Issues on Water Footprint and Beyond

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Required Water for Fast Food

- **Beef Bowl**: Regular JY280, 710 kcal - 1,890L
- **Hamburger Sandwich**: 2 regular Small Fries JY268, 745 kcal - 2020L
- **Hamburger Sandwich** (Teriyaki Burger Regular Fries JY430, 911 kcal - 530L
- **Buckwheat noodle** (With Egg JY300, 377 kcal - 750L
- **Pasta (Udon)** (Plain JY290, 341 kcal - 120L

(M. Sato, 2003, Thesis, The Univ. of Tokyo.)
<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bread</td>
<td>L/loaf</td>
</tr>
<tr>
<td>Beer</td>
<td>L/633 cc bottle</td>
</tr>
<tr>
<td>Whisky</td>
<td>L/700ml bottle</td>
</tr>
<tr>
<td>Soft drink</td>
<td>L/350ml can</td>
</tr>
<tr>
<td>Coat</td>
<td>L/suit</td>
</tr>
<tr>
<td>Mobile Phone</td>
<td>L</td>
</tr>
<tr>
<td>PC</td>
<td>m³</td>
</tr>
<tr>
<td>Bycycle</td>
<td>m³</td>
</tr>
<tr>
<td>Motor Bicycle</td>
<td>m³</td>
</tr>
<tr>
<td>Motor Car</td>
<td>m³</td>
</tr>
</tbody>
</table>

*excluding water for agricultural production*
Current Issues on “Water Footprinting”

- Does not follow the LCA/LCIA framework
  - “Water Footprinting” should be “Impact Assessment”
  - System boundary is not well defined.
  - Definition of consumptive use is controversial.
  - Inventory analysis and impact assessment are mixed.
    - Most of current methodology deals “green”, “blue”, and “gray” waters equally, and gives equal weights for impact assessments without scientific evidences.
    - Unlike CO2 emission, impacts of water use depend on the source, timing, and place of water withdrawal, discharge, and degradation.
      - Auxiliary information should be in the inventory.
Question

<table>
<thead>
<tr>
<th></th>
<th>Product A</th>
<th>Product B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufactured in</td>
<td>Alaska with abundant water</td>
<td>Sub-Saharan Africa</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td></td>
</tr>
<tr>
<td>Timing and origin of water</td>
<td>Spring snow melt water</td>
<td>End of dry season ground water</td>
</tr>
<tr>
<td>Discharge</td>
<td>Well treated</td>
<td>At the regulation level</td>
</tr>
<tr>
<td>Water footprint</td>
<td>Total 200 liter</td>
<td>Total 150 liter</td>
</tr>
</tbody>
</table>

Which has less impacts on environment?
Volumetric Use of Water

- Water withdrawals: statistical information and data are available comparatively.
  - Improvements in irrigation system can reduce the amount of water withdrawals.

- Return flow: can be compensated (subtracted) from withdrawals if returned to the same place.
  - WFN differentiate return to the same watershed or not, but it will underestimate the impact of preventing other water users. In product water may or may not be consumed in the same river basin.

- How to deal with storage?
- Surface Water
- Reservoir
- Ground water
- Desalinated water

Factory/Farm Land

- From which source?
  - Fossil ground water?
- When?
  - Dry season?
- Which area?
  - Water stressed region?
Qualitative Use of Water

- **Quality**
  - There are many chemical and biological pollutants
  - Do we only need to consider the most critical compounds to be diluted under the regulation level?

- **Temperature**
  - Thermal pollution has impacts particularly on aquatic ecosystems.

- **Gravity potential**
  - Not only for hydro-power generation.

- **Color**
  - Could be included in the quality
Elementary flow to Single Number?

- Amount/Serving | %DV
- Total Fat | 14g 22%
- Sat. Fat | 7g 33%
- Trans Fat | 0g
- Cholest. | 5mg 2%
- Sodium | 25mg 1%
- Total Carb. | 19g 6%
- Fibar | 1g 6%
- Sugars | 17g 5%
- Protein | 3g

# Percent Daily Values (DV) are based on a 2,000 calorie diet.

6 pieces (38g)  
Calories 210

or

⇒ NOT Nutrition 36.03g

Are there any indicator like “calories” for Water Footprint? If exists, is that a good proxy to account the impacts of water usage?
Proposed Principles for WF

- Water footprint should be a comparable measure; larger footprint should mean larger environment impacts. If not, non-comparability of water footprint should be well recognized.

- Water footprint should be summed up. Or it should be well known that water footprint can be summed up only under certain specified conditions.

- Water-saving efforts and water quality improvement efforts should be reflected in reducing the value of water footprint.
Water Footprint--- Beyond Labeling

- Critical information for risk management of entities, such as a nation or an enterprise: how much water from what water source in which area their activities rely on? How sustainable is the water use?

Virtual Water Trade through Major Crops

Changes in freshwater resources under CC
飲水思源
When you drink water, think its origin.

飲食思水
When you eat, think about water.

Thank You!