



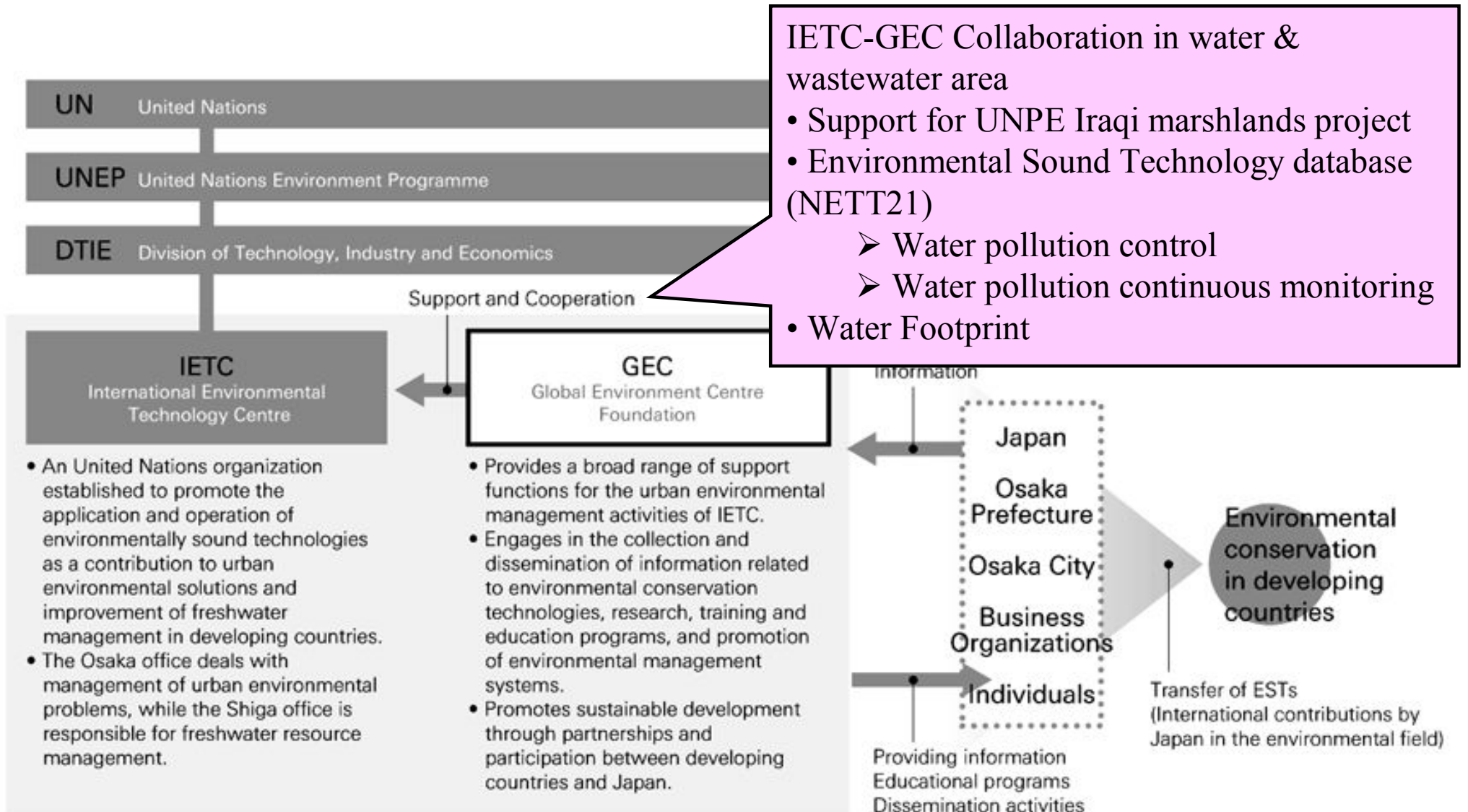
# Water Footprint

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# Collaboration between UNEP/IETC & GEC



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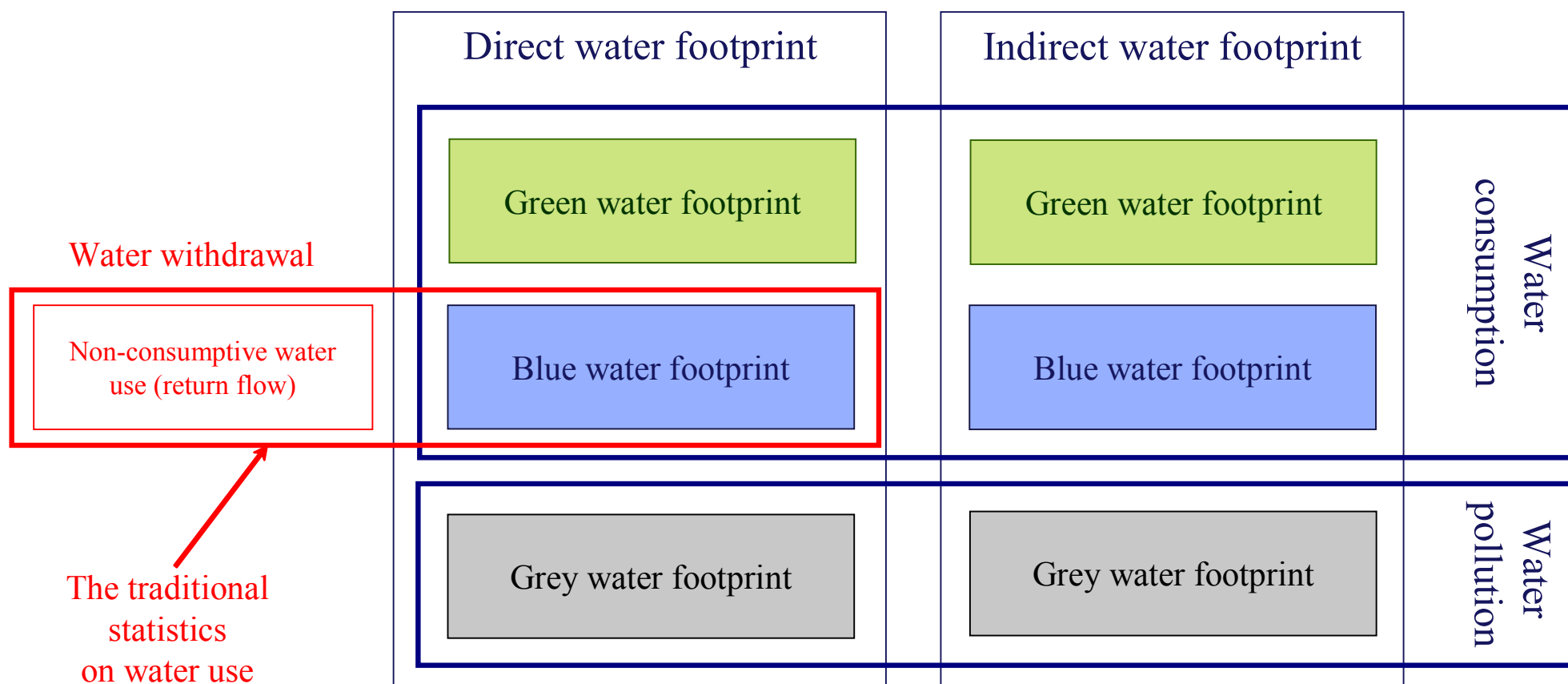
# 1. What is “Water Footprint”?

# What is “Water Footprint”?

- The water footprint is an indicator of freshwater use that looks at both direct and indirect water use of a consumer or producer.
- The Concept of “water footprint” was introduced by Hoekstra in 2002.
- The water footprint is a geographically explicit indicator, not only showing volumes of water use and pollution, but also the locations.

(Source: Water Footprint Manual, Nov. 2009)

# Components of Water Footprint



(Source: Water Footprint Manual, Nov. 2009)

# Meaning of each Water Footprint

## **Green Water Footprint**

Volume of rainwater consumed during the production process. This is particularly relevant for agricultural and forestry products (products based on crops or wood), where it refers to the total rainwater evapotranspiration (from fields and plantations) plus the water incorporated into the harvested crop or wood.

## **Blue Water Footprint**

Volume of surface and groundwater consumed as a result of the production of a good or service. Consumption refers to the volume of freshwater used and then evaporated or incorporated into a product. It also includes water abstracted from surface or groundwater in a catchment and returned to another catchment or the sea. It is amount of water abstracted from ground- or surface water that does not return to the catchment from which it was withdrawn.

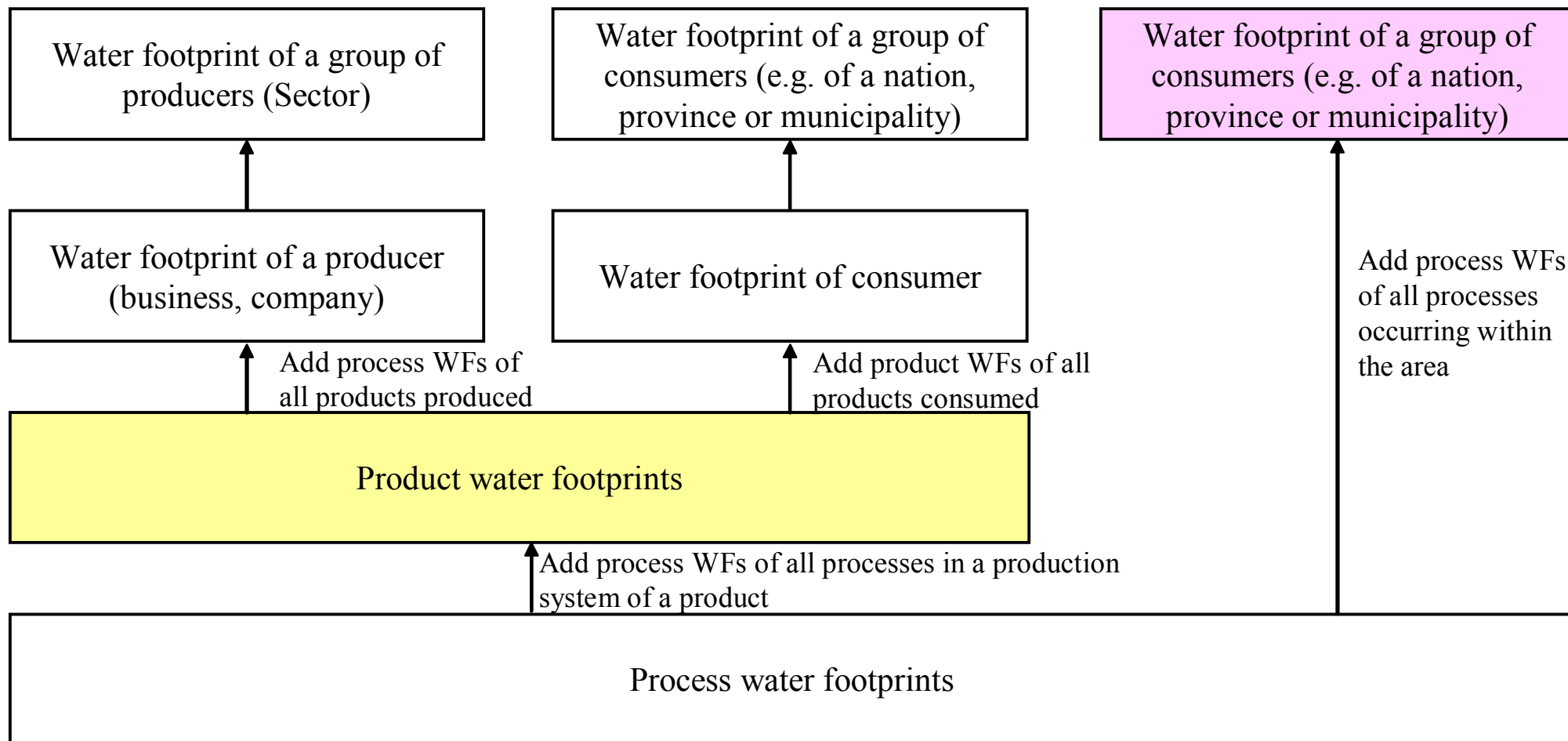
## **Grey Water Footprint**

The grey water footprint of a product is an indicator of freshwater pollution that can be associated with the production of a product over its full supply chain. It is defined as the volume of freshwater that is required to assimilate the load of pollutants based on existing ambient water quality standards. It is calculated as the volume of water that is required to dilute pollutants to such an extent that the quality of the water remains above agreed water quality standards.

(Source: Water Footprint Manual, Nov. 2009)

Consultative Meeting on Water & Wastewater Management, 19 April, 2010 @UNEP/IETC, ILEC, Shiga, JAPAN

# Process water footprints as the basic building block for all other water footprints



(Source: Water Footprint Manual, Nov. 2009)



## 2. International interest in “Water Footprint”

# Toward International Standardization of “Water Footprint”

March 2009	New Work Item Proposal (NWIP) for WF was proposed by Switzerland at ISO/TC207/SC5
June 2009	Working Group (ISO/TC207/SC5/WG8) was newly established for international standardization of WF
November 2009	1st WG8 meeting was held at Stockholm
July 2010	TC207 to be held in Mexico
Oct-Nov 2010	WG8 to be held

# UNEP's Activity on "Water Footprint"

## Water Footprint, Neutrality & Efficiency (WaFNE)

**Time frame:** 3 years (2009/10 – 2012/13)

**Cost of project:** 5,5 million US\$

**Partners:**

UNEP: IETC, DTIE SCP Branch (Paris), UNEP Finance Initiative (Geneva)

UN Global Compact – CEO Water Mandate

Business & Industry: participant companies, organizations

Relevant UN institutions, expert institutes & networks incl. UN-Waters, Pacific Institute, Water Footprint Network and UNEP/ SETAC Life Cycle Initiative

**Component 1:** Refinement, promotion of methodologies and tools for application of water accounting / footprinting related concepts / tools (lead by UNEP SCP)

**Component 2:** Applying water accounting/ footprinting related concepts & management tools in selected industry sectors (lead by UNEP SCP)

**Component 3:** Using water accounting/ footprint and related concepts in financial sector (lead by UNEP FI)

**Component 4:** Applying water accounting/ footprinting and related concepts in selected geographical locations (lead by UNEP IETC)

(Source: UNEP/IETC)

# UNEP/IETC's Activity Under WaFNE

Applying water footprinting and related concepts in selected geographical locations

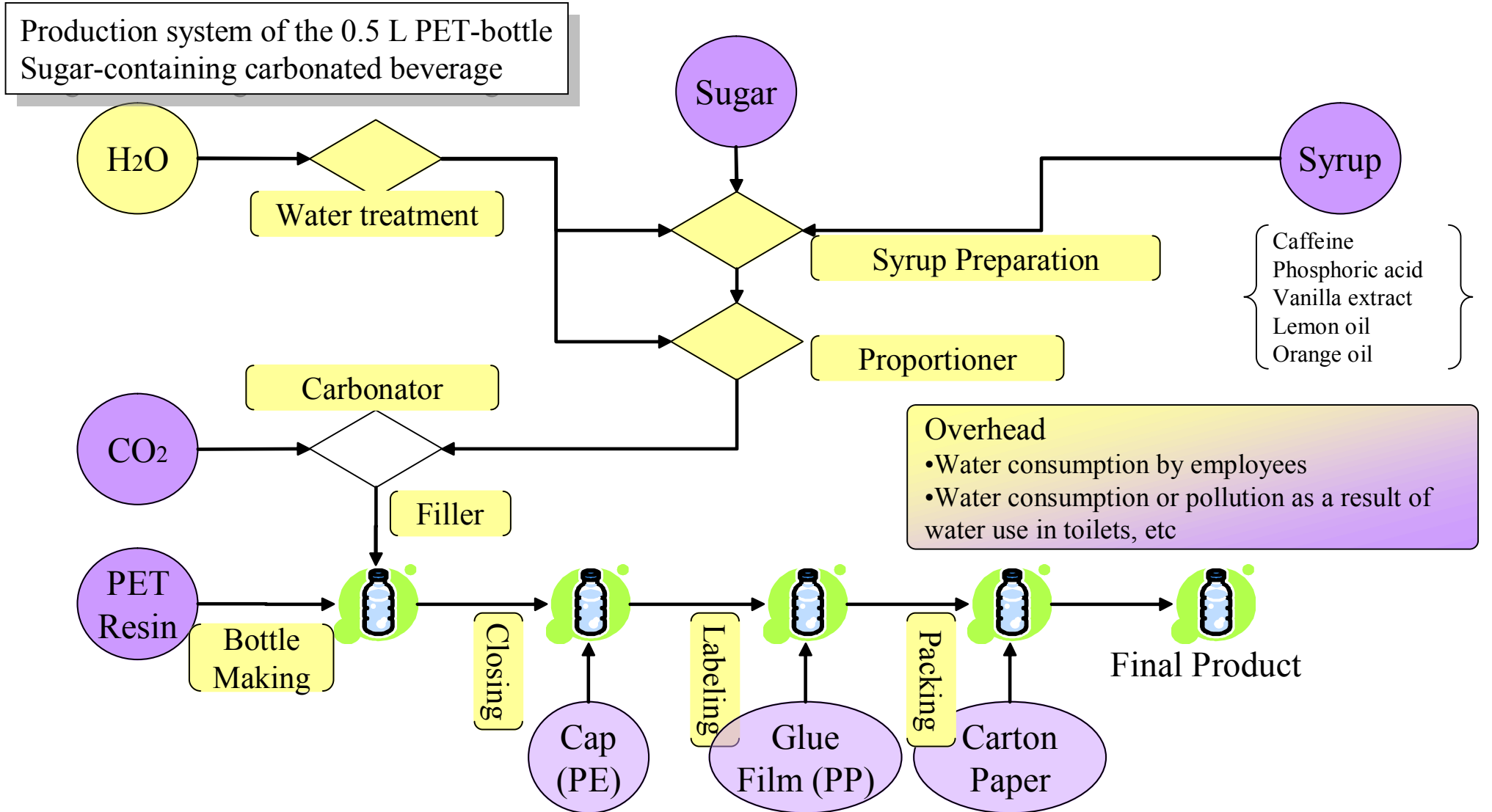
- **2 pilot locations at national, regional or city level or some other defined area (watershed, catchment area) that is experiencing water scarcity and is highly water-stressed**
- **Activities:**
  - **Dialogue**
  - **Capacity building**
  - **Assessment and demonstration**
    - WF accounting
    - WF impact assessment
    - Reduction of the negative impacts of WFs
    - Offsetting the residual impacts of WFs
  - **Awareness raising and replication**

(Source: UNEP/IETC)



### 3. Example of “Water Footprint”

# WF of a sugar-containing carbonated beverage ~ Example of WF~



(Source: A pilot in corporate water footprint accounting and impact assessment, A.E. Ercin, et al., Nov. 2009)  
 Consultative Meeting on Water & Wastewater Management, 19 April, 2010 @UNEP/IETC, ILEC, Shiga, JAPAN

## Result of WF calculation sugar-containing carbonated beverage

$$\begin{aligned}
 \text{Total WF} &= \text{Operational WF (OWF)} + \text{Supply-chain WF (SWF)} \\
 &= (\text{OWF directly associated with the production of the product} + \text{Overhead OWF}) \\
 &\quad + (\text{SWF related to the product inputs} + \text{Overhead SWF})
 \end{aligned}$$

### Total WF

#### Operational WF

Operational WF directly associated with the production of the product

Green water footprint

Blue water footprint

Grey water footprint

Overhead operational water footprint

Green water footprint

Blue water footprint

Grey water footprint

#### Supply-chain WF

Supply-chain WF directly related to the product inputs

Green water footprint

Blue water footprint

Grey water footprint

Overhead supply-chain water footprint

Green water footprint

Blue water footprint

Grey water footprint

## Result of WF calculation sugar-containing carbonated beverage

**Total WF: 168.5~309.4**

**(Green WF: 134.5~252.4, Blue WF: 7.9~124.5, Grey WF: 9.2~19.7)**

### Operational WF

1) Operational WF directly associated with the production of the product

Green water footprint = 0

Blue water footprint = 0.5

Grey water footprint = 0

2) Overhead operational water footprint

Green water footprint = 0

Blue water footprint = 0

Grey water footprint = 0

### Supply-chain WF

3) Supply-chain WF directly related to the product inputs

Green water footprint = 134.5~252.4

Blue water footprint = 7.4~124.0

Grey water footprint = 8.5~19.0

4) Overhead supply-chain water footprint

Green water footprint = 0.001

Blue water footprint = 0.004

Grey water footprint = 0.8

## WF of a sugar-containing carbonated beverage ~ Example of WF~

1) The operational WF directly associated with the production of the product

	Green	Blue	Grey	Total
Direct water used for a 0.5 litre PET (as ingredient)	0	0.5	0	0.5
Net water used in production step	0	0	0	0
Bottle making	0	0	0	0
Bottle cleaning	0	0	0	0
Ingredients mixing	0	0	0	0
Packing	0	0	0	0
Sub-total	0	0.5	0	0.5

2) Overhead operational WF

	Green	Blue	Grey	Total
Domestic water consumption	0	0	0	0
Sub-total	0	0	0	0

## WF of a sugar-containing carbonated beverage ~ Example of WF~

### 3) Supply-chain WF directly related to the product inputs

#### i) Ingredients of the product

	Green	Blue	Grey	Total
<b>Sugar</b>	0-117.9	7.0-123.5	2.4-12.0	26.0-167.0
CO2	0	0.33	0	0.33
Phosphoric acid or citric acid	0	0	0	0
Caffeine	52.8	0	0	52.8
Vanilla extract	79.8	0	0	79.8
Lemon oil	0.01	0	0	0.01
Orange oil	0.9	0	0	0.9
Sub-total	133.4-251.3	7.2-123.8	2.4-12.9	159.8-300.8

## WF of a sugar-containing carbonated beverage ~ Example of WF~

3) Supply-chain WF directly related to the product inputs

ii) Other components related to the product

	Green	Blue	Grey	Total
Bottle -PET	0	0.2	4.4	4.5825
Closure- HDPE	0	0.03	0.68	0.7
Label – PP	0	0.003	0.068	0.07
Label glue (not included)	0	0	0	0
Packing material	0	0	0	0
Tray glue (not included)	0	0	0	0
Tray carton – paperboard	1	0	0.5	1.5
Tray shrink film – PE	0	0.02	0.36	0.38
Pallet stretch wrap – PE	0	0.003	0.054	0.057
Pallet label (2x) – coated paper	0.001	0	0.0004	0.0015
Pallet- painted wood	0.033	0	0.007	0.04
Sub-total	1.1	0.2	6.1	7.4

(Source: A pilot in corporate water footprint accounting and impact assessment, A.E. Ercin, et al., Nov. 2009)  
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## WF of a sugar-containing carbonated beverage ~ Example of WF~

Ref) WF of the sugar input for a 0.5 litre PET bottle sugar containing carbonated beverage (1)

<b>Beet Sugar</b>	Green	Blue	Grey	Total
Iran	5.7	82.8	10.0	98.5
Russia	24.6	34.1	4.5	63.3
USA	14.7	30.1	6.4	51.2
Italy	18.6	20.8	7.1	46.5
Spain	10.0	23.1	9.7	42.8
France	11.7	9.5	6.2	27.4
Netherland	13.6	7.0	5.4	26.0
<b>Sugar Cane</b>	Green	Blue	Grey	Total
Cuba	95.2	65.7	6.2	167.0
Pakistan	9.0	123.5	8.0	140.4
Brazil	35.3	26.6	2.4	64.3
India	26.2	47.9	4.6	78.6
Peru	0.0	41.3	2.6	43.9
USA	29.3	24.4	3.2	56.8

(Source: A pilot in corporate water footprint accounting and impact assessment, A.E. Ercin, et al., Nov. 2009)  
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## WF of a sugar-containing carbonated beverage ~ Example of WF~

Ref) WF of the sugar input for a 0.5 litre PET bottle sugar containing carbonated beverage (2)

<b>HFMS 55</b>	Green	Blue	Grey	Total
India	117.9	38.2	10.2	166.2
USA	15.9	13.8	6.5	36.1
France	10.1	10.0	9.2	29.3
China	33.3	17.9	12.0	63.2

\* HFMS: High Fructose Maize Syrup

## WF of a sugar-containing carbonated beverage ~ Example of WF~

### 4) Overhead supply-chain water footprint

	Green	Blue	Grey	Total
Construction				
Concrete	0	0	0.005	0.005
Steel	0	0.004	0.05	0.054
Paper	0.0012	0	0.0004	0.0016
Energy				
Natural Gas	0	0	0.024	0.024
Electricity	0	0	0.13	0.13
Transportation				
Vehicles	0	0.001	0.009	0.01
Fuel	0	0	0.5	0.5
Sub-total	0.001	0.004	0.8	0.8

(Source: A pilot in corporate water footprint accounting and impact assessment, A.E. Ercin, et al., Nov. 2009)  
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This is a **global average** and **aggregate** number. Policy decisions should be taken on the basis of:

1. Actual water footprint of certain coffee at the precise production location.
2. Ratio green/blue/grey water footprint.
3. Local impacts of the water footprint based on local vulnerability and scarcity.







## 4. Issues to be discussed

# Issues to be discussed

## **1. Total WF is defined as “Green WF + Blue WF + Grey WF”, but ?**

- Both Green WF and Blue WF show amount of water consumption.
- On the other hand, Grey WF indicates freshwater pollution.
- Is it possible to add three of WF? What do you think?
- WF can be used as “three dimensional indicator”, but not simple. How can each consumer choose a good/service?

## **2. What is WF used for?**

- **Process or product level**
  - A company/factory can check how much water can be saved compared to the previous year by WF.
  - A company/factory can show its eco-friendly attitude to a consumer by WF.
  - However, we have to think about how WF assess water recovery/water saving practice.
- **National or regional level**
  - WF of sugar cane in Peru is lower than that in Cuba. Can you say that Peru should produce more sugar cane, or Cuba should produce other crops?
  - A value of WF depends on local condition such as weather, consumption pattern, level of agricultural technology, etc.

## **3. Relation among Carbon Footprint, Ecological Footprint and Water Footprint**

- If waste water treatment plant is installed in order to reduce grey water footprint, carbon footprint can increase. Is it OK?
- It is important to take a balance among above 3 footprints comprehensively. But how?



## 5. Move Forward

# Move Forward

- 1. GEC will work together with UNEP/IETC to make WF more useful and meaningful indicator especially for developing countries.**
- 2. GEC will conduct further research to make input for discussion of WF (with MOEJ).**
- 3. Consultative Meeting on Water Footprint**
  - **Co-Organizer**            **UNEP/IETC & GEC**
  - **Date**                      **June 2-4, 2010**
  - **Venue**                    **GEC, OSAKA, JAPAN**
  - **Objectives**              **To articulate opportunities and constraints for the geographical pilot implementation**  
**To identify developing partners to carry out pilot implementation initiatives**

Thank you very much for your attention!



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URL: <http://gec.jp>