

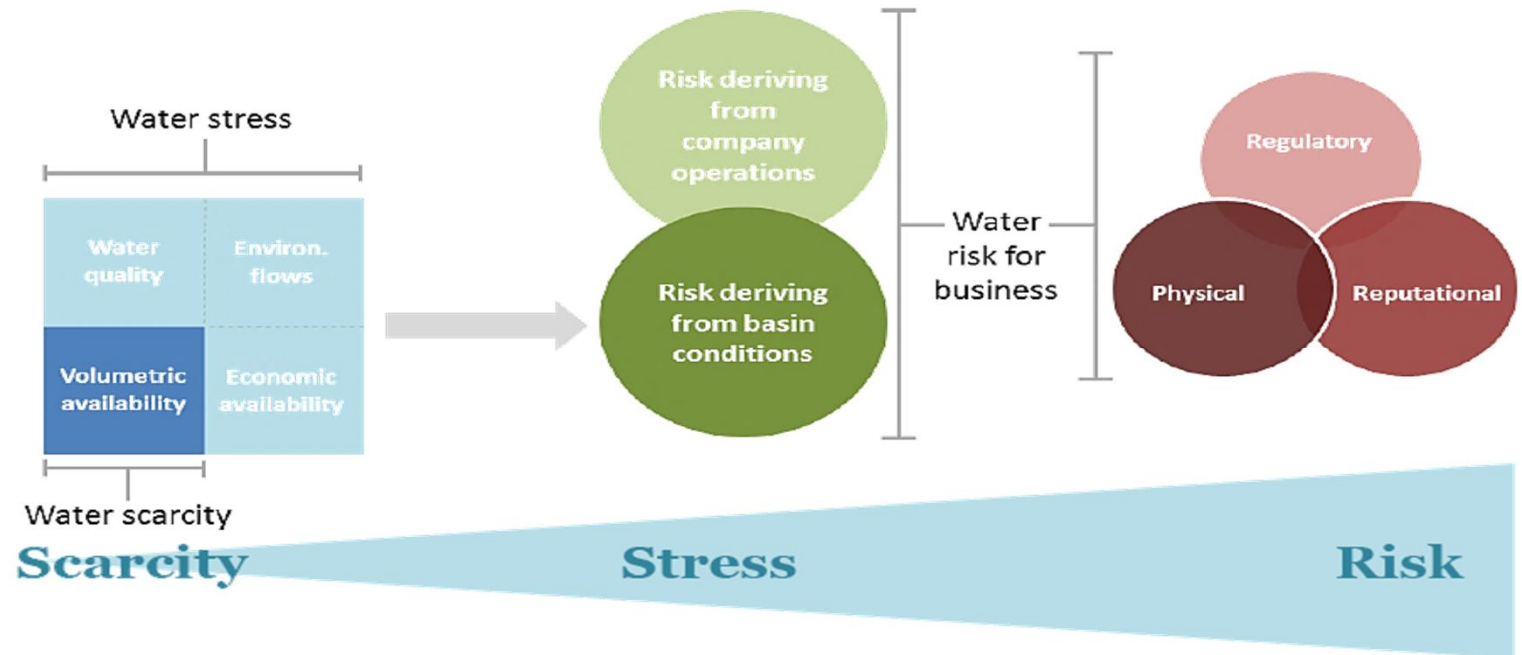
Quantification of water risks in financial institutions

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July 17, 2017

1. What is water stress?

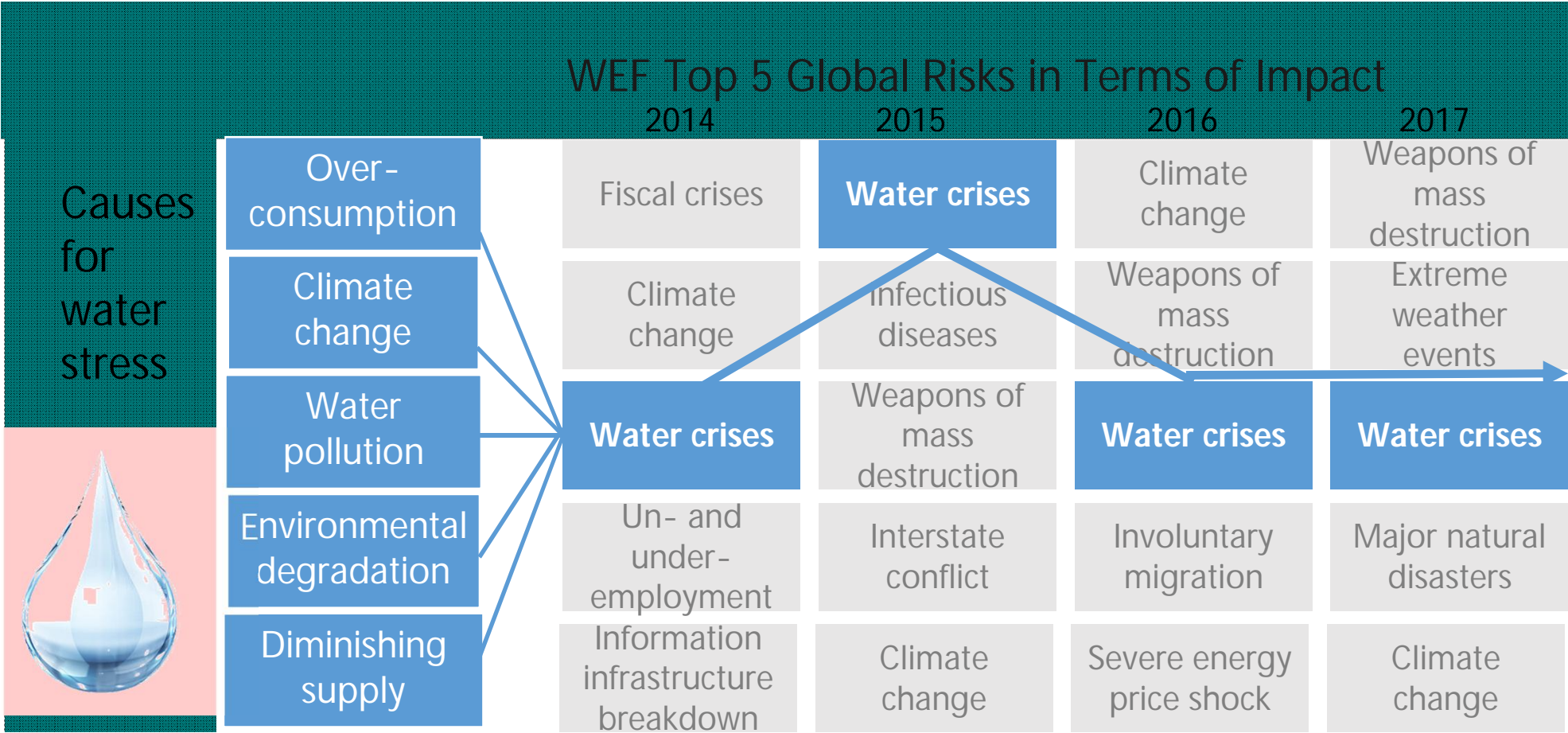
Relationship between water scarcity, stress and water risk



- Simple
- Reflect objective & physical realities
- Suitable for quantitative measurement

- Complex
- Reflect socioeconomic and political conditions and subjective human values
- Difficult to quantify

1. What is water stress?

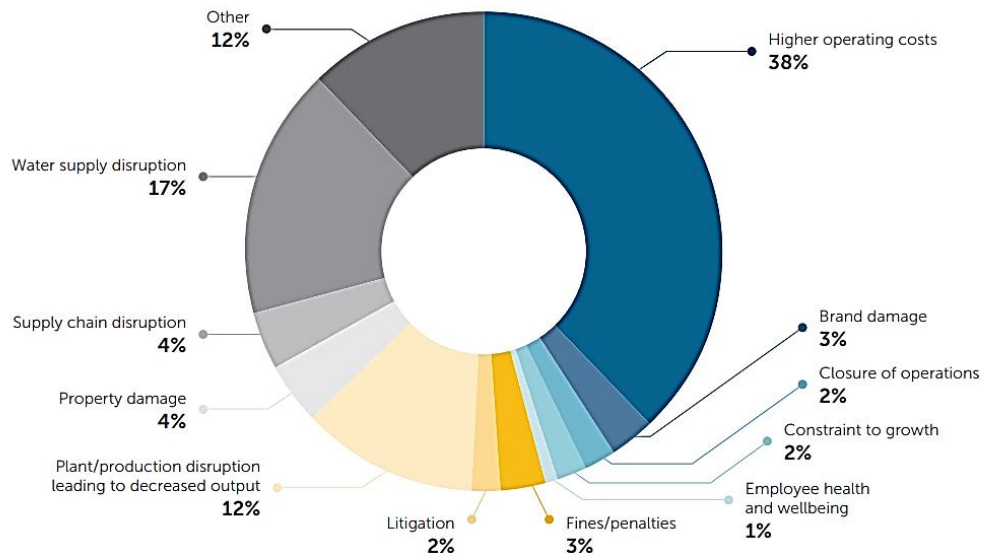


Source: World Economic Forum, *The Global Risks Report 2017*, 12th Edition, 2017

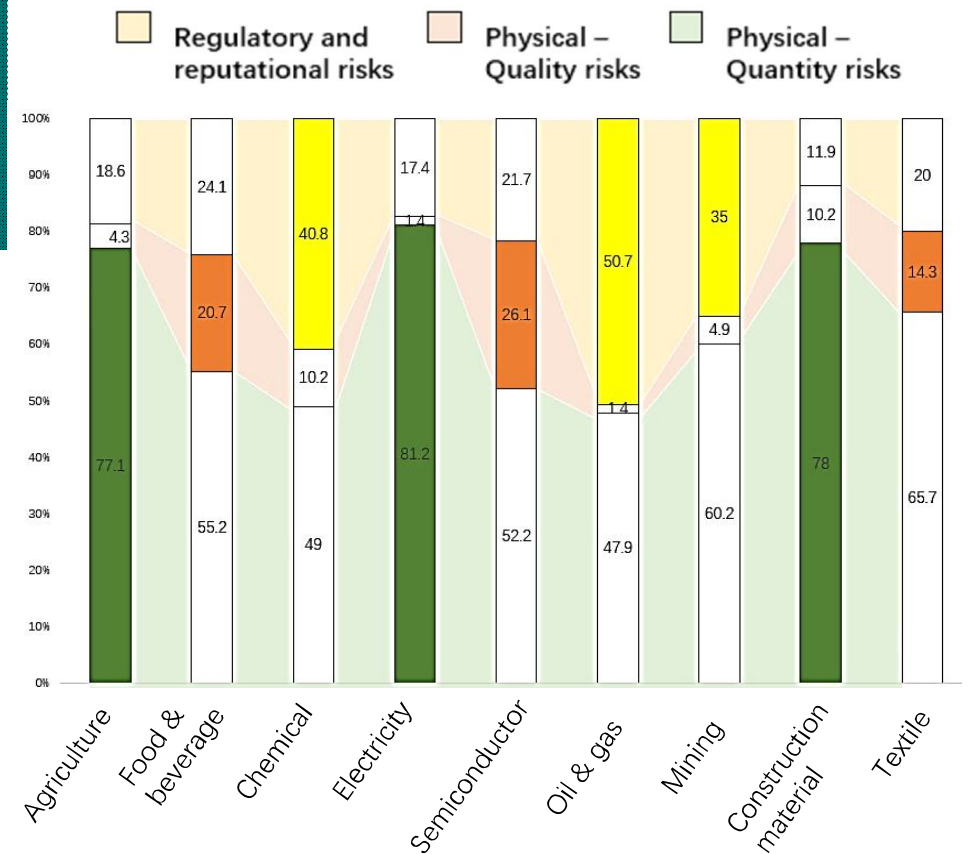
2. Water stress as risk to business

- Water stress leads to capex and opex increases
- Physical, regulatory and reputational risks
- Credit rating agencies are incorporating ESG factors

Financial impacts of declining water quality and increasing regulatory costs

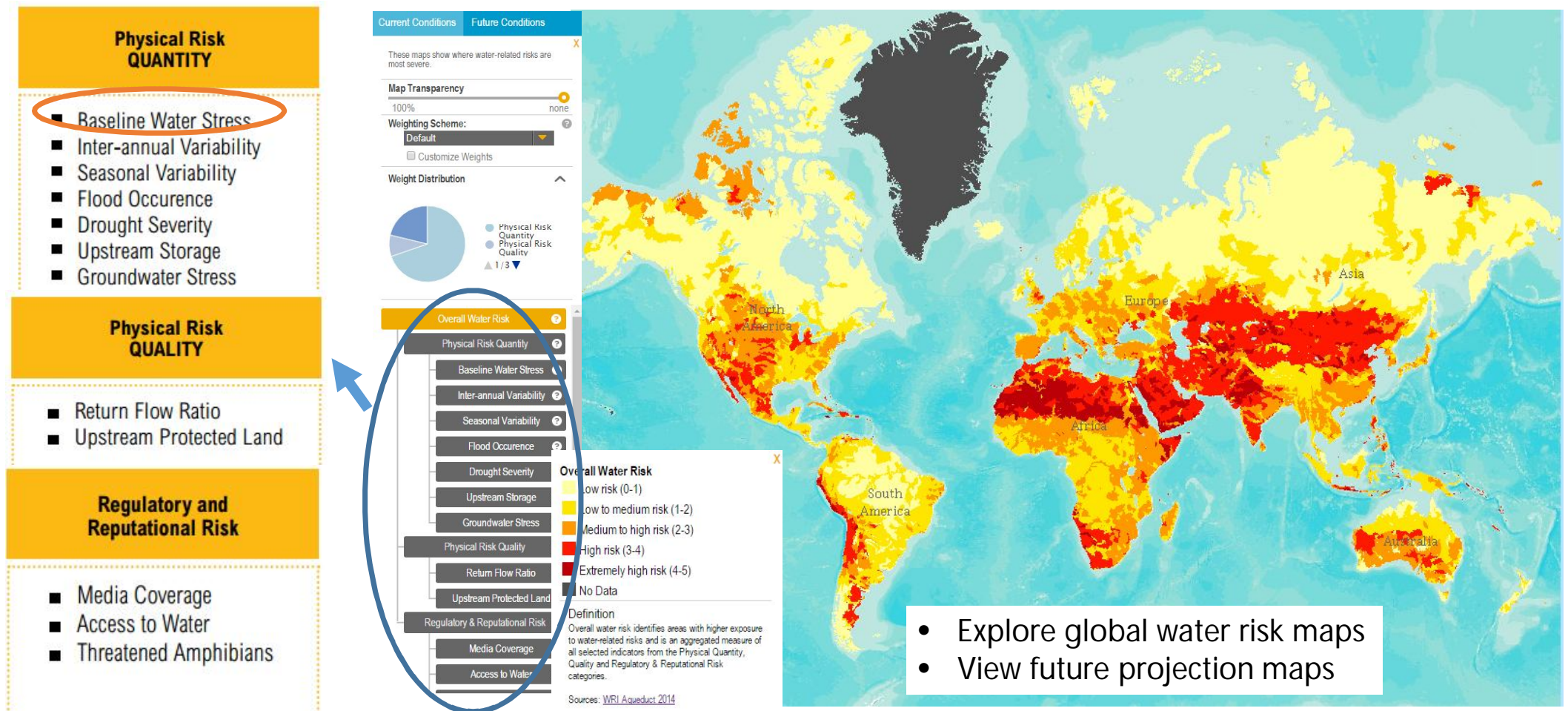


Water risk weights for 9 major industry sectors



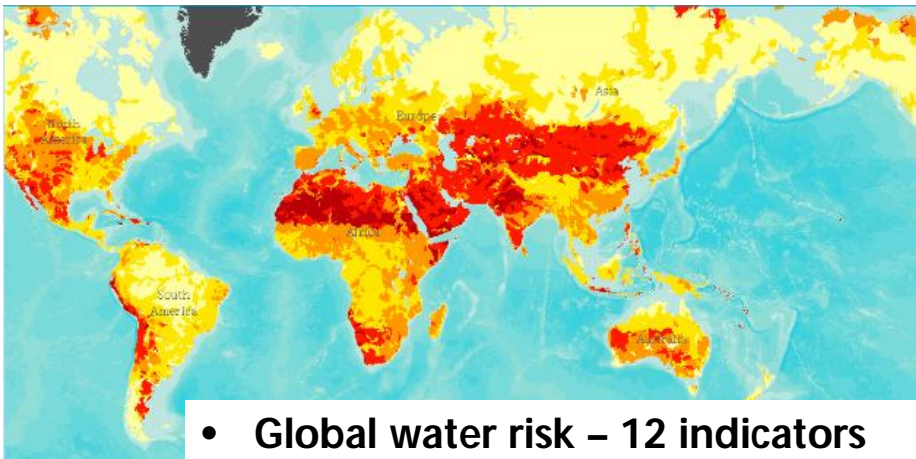
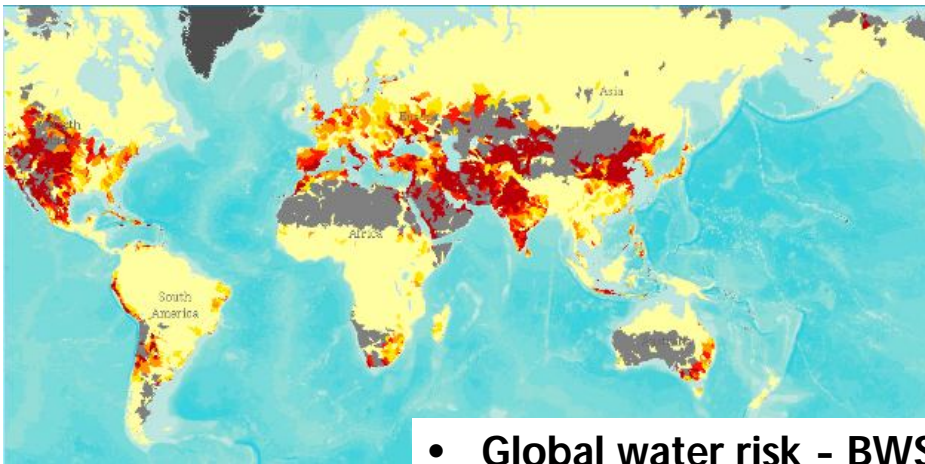
Source: Left: Water Risk Monetizer, *Smart Water Management for Business Growth*, 2017
 Right: WRI, *Aqueduct Atlas* (<http://www.wri.org/applications/maps/aqueduct-atlas>)

3. Efforts to map water stress - WRI's Aqueduct



Source: WRI, Aqueduct Atlas (<http://www.wri.org/applications/maps/aqueduct-atlas>)

3. Efforts to map water stress – WRI Aqueduct and BWS

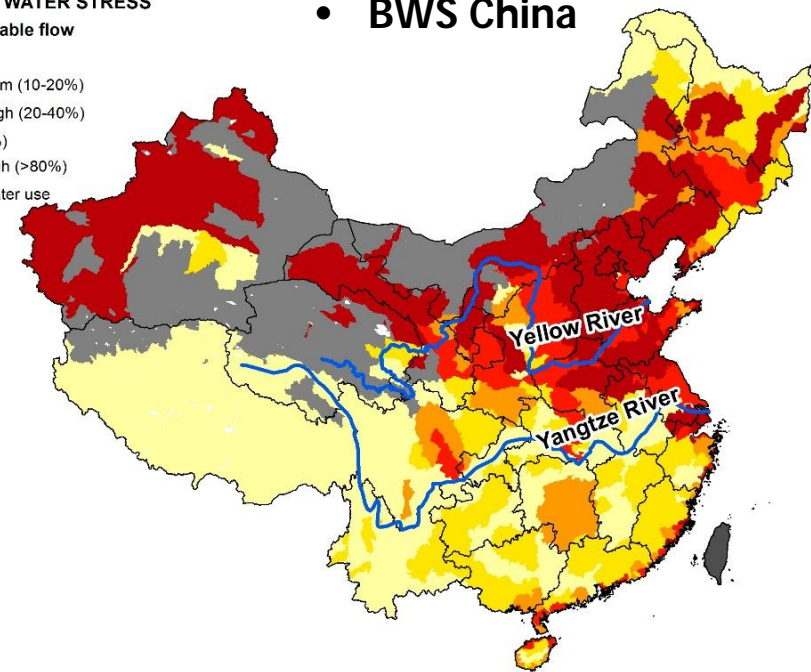


Baseline water stress is the ratio of water withdrawal to available water supply. A baseline water stress ratio over 40% is considered high water stress. BWS China has more detailed spatial information.

2010 BASELINE WATER STRESS
withdrawals/available flow

- Low (<10%)
- Low to medium (10-20%)
- Medium to high (20-40%)
- High (40-80%)
- Extremely high (>80%)
- Arid & low water use
- Province
- No data

• BWS China



4. Efforts to quantify and evaluate water risk

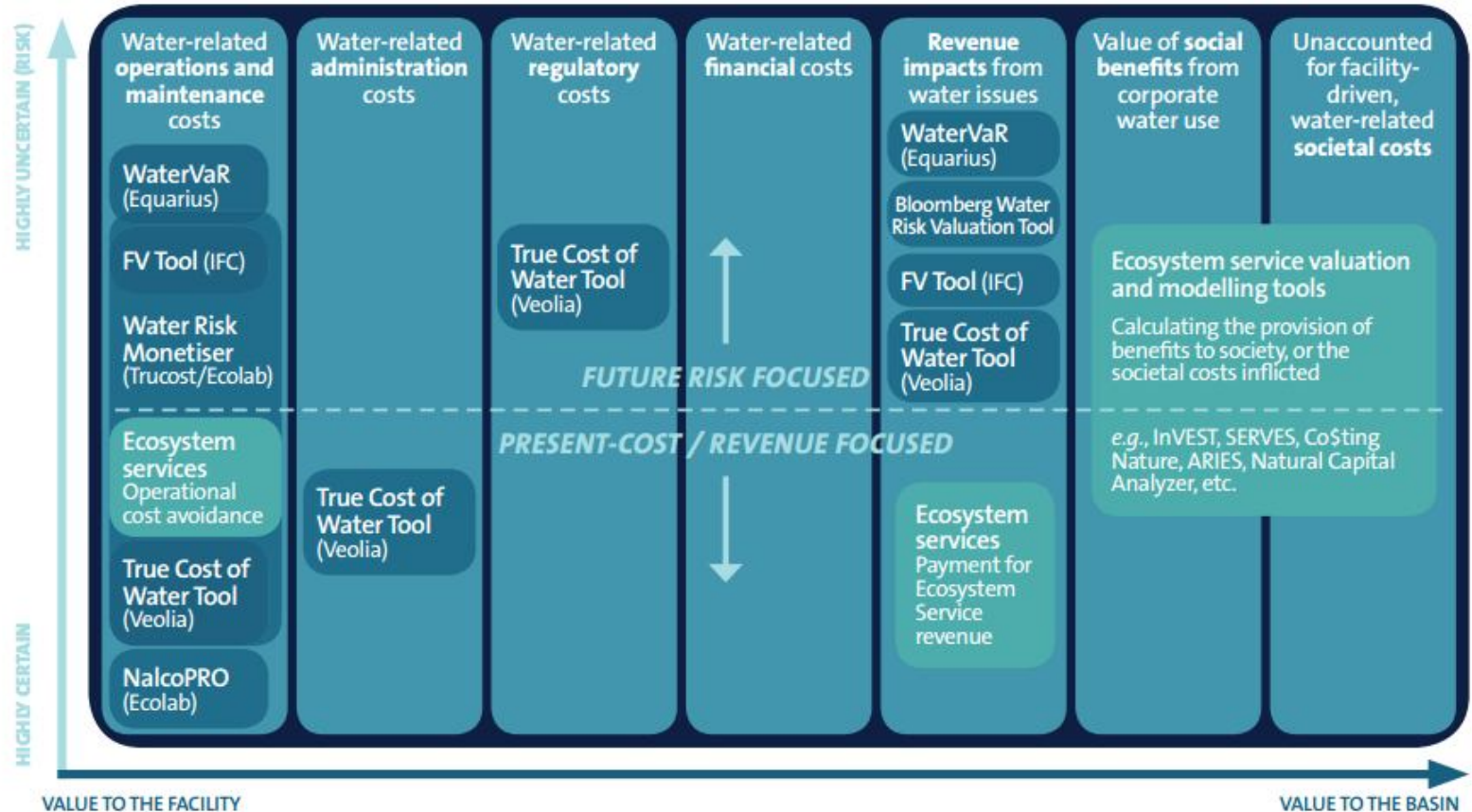
Measure and analyze		Management
Risk identification	Financial evaluation	Information disclosure and management framework
WRI Aqueduct and BWS	Drought Stress Testing Tool by GIZ and NCD	GRI
Global Water Tool by WBCSD	Corporate Bond Water Credit Risk Tool by GIZ, NCD and VfU	CDP
Local Water Tool by GEMI and WBCSD	Water Risk Valuation Tool by Bloomberg, NCD and GCP	DJSI
Water Risk Filter by WWF and DEG	Water Risk Monetizer by Trucost/Ecolab	Aqua Gauge by Ceres
	True Cost of Water by Veolia	

4. Efforts to quantify and evaluate water risk

Financial evaluation

Placing financial valuation tools into the income statement water valuation framework

Source: WWF and IFC, 2015, *The Value of Water: A framework for understanding water valuation, risk and stewardship*



5. Challenges and future development

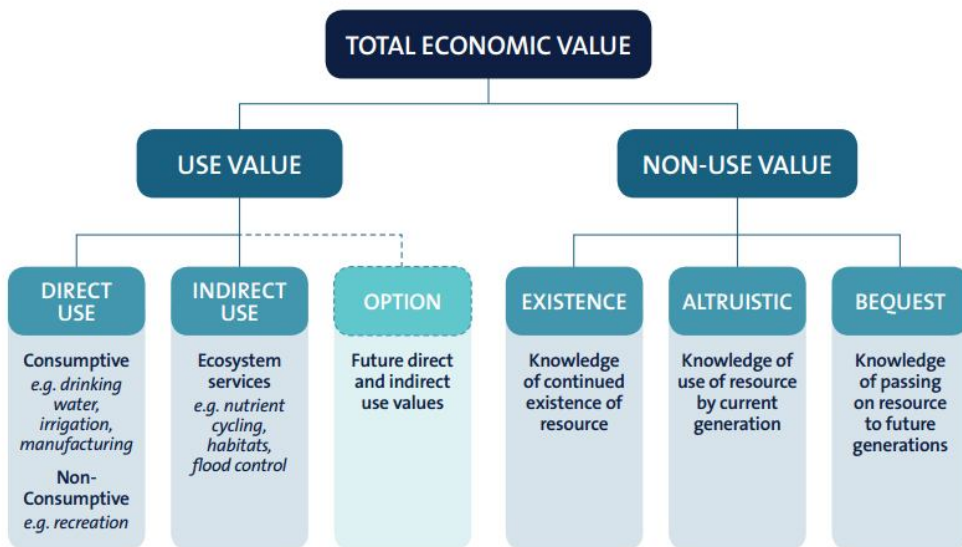
- Water valuation seeks to determine the ***monetary*** and ***non-monetary*** value of water-related ***stocks and flows*** at ***various spatial scales*** to ***different audiences*** under ***varying levels of certainty***.
- For businesses, water valuation seeks to determine the monetary value of **assets, liabilities, revenues and costs** at **the facility and corporate levels** under **varying levels of risk**.

5. Challenges and future development

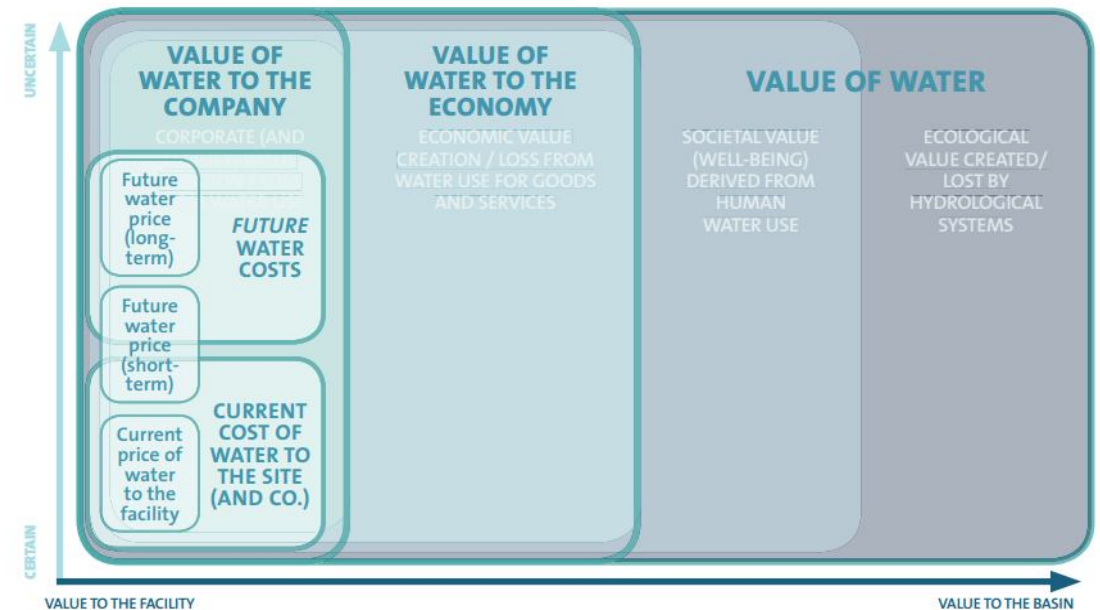
Water problem is beyond the control of an individual business

Complexity in estimating the TEV of water and turning shadow price into real price

● Total Economic Value Framework



● Difference between the price, cost and value of water



Source: WWF and IFC, 2015, *The Value of Water: A framework for understanding water valuation, risk and stewardship*

5. Challenges and future development

Subscription and use of the existing tools need to be enhanced

According to the China Water Risk 2016 survey:

% of Investors who have “never heard of” these tools...

