WULCA

A LIFE CYCLE INITIATIVE PROJECT

Zurich and teleconference meeting
Anne-Marie Boulay, Chair
Stephan Pfister, Co-Chair

Kick Off meeting
Consensual Indicator Project
January 23rd, 2014

The objectives of this meeting is to launch the work on the Consensual Indicator Project by:

- Introduce the working group for newcomers
- State the objectives and plan
- Define a work strategy and structure
- Agree on the indicator to work on

Outline

1- INTRODUCTION (45 minutes)

Objectives of meeting and presentation of WULCA and project

2- WORKING PLAN: (30 minutes)

Project objectives, timeline and meeting planning

Task list review and work strategy

---------- **Break: 15 min** ----------

3- FRAMEWORK AND INDICATORS (90 minutes)

Presentation of detailed framework and consensus options

Discussion and preliminary choice

Areas of agreement and disagreement

4- CONCLUSION (15 minutes)

Questions, next meeting, others

1- Introduction

WULCA Working group

Water Use in LCA - International initiative for LCA (2007)

Goal

- Guide the scientific development of a **consensual and operational method** which shall be in line with both the **ISO Water Footprint Standard** and the **LCA principles**
- Provide **guidance to practitioners** and **researchers** in their understanding of comprehensive water footprinting.
- **Represent the scientific voice on water footprinting**
  - Provide scientific support and guidance to the ISO 14046 TR
  - Influence international initiatives (e.g. CEO Water Mandate, WRI activities etc.) + conferences and trainings

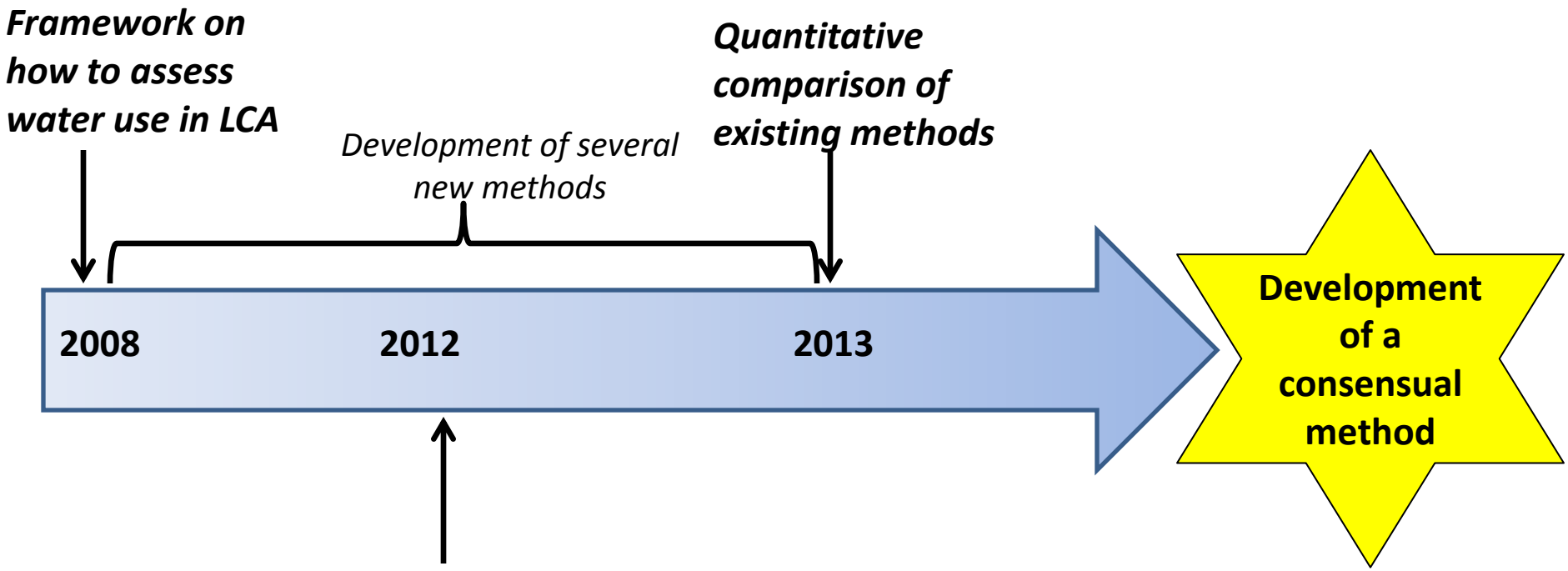
WULCA Working group

Water Use in LCA

Specific Task for the Flagship Project on LCIA Guidance on indicators:

Develop a consensual method for a subset of impact pathways assessing ***water use in LCA*** with priority to midpoint indicators and an area of protection showing sufficient scientific maturity.

Timeline and progress of work



Progress of work

Outputs to date

- **Phase 1:** Proposed a framework to evaluate water in LCA (Bayart et al. 2010)
- **Phase 2:** Review of different methods (Kounina et al. 2013)
- **Phase 3:** Quantitative comparison (Boulay et al A and B, under review)

WULCA Phase 3

- Transition into Phase 3 and official acceptance from Life Cycle Initiative in Spring 2013
- Identified in Glasgow as a Flagship category from the Global Guidance Flagship categories from UNEP SETAC Life Initiative

Anne-Marie Boulay
Project Manager

Stephan Pfister
Deputy Manager

www.wulca-waterlca.org

Membership

Active (~25 members) approx. 1 day/month

- Involved in water-related methodology development or plan to be
- Contribute to the outcome and deliverables of the working group
- Included in all communications with respect to on-going work and progress

Expert (~35 members) approx. ½ day/month

- Knowledgeable on the topic of water and LCA
- Contribute their expert judgment to the outcome of the working group
- Included on communications that are relevant for their expertise

Observer (~ 35 members) no time investment

- Not necessarily an expert or do not have enough time to invest
- Kept informed of the progress of this working group and its deliverables

Sponsors (8-9 sponsoring companies)

- Provide 10’000 USD/yr for 2 years
- Individual from sponsoring companies can act as an active, expert or observer member

SPONSORS

To date, we are formalizing the sponsorship agreement with:

- Hydro-Quebec
- Cascades
- Exxon
- Cottons Inc
- Unilever
- GDF-Suez
- Danone
- Veolia

A specific kick-off meeting for the sponsors is planned for February.

Sponsorship will serve in financing industrial contribution to Mitacs (for fellowship), organize workshop, dissemination, WULCA participation to conference and events (e.g. SETAC, World Water Week, etc) and other operational costs (website, softwares, etc).

PRESENTATION OF PARTICIPANTS

Name
Organisation
Type of member

Position as Chair/Project manager

ADMINISTRATIVELY:

- CIRAIG employee dedicated to WULCA from January 2014-December 2015

- Hired as a post-doc, financed by the Canadian agency MITACS, with industrial contribution from 2.5 sponsors, under supervision of Prof. Manuele Margni. Funds are administratively collected and managed via Ecole Polytechnique Montréal (CIRAIG).

SCIENTIFICALLY – in close collaboration with Dr. Stephan Pfister:

- Guiding this group of experts towards a consensus on one or several water-related indicators within the LCA framework

- Provide communication and training on the topic of water footprinting in LCA, and on the outcome of this group's work

- Continue to support ISO in the DIS development and in the TR 14073, on application and examples of water footprints

Link with ISO water footprint process

There is no official link between ISO DIS 14046 on Water footprint and WULCA, however:

-The convener and several delegates of the ISO working group are members of WULCA

- The work of WULCA has served as a basis in the development of the DIS

-The current DIS does not propose one specific method, but rather Principles, Requirements and Guidelines

- **WULCA can propose this method as the result of a consensus** which could be integrated in the next review of the standard

Link with LCIA global guidance flagship project

Goal of the flagship project

- Establish a consensual set of environmental impact category indicators
- For use in
  - Environmental product information schemes
  - Corporate reporting of multinational companies
  - International and/or national environmental policies
  - Common LCA work commissioned by governments and companies

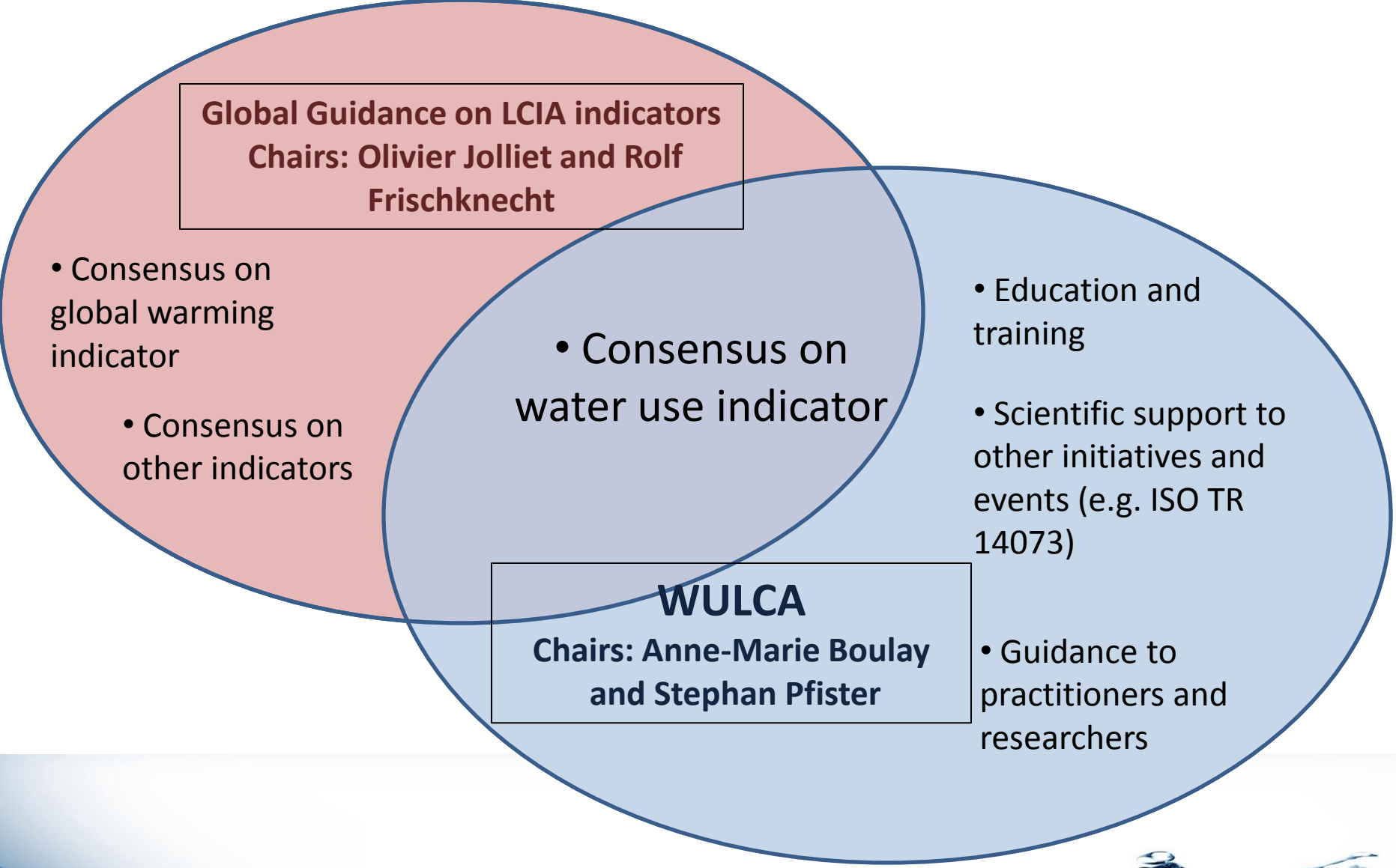
General outline

- **Task 1: Scoping phase** (2012-2013)
  Establish short list of impact category indicators and themes for first and second stage
  → Yokohama 2012 & Glasgow 2013 scoping workshops
  → Stakeholder feedback at events worldwide
- **Task 2: Consensus finding**, stage 1 (2013-2015)
  → Pellston workshop 1 (with output being an agreement)
- **Task 3: Consensus finding**, stage 2 (2015-2017)
  → Pellston workshop 2
- **Task 4: Dissemination** (2018)

Tentative list of selected impact categories and their relationship/relevance to endpoints

(x for first priority and an (x) for second priority)

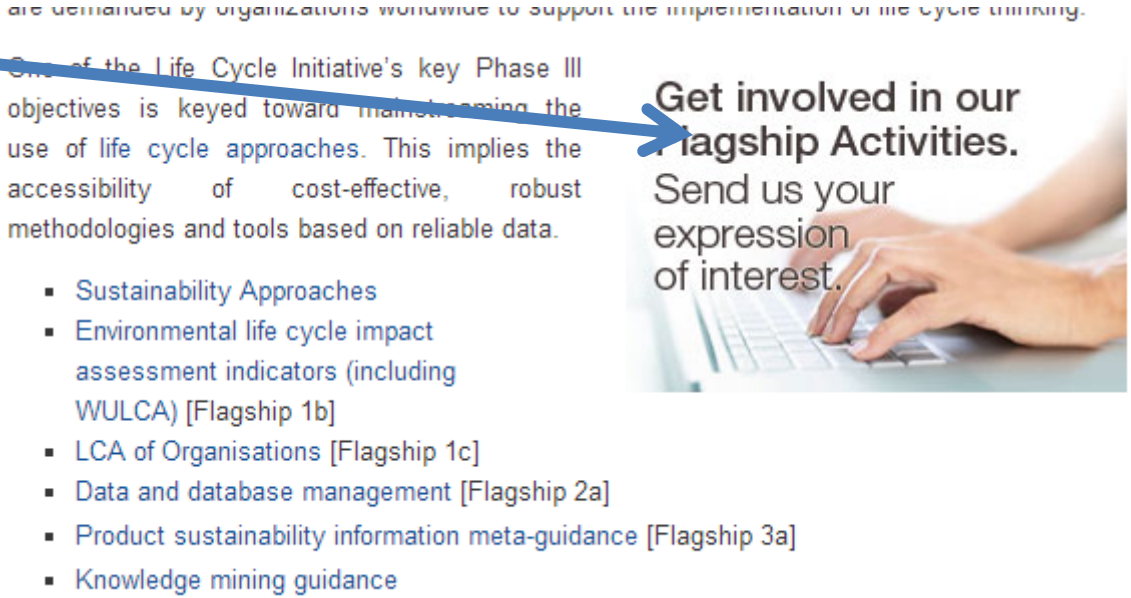
Stage	Impact category	Human health	Biodiversity	Resources / ecosystem services
1	Global warming (focusing on midpoint characterization	x	x	x
1	Primary and secondary particulate matter (incl. PM indoors)	x	(x)	
1	Land use (Initially focus on land occupation impacts on biodiversity)	(x)	x	(x)
1	Water use (may only cover part of the impact pathway)	x	x	x
2	Human toxicity (incl. indoor)	x		
2	Acidification, eutrophication & ecotoxicity		Starting with terrestrial acidification, freshwater eutrophication, and ecotoxicity	(x)
2	Energy resources	(x)	(x)	x


Global Guidance on LCIA indicators
Chairs: Olivier Jolliet and Rolf Frischknecht
• Consensus on global warming indicator
• Consensus on other indicators
• Consensus on water use indicator
• Education and training
• Scientific support to other initiatives and events (e.g. ISO TR 14073)
WULCA
Chairs: Anne-Marie Boulay and Stephan Pfister
• Guidance to practitioners and researchers

EXPRESSION OF INTEREST

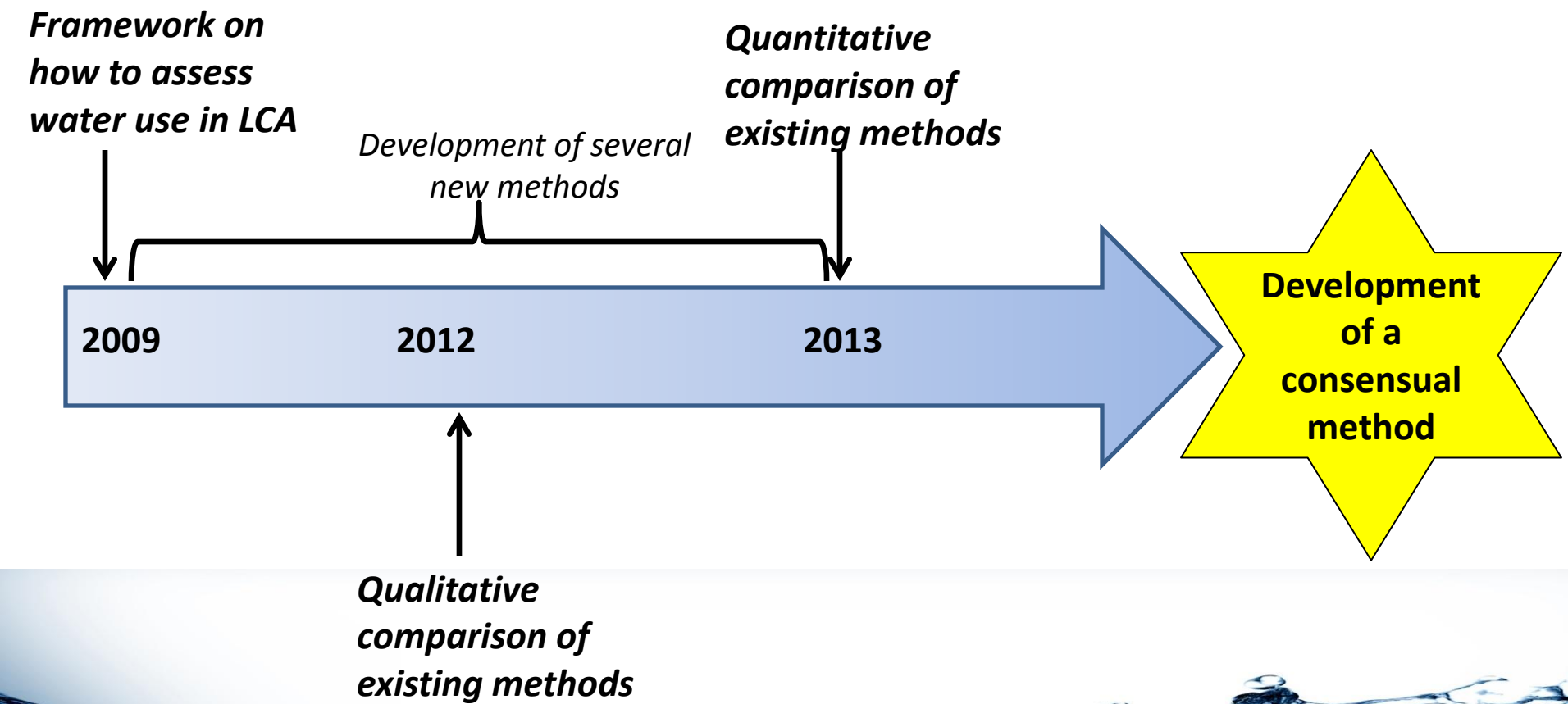
- **Form to fill to be specifically in this project (not necessarily all WULCA members)**
  http://www.lifecycleinitiative.org/activities/phase-iii/
- Form to be sent to Tracey Colley:
  Tracey.Colley.affiliate@unep.org

Click on image to download form

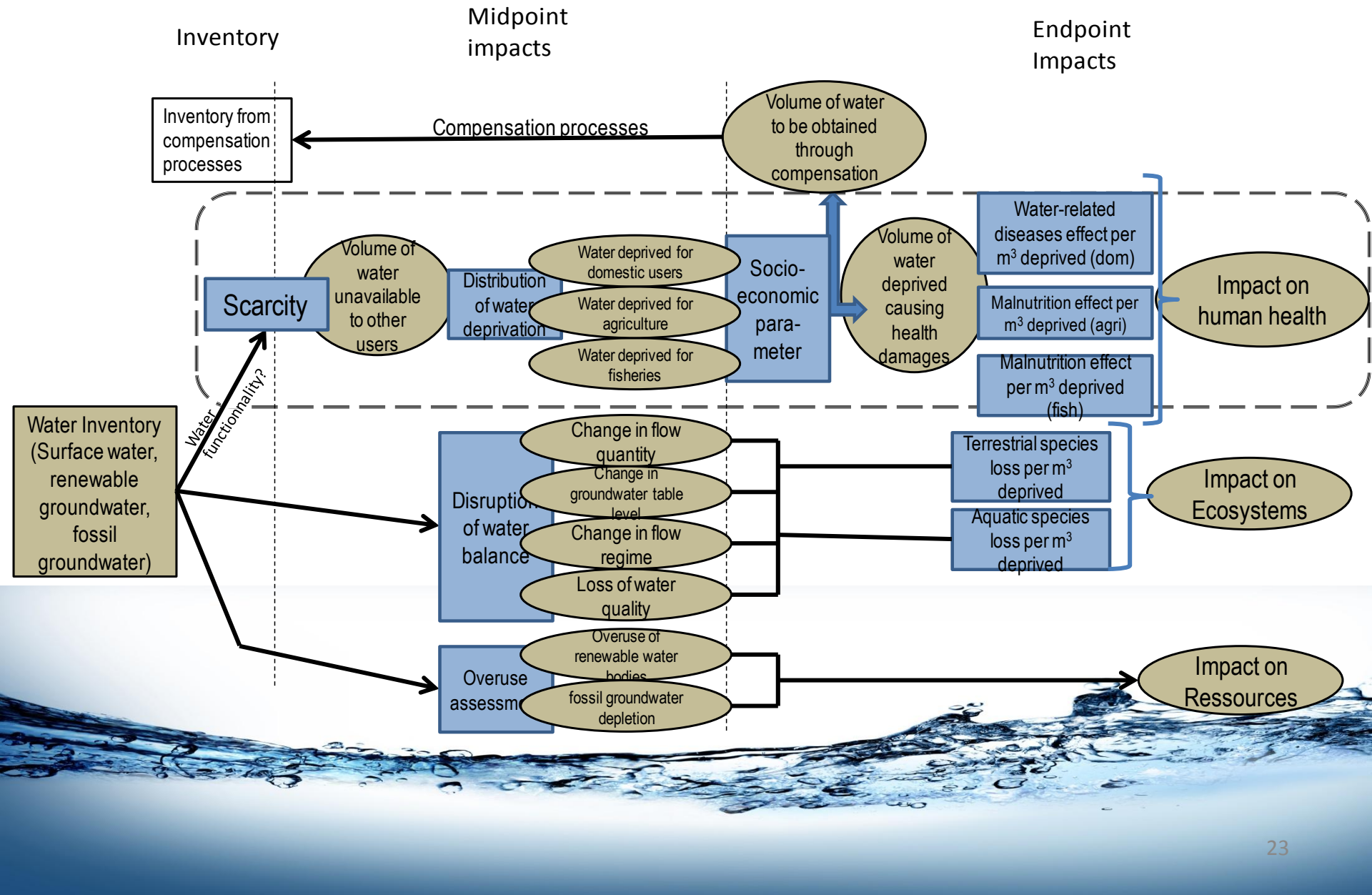


2- Working Plan

Laying the ground work



Current General Framework



Evaluation Criteria/Subcriteria

- **Based on the EULCIA project** ("Recommendation of methods for LCIA")

- **Scientific criteria**:
  1. Completeness of scope
  2. Environmental relevance
  3. Scientific robustness and certainty
  4. Documentation, transparency and reproducibility
  5. Applicability

- **Stakeholder acceptance criterion:**
  Degree of potential stakeholder acceptance and suitability for communication in a business and policy contexts

Completeness of scope water-specific criteria

Criteria	Sub-criteria	Relevant modeling aspect
Completeness of scope	Midpoint: which impact mechanisms are covered by the impact indicators for the midpoint affecting the area of protection *human health*?	Water deprivation for: - Domestic use - Irrigation - Fisheries / aquaculture
	Midpoint: which impact mechanisms are covered by the impact indicator for the midpoint affecting the area of protection *ecosystem quality*?	- Changes in flow quantity (river, lake, wetland) - Changes in groundwater table level - Change in flow regimes - Loss water quality
	Midpoint: which impact mechanisms are covered by the impact indicator for the midpoint affecting the area of protection *resources*?	- Overuse of renewable water bodies - Fossil groundwater exhaustion
	Endpoint: which impact mechanisms are covered by the endpoint indicator affecting the area of protection *human health*?	- Spread of diseases due to midpoint impact on domestic use - Malnutrition due to midpoint impact on irrigation and fisheries /aquaculture
	Endpoint: which impact mechanisms are covered by the endpoint indicator affecting the area of protection *ecosystem quality*?	- Terrestrial species loss - Aquatic species loss
	Endpoint: is the endpoint indicator affecting the area of protection *resources* covered?	

Environmental relevance water-specific criteria

Environmental relevance	**Water type in nature**	What types of water are considered?	- Surface water (river, lake, sea) - Groundwater (renewable, fossil, shallow, deep) - Precipitation water stored as soil moisture
		Are consumption and water degradative use (release) considered?	
		Inventory: is intake and released water quality considered?	
	Cause-effect chain	Midpoint/endpoint cause-effect chain affecting area of protection *human health*: is **water scarcity** taken in account?	
		Midpoint/endpoint cause-effect chain affecting area of protection *human health*: are **water functionalities** of the water resource taken in account?	
		Midpoint/endpoint cause-effect chain affecting area of protection *human health*: are **economic development level** and **compensation mechanisms** taken in account?	
		Midpoint/endpoint cause-effect chain affecting area of protection *ecosystem quality*: is **water ecological** value taken in account?	
		Midpoint/endpoint cause-effect chain affecting area of protection *resources*: is **water scarcity** taken in account?	
		Midpoint/endpoint cause-effect chain affecting area of protection *resources*: is **water renewability rate** taken in account?	

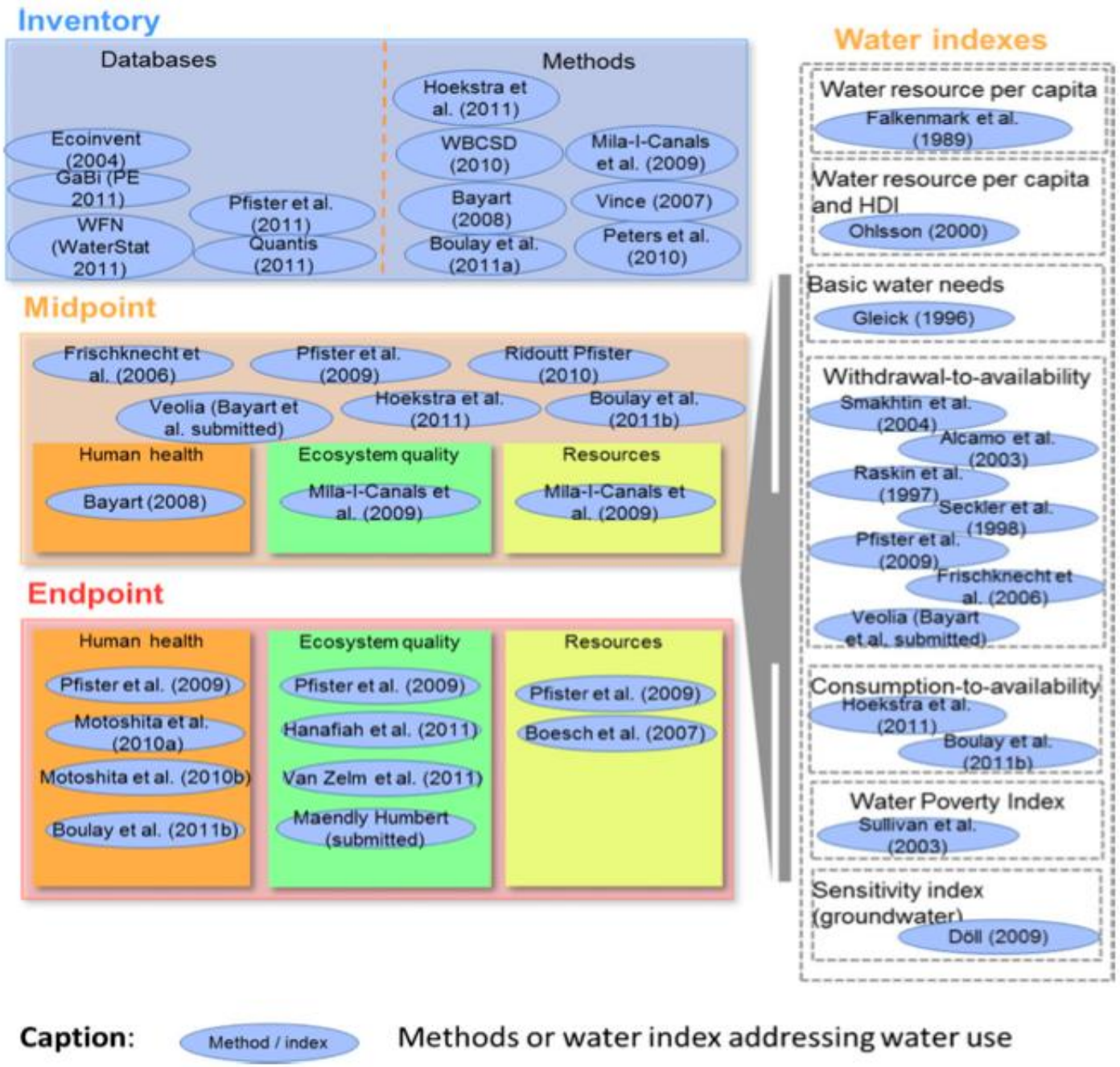
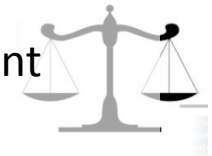


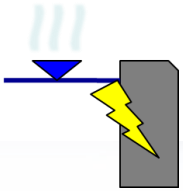
Fig. 2 Scope of and relationship between the available freshwater use inventory and impact assessment methods with classification for the three areas of protection

Model components to build a scientific consensus for method developers (1)

Inventory databases



- Differentiate **consumptive** freshwater use from **withdrawal** through consistent water balances for foreground and background processes
- Do not mix physical flows with assessment of polluted water (such as m^3-eq.)
- **Distinguish** among different water types based on **origin** (surface freshwater, including river, lake and sea, groundwater, including renewable, shallow and deep and precipitation freshwater stored as soil moisture and fossil groundwater) and freshwater **quality** (and thus functionality)
- Include freshwater **evaporation from water reservoirs** as consumptive use



Optionally:

- Differentiate **shallow** (<3.5) and **deep** groundwater (e.g., in order to apply Van Zelm et al. 2011) or estimate regional average fractions of areas of each type
- Differentiate withdrawal of **fossil** groundwater from **renewable groundwater** based on regionally available resources

Model components to build a scientific consensus for method developers (2)

Inventory methods

- Include only measurable freshwater types (or said it differently, calculated in a **transparent** way), e.g., surface water and groundwater, or a method to estimate those flows shall be provided
- Use water quality parameters to characterize freshwater flows that are available in existing databases

Midpoint methods addressing water scarcity

- Include **water storage** capacity in the modelling of total water availability within a geographical unit
- **Compare** quantitatively more comprehensive midpoint indicators (e.g., including water functionality) with other indicators based solely on water scarcity
- Provide further empirical evidence of the **link** among **water scarcity, water deprivation, and impact** on different areas of protection to evaluate the relevance of midpoint versus endpoint indicators

Model components to build a scientific consensus for method developers (3)

Endpoint method for the area of protection human health

- Provide a **quantitative comparison** of existing methods as well as an evaluation against empirical figures
- Assess the relevance and uncertainty of modelling indirect impacts related to **water deprivation**
- Develop new approaches for modelling of **compensation mechanisms** to prevent water loss in functionality throughout impact categories

Endpoint method for the area of protection ecosystem quality

- Identify extensively **missing cause-effect chain**
- Provide **global coverage** for methods developed for a single country or with partial basin coverage

Model components to build a scientific consensus for method developers (4)

Endpoint method for the area of protection resources

- Cover the cause-effect chain leading to impact of **fossil groundwater** exhaustion
- Distinguish impact related to **different freshwater types** consumption, given they have different renewability rates and functionalities
- Quantifying the link between **green water use** and resources
- Explore the possibility of considering freshwater issues in a global perspective by expressing water consumption and evapotranspiration in relation to global freshwater availability

All methods

- Evaluate uncertainties of input data as well as model **uncertainty**
- Provide characterization factors with **monthly differentiation** to reflect variability related to meteorological conditions and associated ecosystem changes

Quantitative comparison at midpoint

4 water scarcity models	3 types of comparisons	3 indicators to interpret results
1- Swiss Ecoscarcity	*1- Level of details*	*1- Difference*
2- Pfister	*2- Model choice*	*2- Consistency*
3- Boulay	*3- Uncertainty*	*3- Regional relevance*
4- WFN		

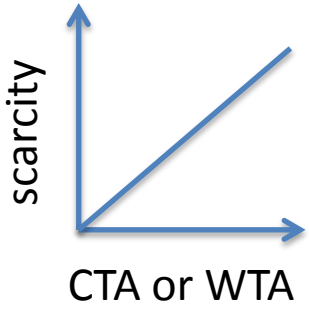
Aspects compared

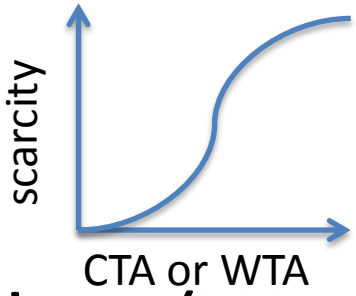
1- Comparison of detail level of the model:

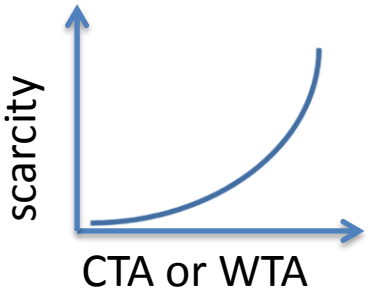
	High detail	Low detail (coarse scale)	Low detail (aggregation from high detail)
Regional Resolution	Sub- watershed	Country	Country – obtained from weighted average of sub-watersheds scarcities
	Watershed		
Water Source	Surface water	No source specified	No source specified – obtained from weighted average of surface and ground water-specific scarcities
	Ground water		
Temporal Resolution	Monthly	Annual	Annual – obtained from weighted average of monthly scarcities
Quality aspect	Quality specified	Not specified	N/A

Aspects compared

- 2- Modeling choices:
  - –CTA vs WTA
  - –Model algorithm





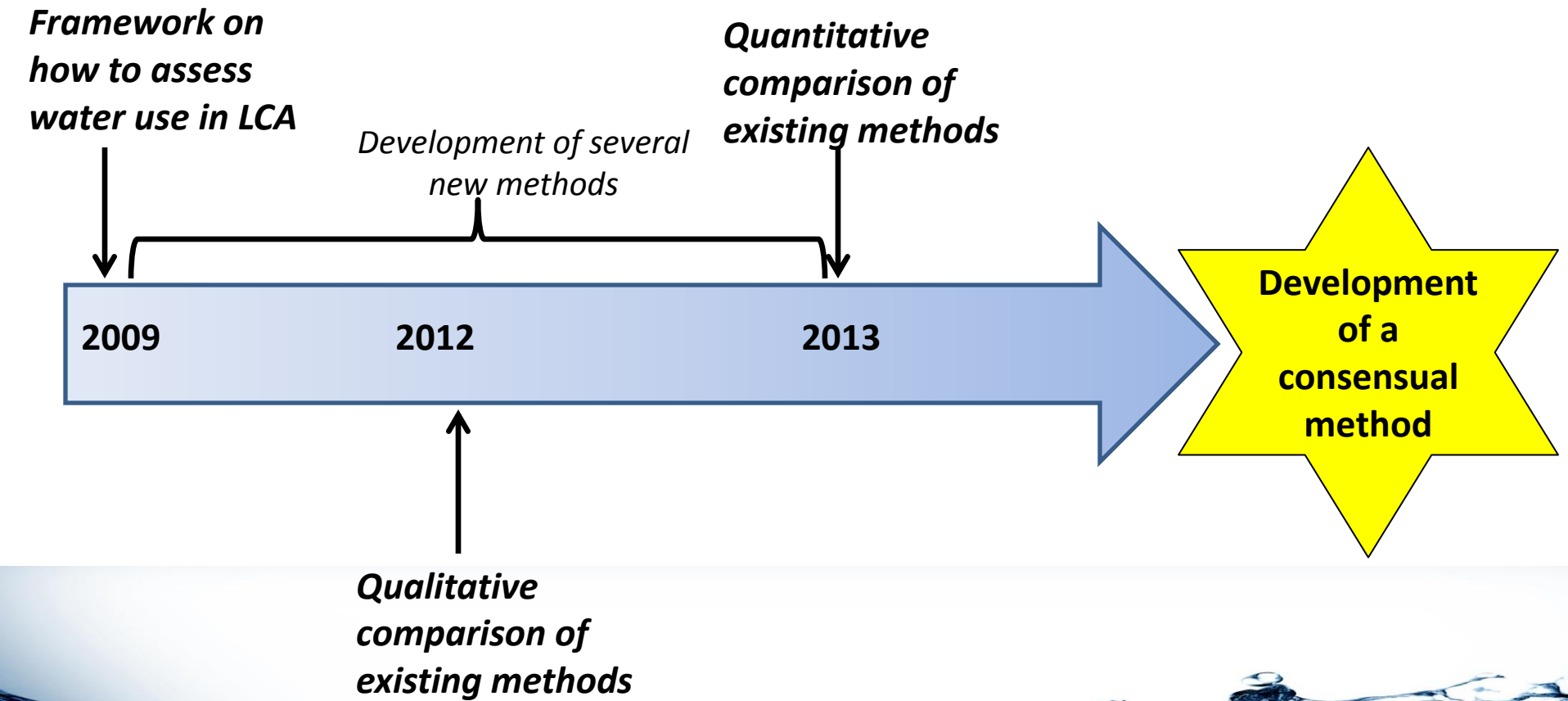


  - –Source of data (WaterGap, WFN)
- 3- Uncertainty associated with choice of model (min-max)

RESULTS

- Available scarcity models are currently different and inconsistent
- **Regional resolution** for modeling, **quality aspect** of availability, **model algorithm** are the most influential aspects on scarcity model results
- More specific results for each modeling aspects available for consensus building

Moving forward



Consensual method: Methodology

Step 1: Agree on which point of the impact pathway to focus on and on its position in the midpoint-endpoint framework (midpoint, endpoint, AoP -specific or generic)

→ ***Write Goal and Scope document****
→ ***Write agreement and disagreements document****

Step 2: Using a review and comparison of existing models, develop a list of assessment elements and aspects to be considered in the resulting consensual model.

* Required from the Global Guidance on Indicator Project

Consensual method: Methodology

Step 3: For each element, identify which are mature for consensus and which ones require further research. For each of these categories, a decision is made on the preferred way to address these aspects.

→ ***Consult with experts****

Step 4: Build a model prototype and calculate preliminary characterization factors worldwide.

Step 5: Evaluate the method prototype based on correlation with reported data, comparison with previous models and its application to selected case studies.

* Required from the Global Guidance on Indicator Project

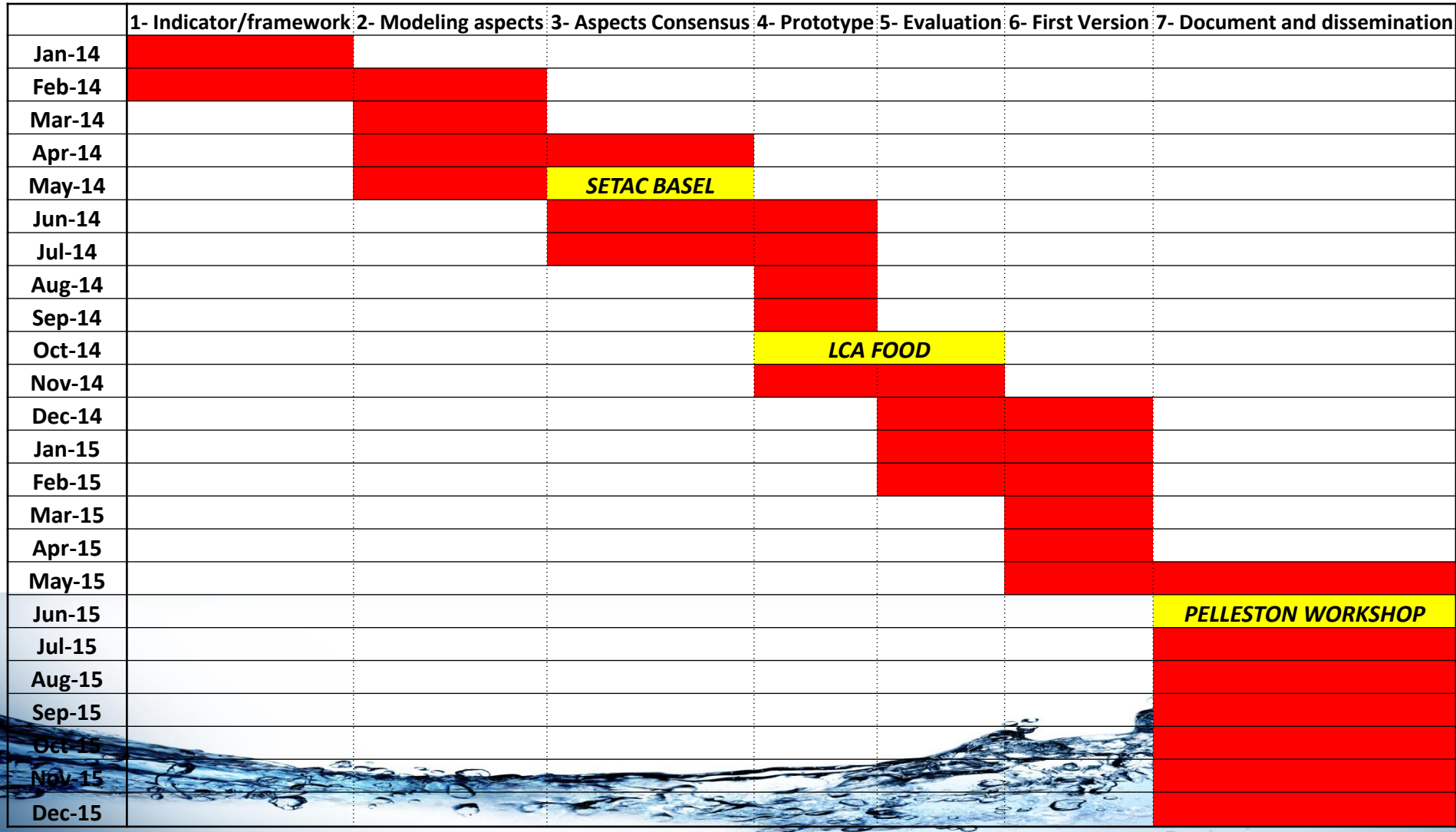
Consensual method: Methodology

Step 6: Elaborate the version 1.0 of the model
→ Present to Pellston Workshop*

Step 7: Elaborate Guidance document intended for practitioners and disseminate the results

* Required from the Global Guidance on Indicator Project

Time Planning



Work Strategy

- MEETINGS:
  -One working meeting with all active members every month
  - Minutes available on the website and sent by emails to active members
  -Sub-meeting with specific task groups
- DECISION MAKING
  -Performed during the meetings and registered in the minute
  - If an absent member disagrees, an email should be sent to the chairs and the topic may be re-opened no later than the following meeting (with notice in advance)

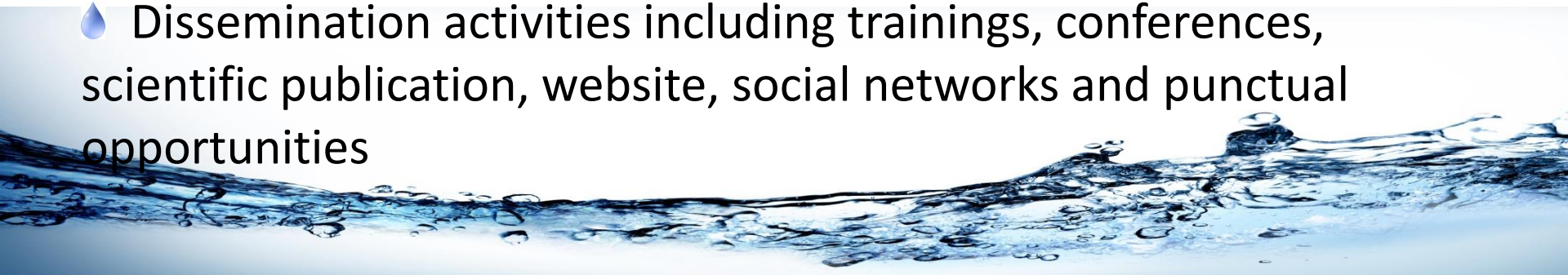
Deliverables

- Consensual method for a subset of impact pathways assessing water use in LCA with priority to midpoint indicators and an area of protection showing sufficient scientific maturity.

- Guideline and examples on best practices to elaborate a water footprint aligned with ISO DIS 14046 is ensured

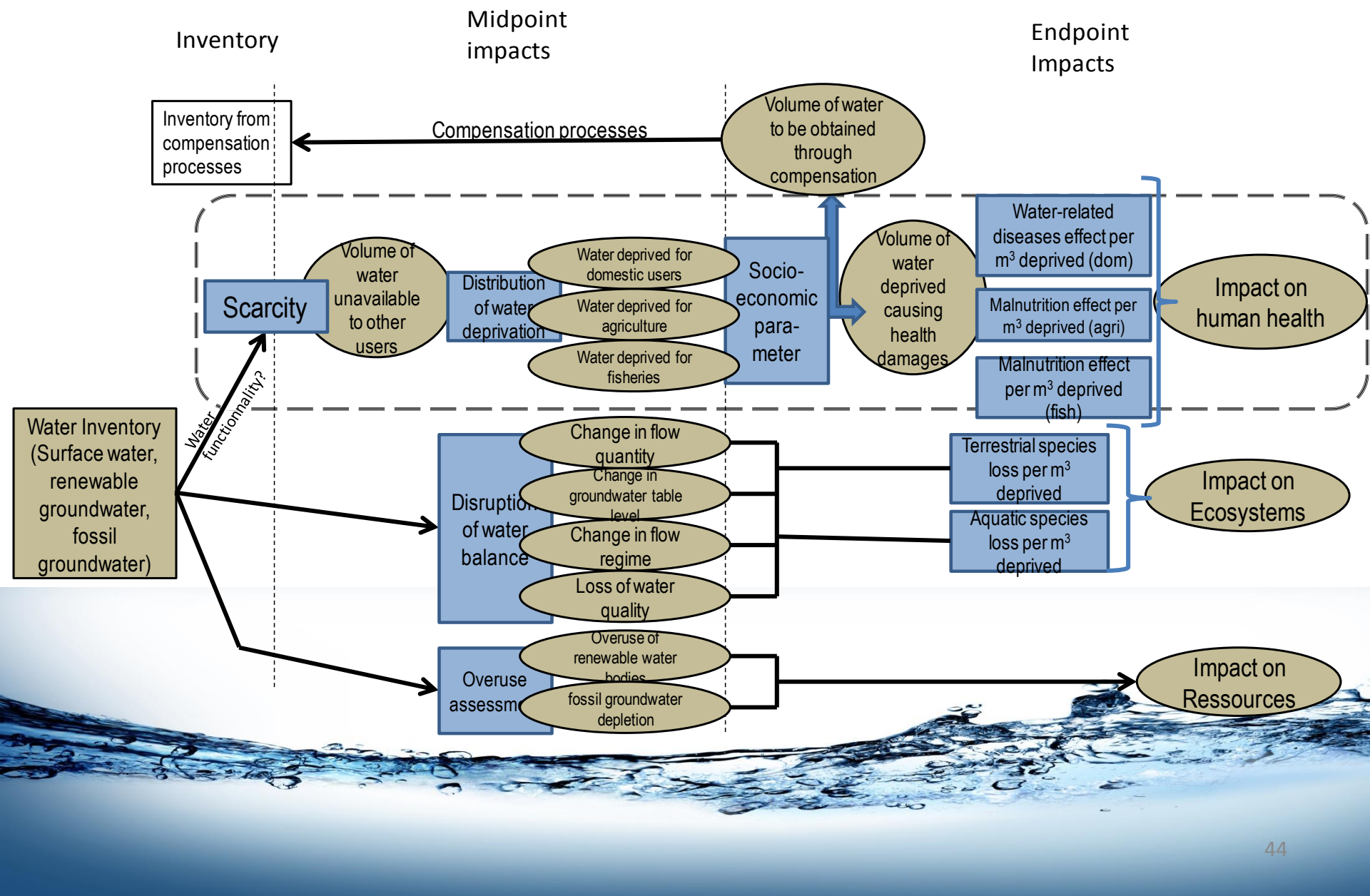
- Development of training material, and one full-day personalized training session for each sponsoring partners

- Dissemination activities including trainings, conferences, scientific publication, website, social networks and punctual opportunities



3- Framework and indicators

Current General Framework



Options discussed

1- Specific midpoint for each Area of Protection (AoP) (adapted by Jane Bare)

2- One additional impact category “water pressure”, to be used in parallel with HH and EQ (Sebastien)

3- Endpoint indicators in all AoP normalized back to midpoint indicators (not retained)

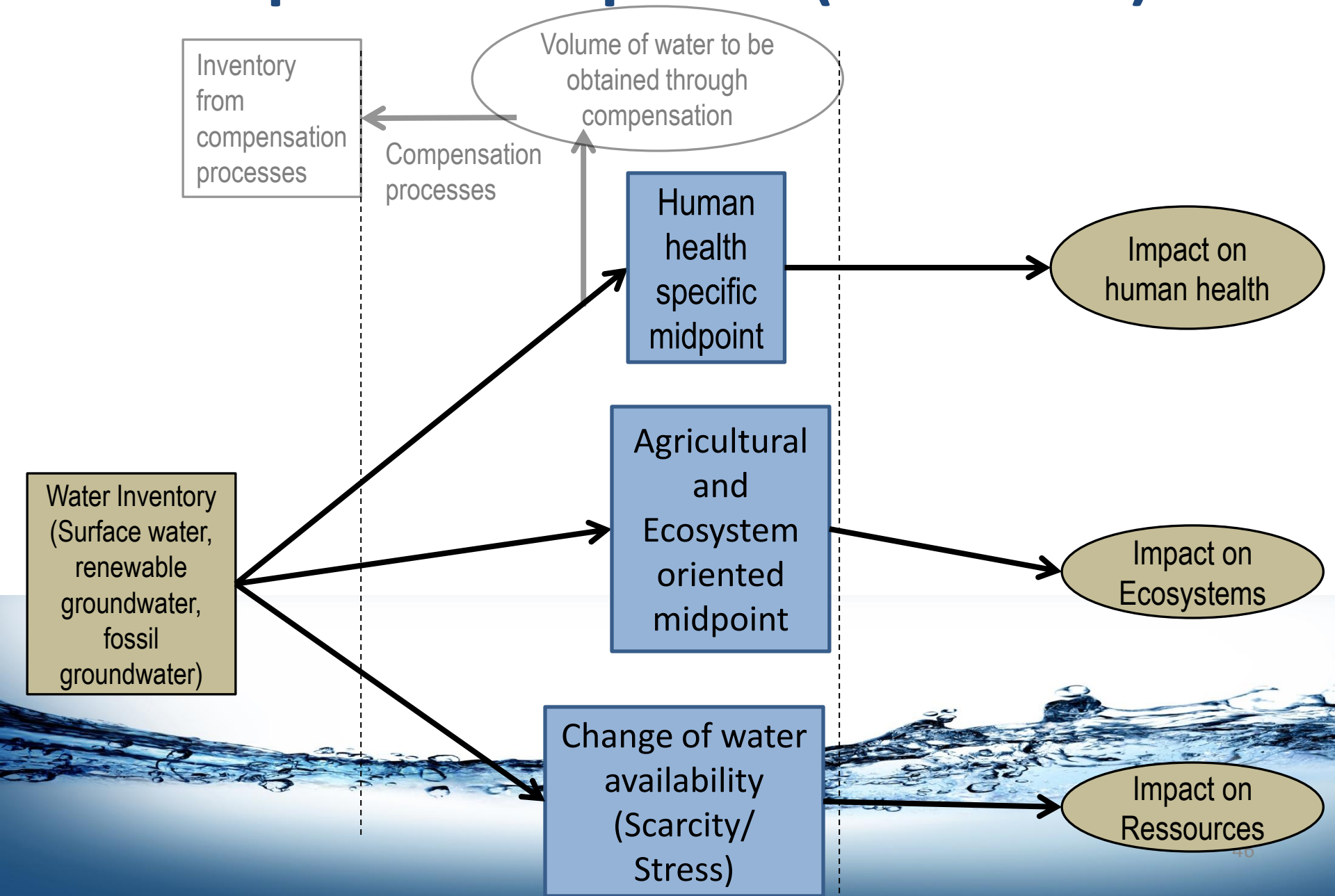
4- One indicator scarcity/stress as a midpoint for all AoP

5- One indicator scarcity/stress as a midpoint for HH and resource and one other EQ-specific midpoint

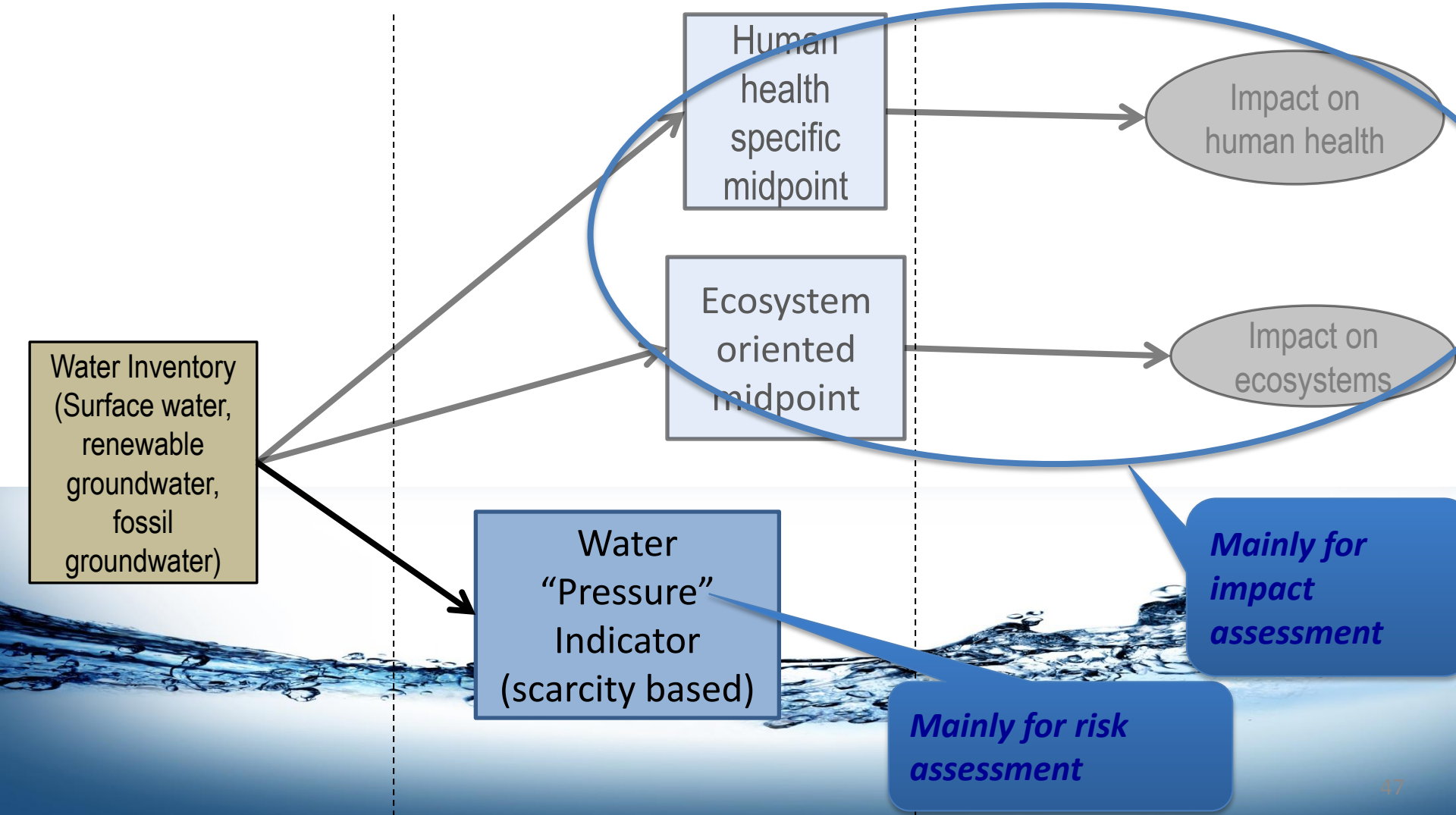
6- One pseudo-midpoint, to be used in parallel to the 3 other categories

7- One pseudo-midpoint, upstream from 2 specific AoP midpoints (HH and EQ) (Montse and Francesca). This option is roughly inclusive of options 4,5,6

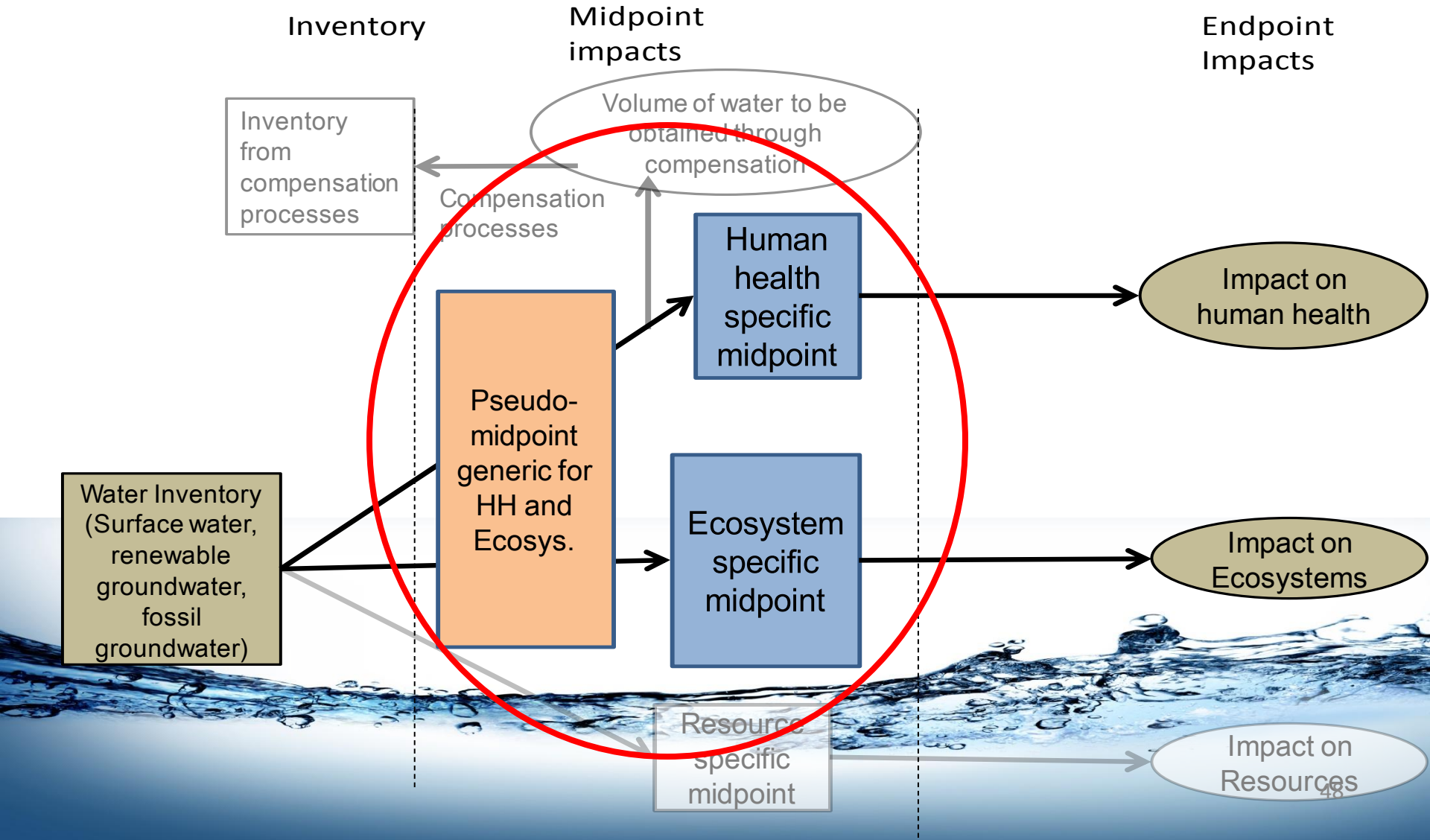
3 specific midpoints (Jane Bare)



One independent impact pathway "Water Pressure" (Sebastien Humbert)



Inclusive Framework
(Montse and Francesca's suggestion)



Other points to consider I

HUMAN HEALTH:

1- Agricultural deprivation in developed countries can lead to malnutrition from lower food availability caused by a decreased in exports (Jane Bare)

2- Water degradation can lead to lower water availability and impact on human health

ECOSYSTEMS:

1- Terrestrial and aquatic ecosystems should be included

Other points to consider II

Temporal resolution:
Monthly resolution vs. annual resolution

Spatial resolution:
Major watersheds vs. sub-watershed vs. grid cell assessment
-> downstream effects (Verones et al., Loubet et al., Tendall)

Spatial and temporal aggregation for background processes

Other points to consider III

Source of water:
Groundwater vs. surface water

Water quality:
Inclusion of aspects of water quality

Hydrological recycling of water consumption within watershed

Risk of double counting with inventory for compensation/trade issues (Bo Weidema)

Next steps

- Sub-working groups:

- Pseudo-midpoint
- Human Health midpoint
- Ecosystems midpoint

- Other support: Website

- Next meetings

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THANK YOU FOR YOUR PARTICIPATION