index

Sullivan

Consistency? Applicability? Meaning?

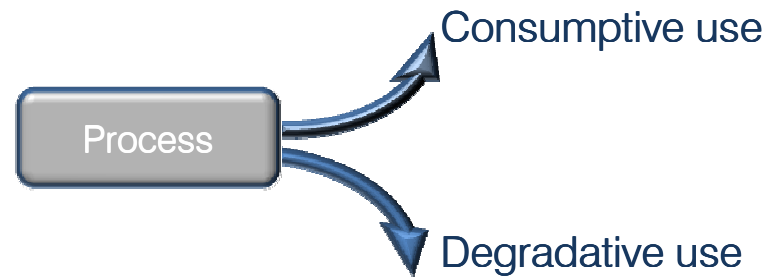


Definitions

In-stream water use



Off-stream water use



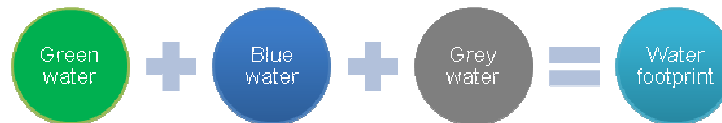
Green water



Blue water



Grey water





Evaluation Criteria/Subcriteria

- e Based on the EULCIA project (“Recommendation of methods for LCIA”)
- e Scientific criteria:
 1. Completeness of scope
 2. Environmental relevance
 3. Scientific robustness and certainty
 4. Documentation, transparency and reproducibility
 5. Applicability
- e Stakeholder acceptance criterion:
 6. Degree of potential stakeholder acceptance and suitability for communication in a business and policy contexts

Preliminary results: inventory methods

In-stream

Green

Quality

Criteria	Ecoinvent	Water tool	Hoekstra	Vince	Bayart	Milà i Canals	GaBi
Scope Relevance	<ul style="list-style-type: none"> • Off-stream and in-stream • No green water 	<ul style="list-style-type: none"> • Off-stream consumption 	<ul style="list-style-type: none"> • Only off-stream consumptive and “degradative” 	<ul style="list-style-type: none"> • Off-stream uses except green • Water quality 	<ul style="list-style-type: none"> • Off-stream uses except green • Water quality 	<ul style="list-style-type: none"> • Off-stream and in-stream • Land use effects • Fossil vs. renewable underground 	
Science	<ul style="list-style-type: none"> • Reviewed 		<ul style="list-style-type: none"> • Not yet reviewed 		<ul style="list-style-type: none"> • Reviewed 	<ul style="list-style-type: none"> • To come 	
Transparency	<ul style="list-style-type: none"> • Published 		<ul style="list-style-type: none"> • Not yet published 		<ul style="list-style-type: none"> • Published 		
Applicability	<ul style="list-style-type: none"> • Easy • Contains data 	<ul style="list-style-type: none"> • More complex 					
Acceptance	<ul style="list-style-type: none"> • Known 			<ul style="list-style-type: none"> • New 			

Preliminary results: scarcity indexes

Future adaptative capacity

Water requirement for environment

Criteria	Gleick (BWR)	Falkenmark (WRPC)	Ohlsson (SWSI)	Alcamo (Criticality ratio)	Seckler (IRWS)	Smakhtin (EWR)	Pfister	Alcamo (criticality index)	Raskin (WRVI)	Sullivan (WPI)
Scope	<ul style="list-style-type: none"> Country level 				<ul style="list-style-type: none"> Annual data & critical conditions Watershed level 	<ul style="list-style-type: none"> Annual data Watershed level 	<ul style="list-style-type: none"> Monthly data Watershed level 	<ul style="list-style-type: none"> Annual data & critical conditions Watershed level 	<ul style="list-style-type: none"> Annual data Country level 	<ul style="list-style-type: none"> Seasonal variability Country level
Relevance	<ul style="list-style-type: none"> 50 l/pers/d as basic water requirement 	<ul style="list-style-type: none"> 1700m³/per/yr as threshold for water shortages 	<ul style="list-style-type: none"> Falkenmark / HDI 	<ul style="list-style-type: none"> Annual water use/annual runoff or watershed 	<ul style="list-style-type: none"> Alcamo + Share of resource for human need + Future adaptative capacity 	<ul style="list-style-type: none"> Alcamo + Human needs = total availability - EWR 	<ul style="list-style-type: none"> Alcamo + variability of precipitation 	<ul style="list-style-type: none"> Alcamo / water availability 	<ul style="list-style-type: none"> Reliability index + Coping capacity + Use-to-resource ratio 	<ul style="list-style-type: none"> Comprehensive and complex
Science	<ul style="list-style-type: none"> All reviewed 									
Transparency	<ul style="list-style-type: none"> All published 									
Applicability	<ul style="list-style-type: none"> Easy 									<ul style="list-style-type: none"> Complex Quite known
Acceptance	<ul style="list-style-type: none"> Quite known 	<ul style="list-style-type: none"> Very widespread 	<ul style="list-style-type: none"> Quite known 	<ul style="list-style-type: none"> Very widespread 	<ul style="list-style-type: none"> Known 	<ul style="list-style-type: none"> New 	<ul style="list-style-type: none"> Known 	<ul style="list-style-type: none"> Known 	<ul style="list-style-type: none"> Known 	<ul style="list-style-type: none"> Known

Preliminary results: midpoint

One midpoint leading to Midpoint of Material Ecosystem Resource Consumption

Criteria	Hoekstra	Frischknecht (Ecopoints)	Pfister	Milà i Canals	Boulay
Scope	<ul style="list-style-type: none"> • Only grey characterized 	<ul style="list-style-type: none"> • Water scarcity quantification • One midpoint leading to 3 AoP 	<ul style="list-style-type: none"> • Not midpoint oriented method • Human health • Ecosystem quality • Resources consumption 	<ul style="list-style-type: none"> • Ecosystem Quality • Resources Consumption 	
Relevance	<ul style="list-style-type: none"> • In discussion 	<ul style="list-style-type: none"> • Off-stream consumptive and borrowing 	<ul style="list-style-type: none"> • Off-stream consumption 	<ul style="list-style-type: none"> • Off-stream and in-stream • Land use effects • Distinguishes fossil and renewable underground 	<ul style="list-style-type: none"> • Same as endpoint
Science		<ul style="list-style-type: none"> • Reviewed 			
Transparency		<ul style="list-style-type: none"> • Published 			
Applicability		<ul style="list-style-type: none"> • Easy 	<ul style="list-style-type: none"> • More complex 	<ul style="list-style-type: none"> • Easy 	
Acceptance		<ul style="list-style-type: none"> • Known 	<ul style="list-style-type: none"> • New 		

Preliminary results: endpoint

Endpoint Human Health Endpoint Ecosystem Quality Endpoint Resource Consumption

Criteria	Pfister	Motoshita (1)	Motoshita (2)	Boulay	Maendly and Humbert	Van Zelm	Bösch (CExD)	Ridoutt
Scope	• All AoP	• Oral infectious diseases from domestic water use	• Undernourishment from agricultural water scarcity	• Human health	• Aquatic biodiversity from dams • Same for humans	• Terrestrial biodiversity from groundwater extraction	Not specific to water • Human health and resource consumption	
Relevance	• Applicable for off-stream water consumption	• Applicable within its scope	• Applicable within its scope	• Applicable for all water uses	• Applicable for turbined water	• Applicable for groundwater	• Water considered as any other resource	• To come
Science	• Reviewed	• Not yet reviewed					• Reviewed	
Transparency	• Published	• Not yet published					• Published	
Applicability	• Easy	• More complex		• Easy				
Acceptance		• New					• Good	

Preliminary learnings: for scientists

Inventory

Method development

- Adding output in addition to inputs?
- In-stream, off-stream, consumptive, degradative and borrowing uses and different water functionalities
- Quality? (e.g., electricity to achieve upper quality level)
- Land use effect on water
- Regional information

Communication

- Colors (e.g., including consumptive and non-consumptive blue water)





Preliminary learnings: for scientists

Midpoint impact assessment

- Improve Ecosystem Quality and Resources Consumption (e.g., include quality)
- Improve Human health for in-stream and off-stream use
- One single midpoint category or Area of Protection specific?
- Etc.



Preliminary learnings: for scientists

Endpoint impact assessment

- Include in-stream use and water quality
- Develop water extraction impact on specific biota
- Develop turbined water impact on human health or specific types of dams
- Include specific-scope methods on broader-scope ones
- Etc.



Current situation

- e Review to be finished by the working group
- e Each developers will be asked for feedbacks
- e Learnings: which tool for which assessment?
- e Final results published by December?
- e Interested?
 - e Contact: Sebastien.Humbert@quantis-intl.com



Thank you for your attention

Questions?