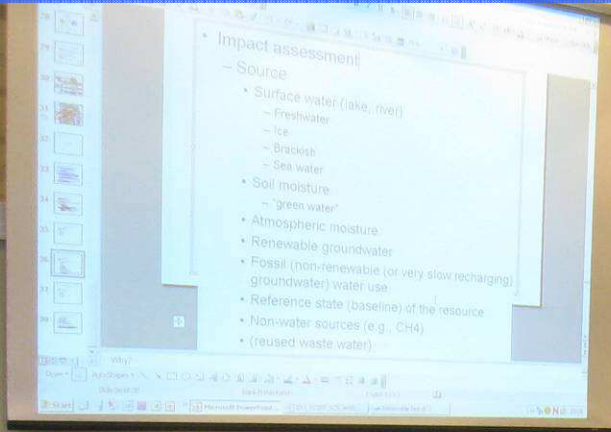


Issues on Water Footprint and Beyond



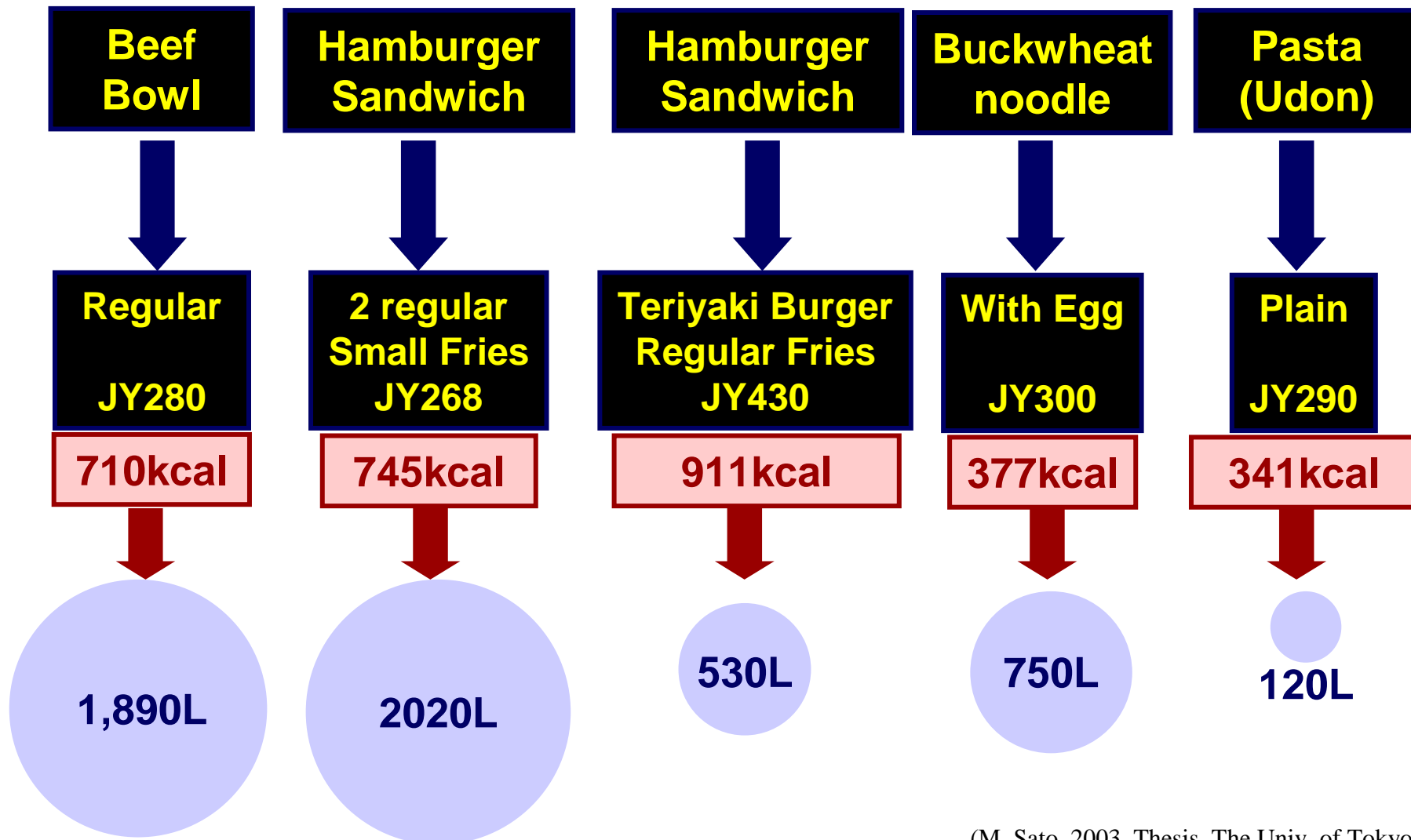
Taikan Oki

Institute of Industrial Science, The University of Tokyo

**Consultative Workshop on Water Footprint, Neutrality and Efficiency
Global Environmental Centre Foundation, Japan, June 3rd, 2010**



Required Water for Fast Food





How much water for production?

Bread		L/loaf
Beer		L/633 cc bottle
Whisky		L/700ml bottle
Soft drink		L/350ml can
Coat		L/suit
Mobile Phone		L
PC		m ³
Bicycle		m ³
Motor Byke		m ³
Motor Car		m ³

***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

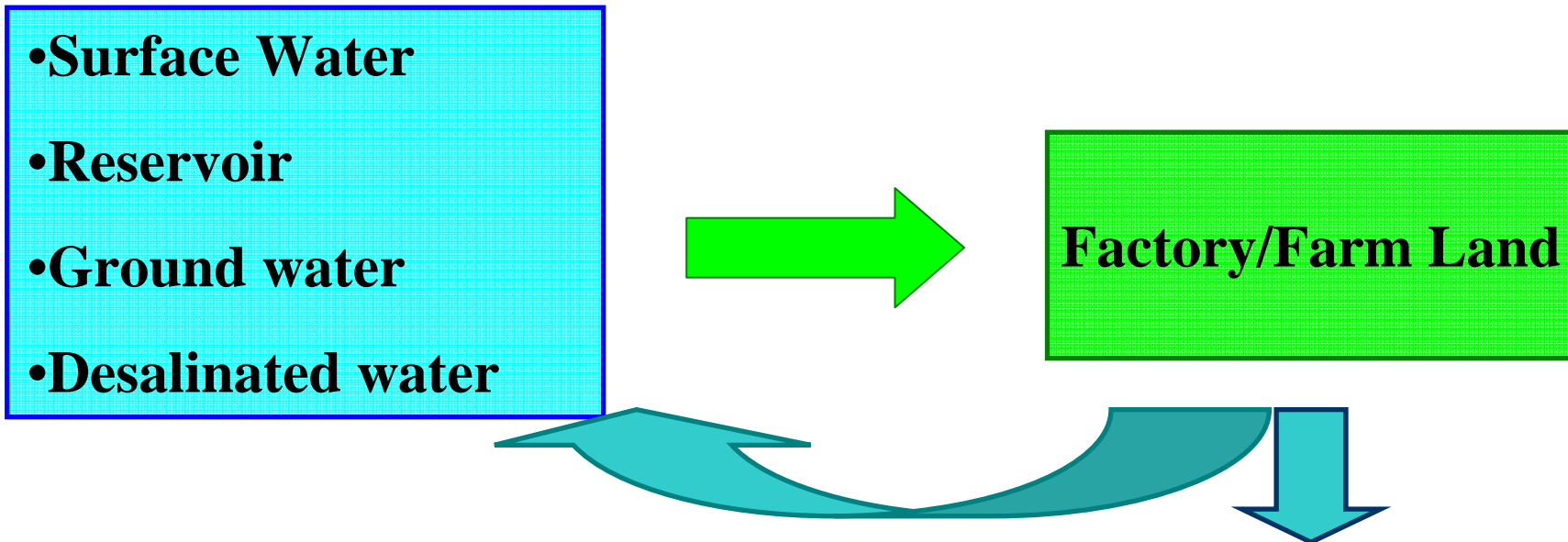
	Product A	Product B
Manufactured in ...	Alaska with abundant water	Sub-Saharan Africa
Timing and origin of water	Spring snow melt water	End of dry season ground water
Discharge	Well treated	At the regulation level
Water footprint	Total 200 liter	Total 150 liter

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?**



💧 From which source?

❄️ Fossil ground water?

💧 When?

❄️ Dry season?

💧 Which area?

❄️ Water stressed region?

•Surface Water

•Reservoir

•Ground water



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?**

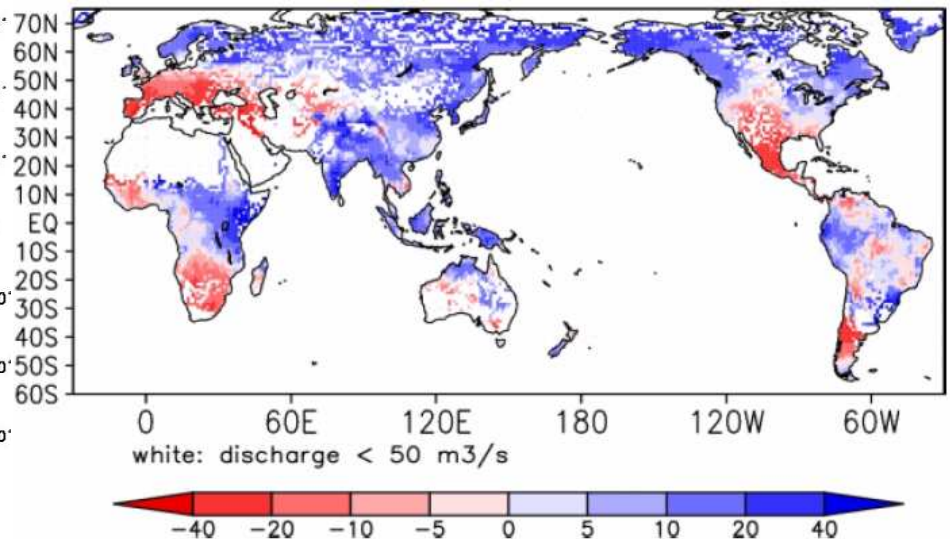
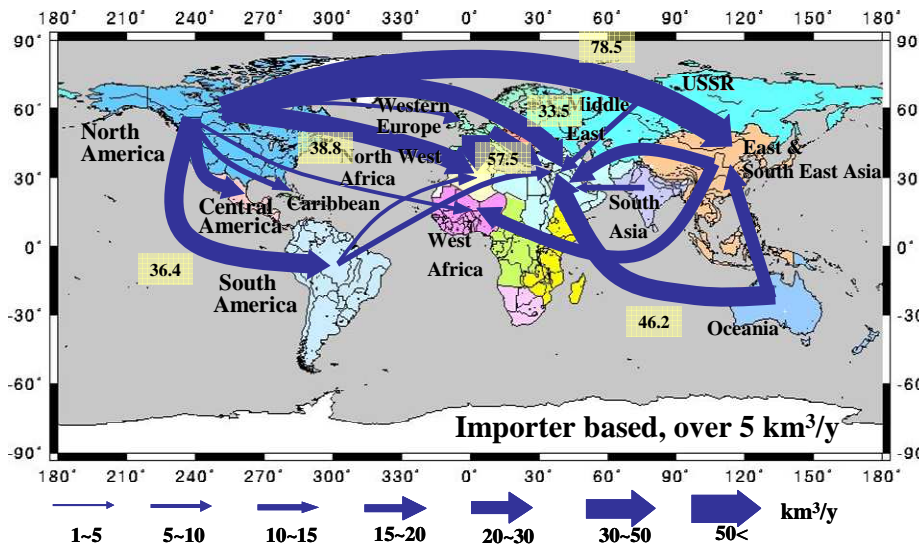


Proposed Principles for WF

- 💧 **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.

飲水区，禁止污染！
Drinking water part
No pollution!



Thank You!

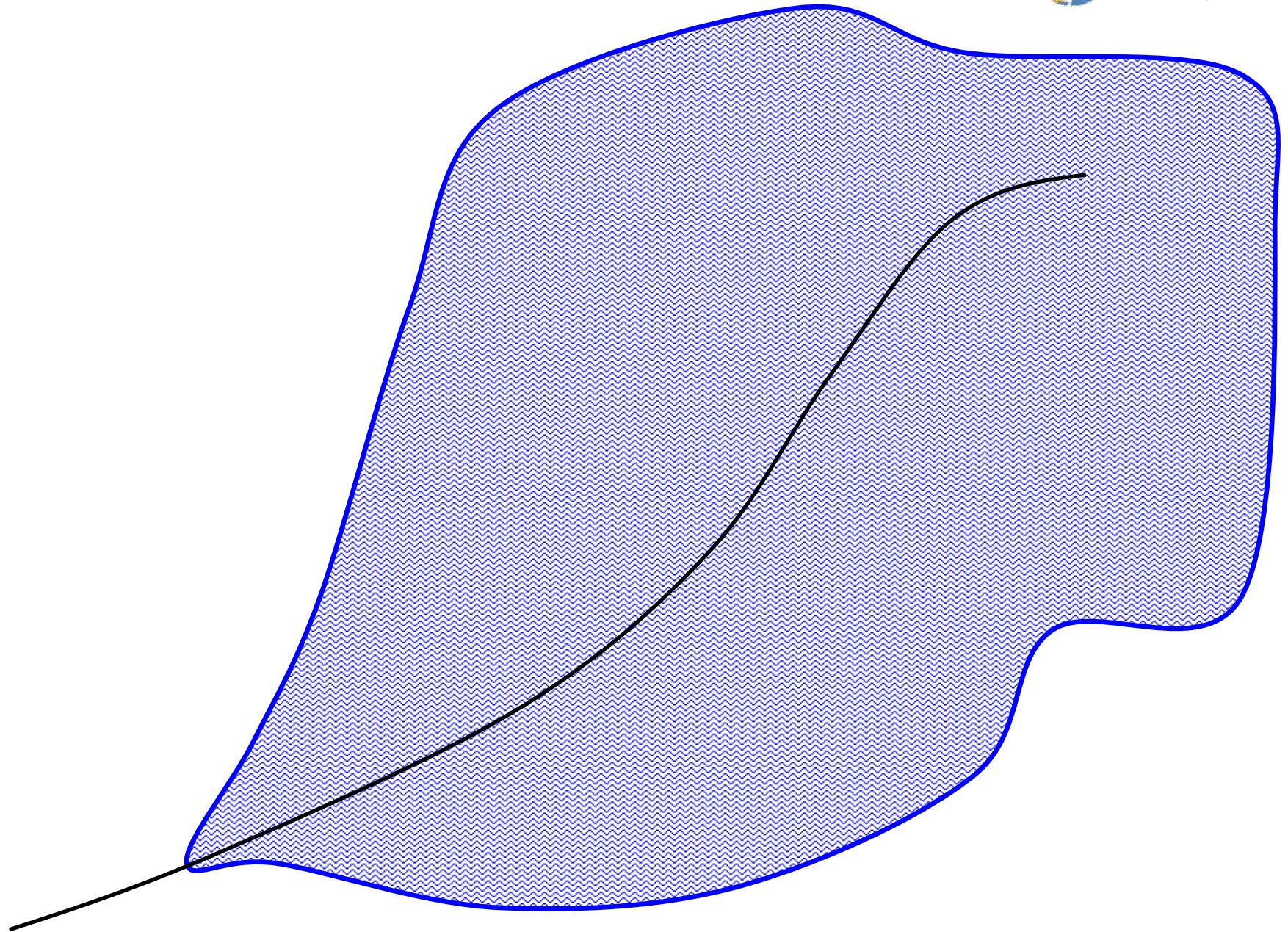


<http://hydro.iis.u-tokyo.ac.jp/>

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東京大学
THE UNIVERSITY OF TOKYO





What is virtual water trade?

“Required water”: water used for production

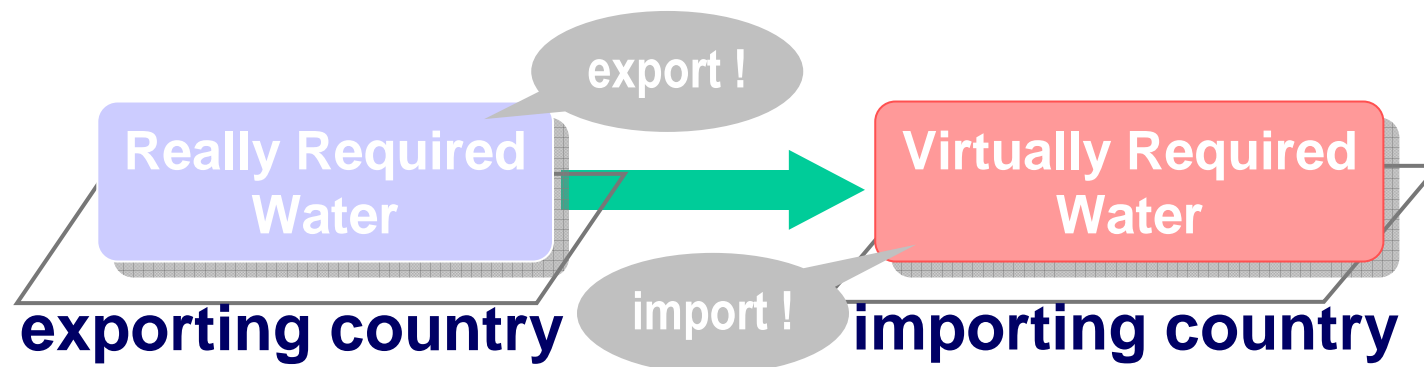
Two types of required water:

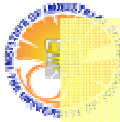
- Really Required Water (Real Water ; *RW*)
water used in *exporting* countries for production

Trade of “Virtual Water” (external cost)

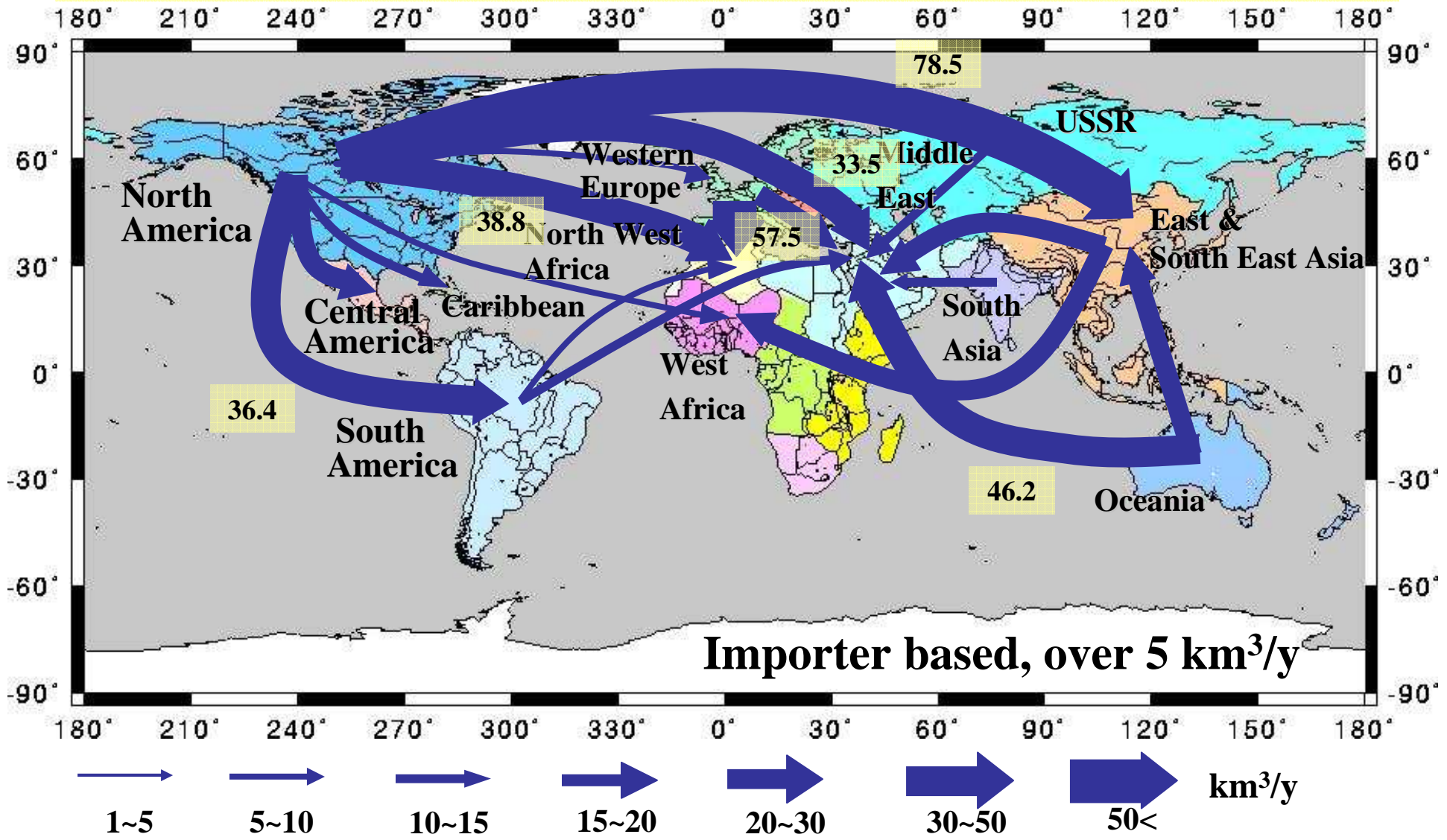
- Virtually Required Water (Virtual Water ; *VW*)
water needed in *importing* countries if the same amount of products were produced domestically

“Virtual Trade” of Water (opportunity cost)





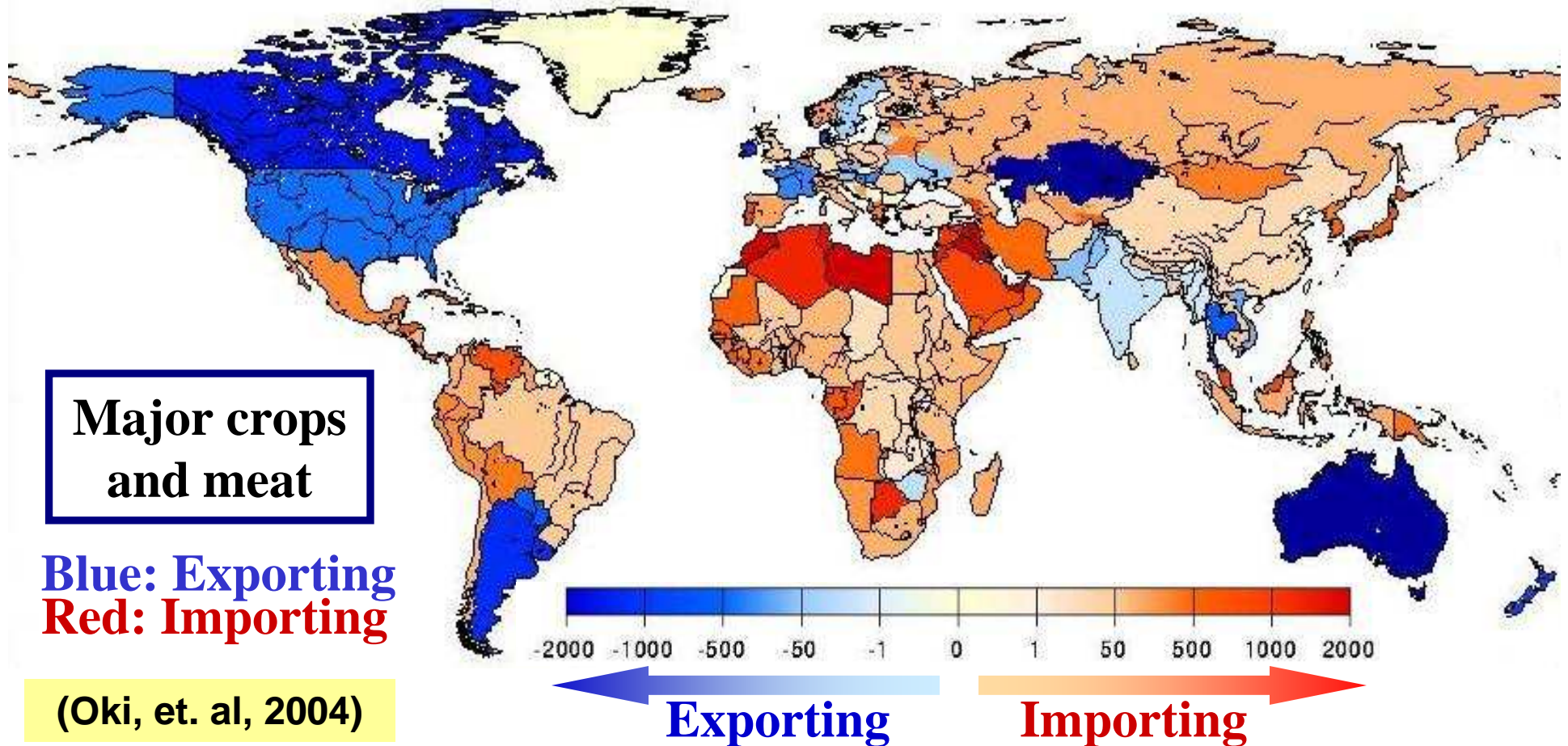
“Virtually Required Water” Trade between Regions in 2000 (cereals only)



(Oki, et. al, 2004)

(Based on Statistics from FAO etc., for 2000)

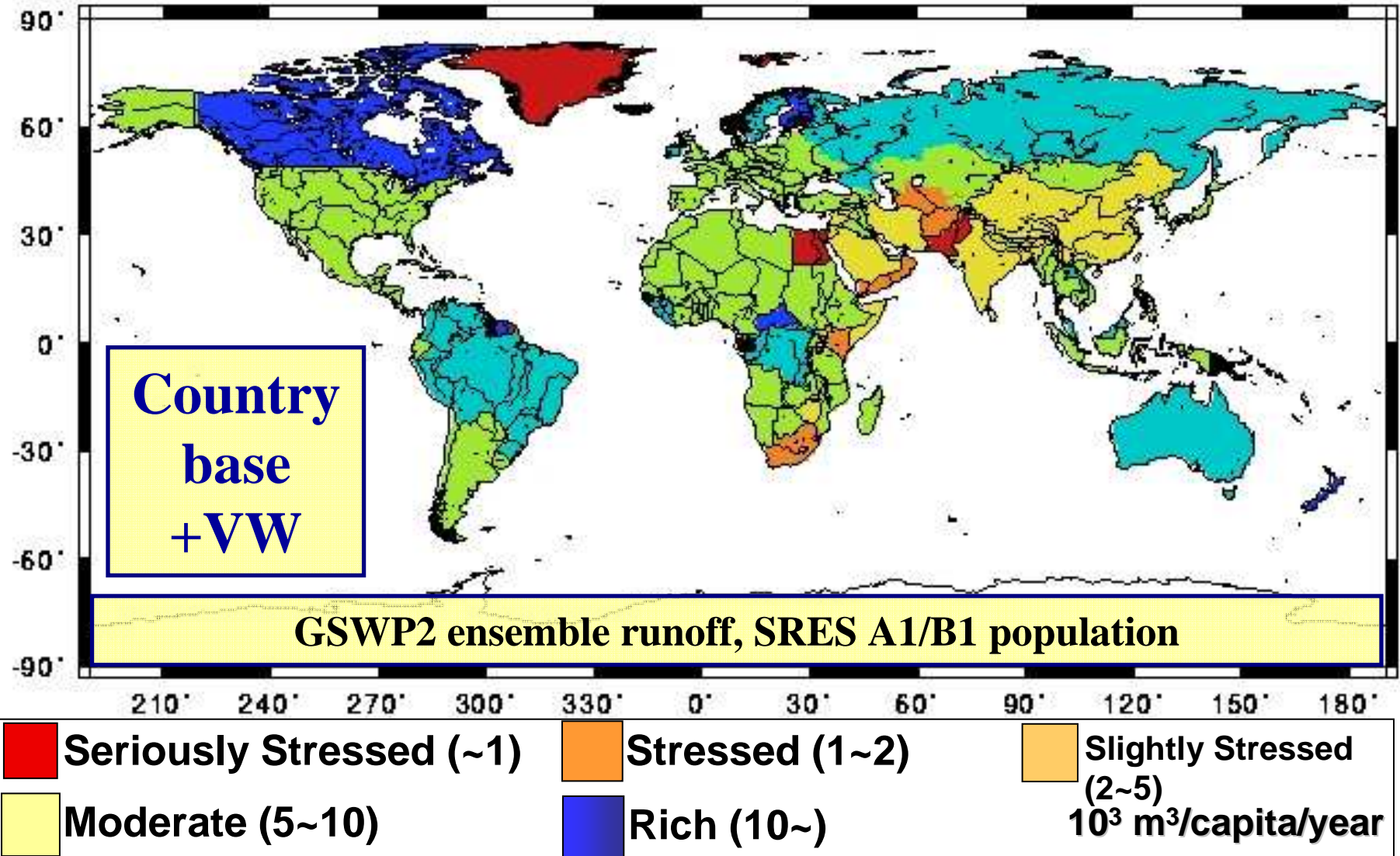
Virtual Water Balance in Countries (m³/c/y) in 2000



- 7 out of top 10 importing countries are seriously poor in water resources.
- 7 out of top 10 exporting countries are rich in water resources.
- Denmark (10) and India (18) are water stressed but exporting *RW* in net.

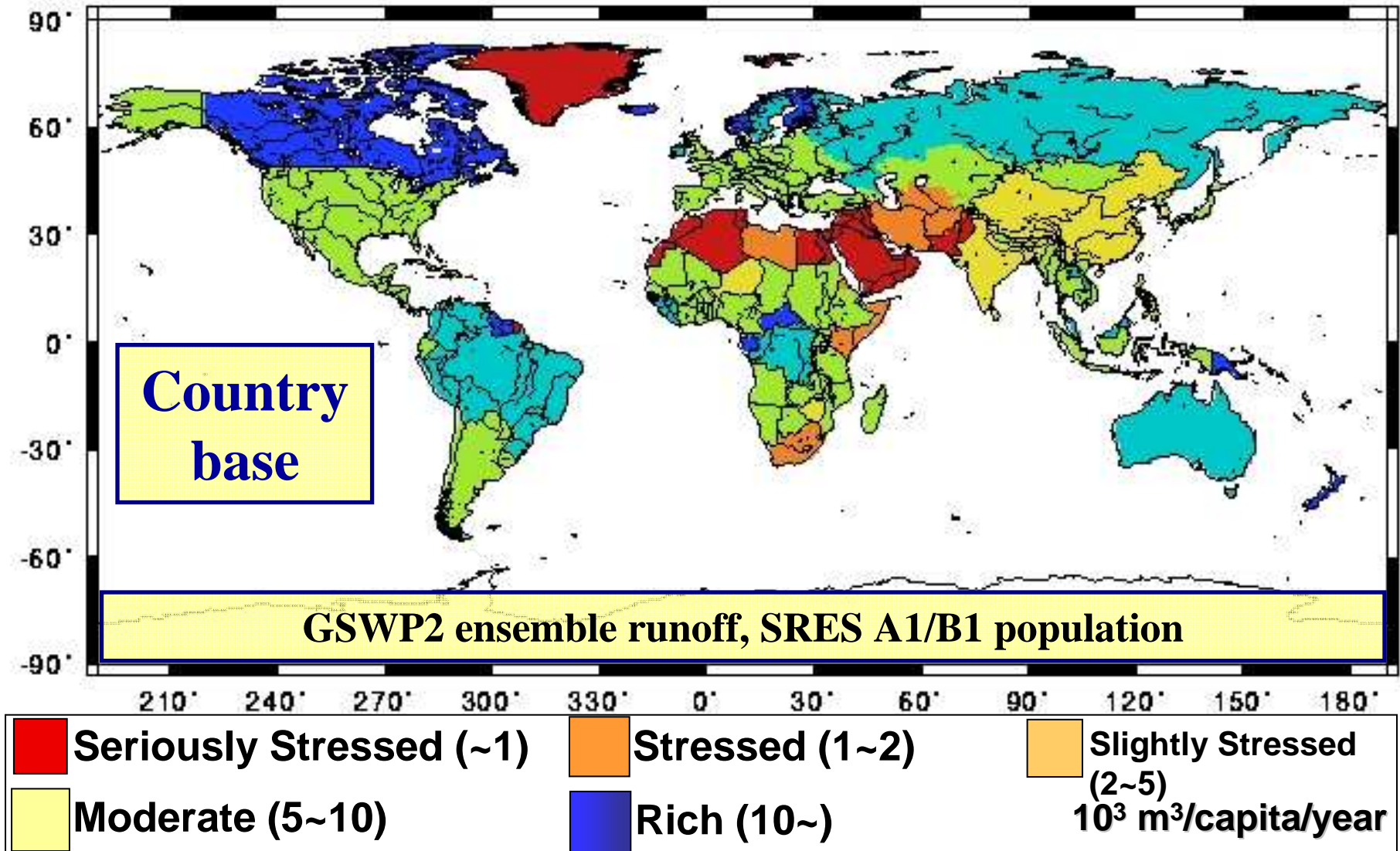
World Water Resources Considering Virtual Water Trade

Potentially Available Water Resources per Capita in 2000



Conventional Water Resources Assessment

Potentially Available Water Resources per Capita in 2000

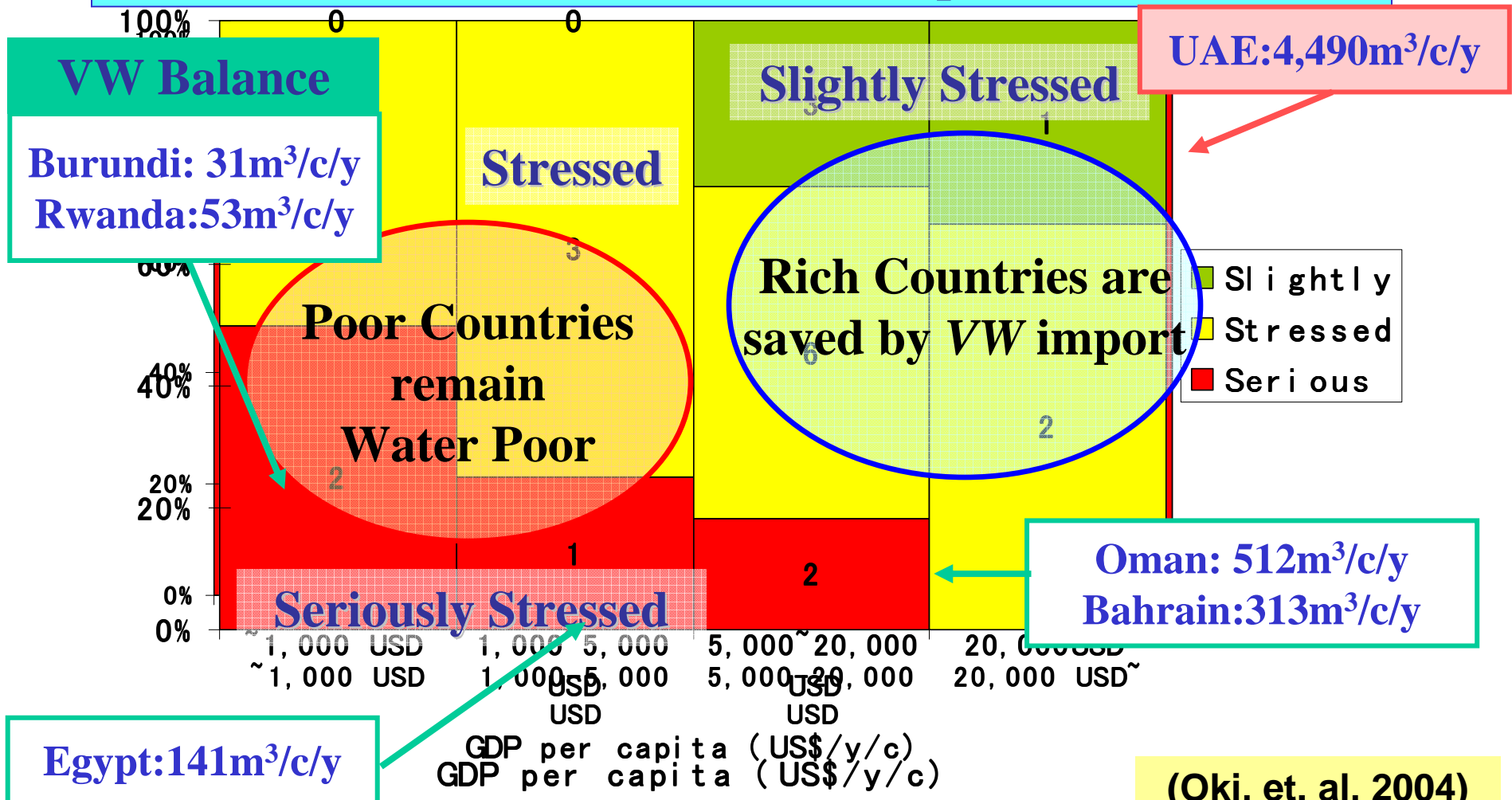




Water Resources Assessment Considering VW trade

22 Countries were classified into “seriously stressed” in 2000 by conventional water resources assessment.

➔ +Virtual Water Import

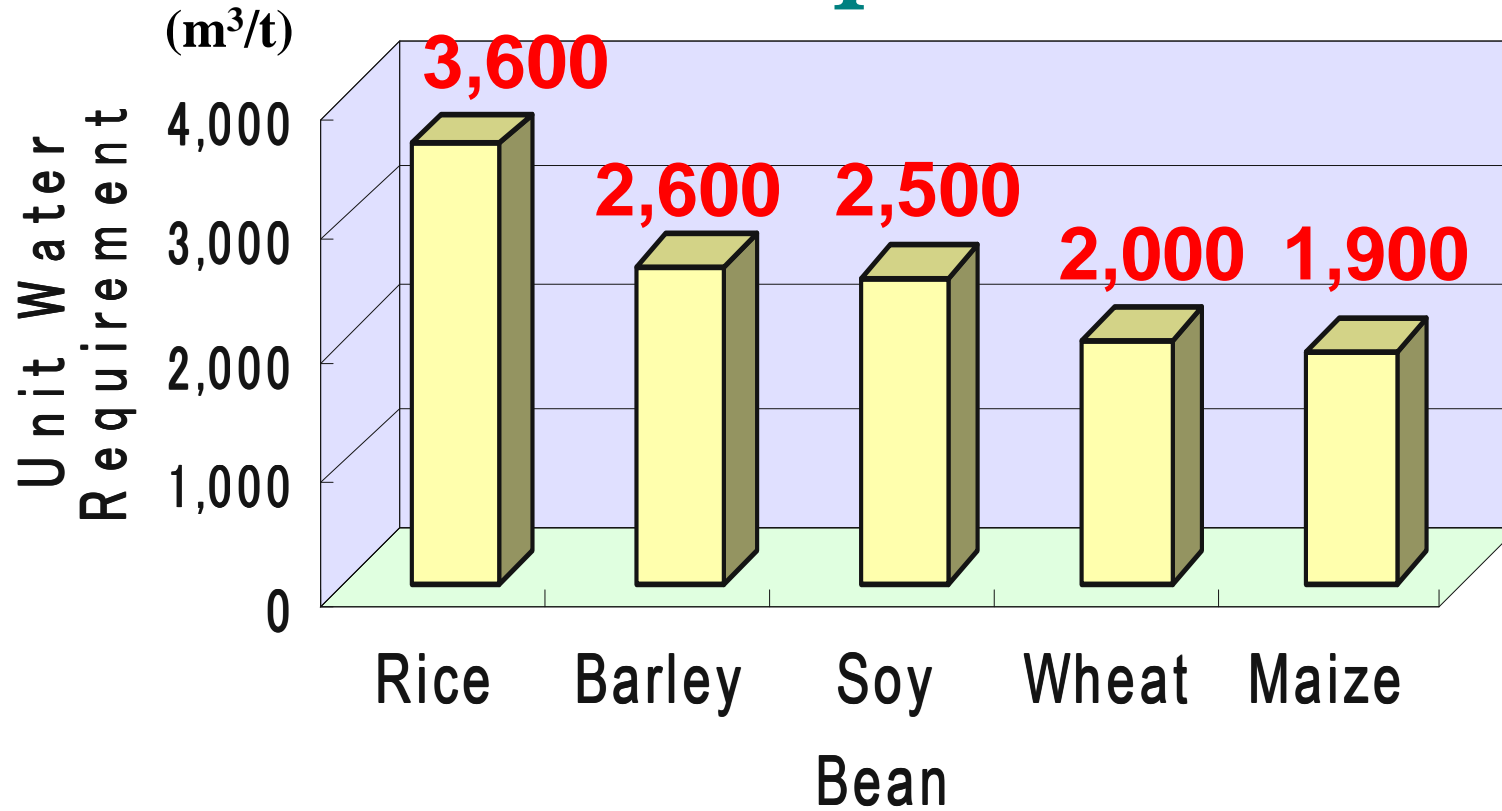


(Oki, et. al, 2004)



Unit Requirement of Water

--Crops--



Unit Water Requirement of Major Crops

(based on crop yield in Japan, FAOSTAT mean 1996-2000)

(Oki, et. al, 2002, IHE-UNESCO)

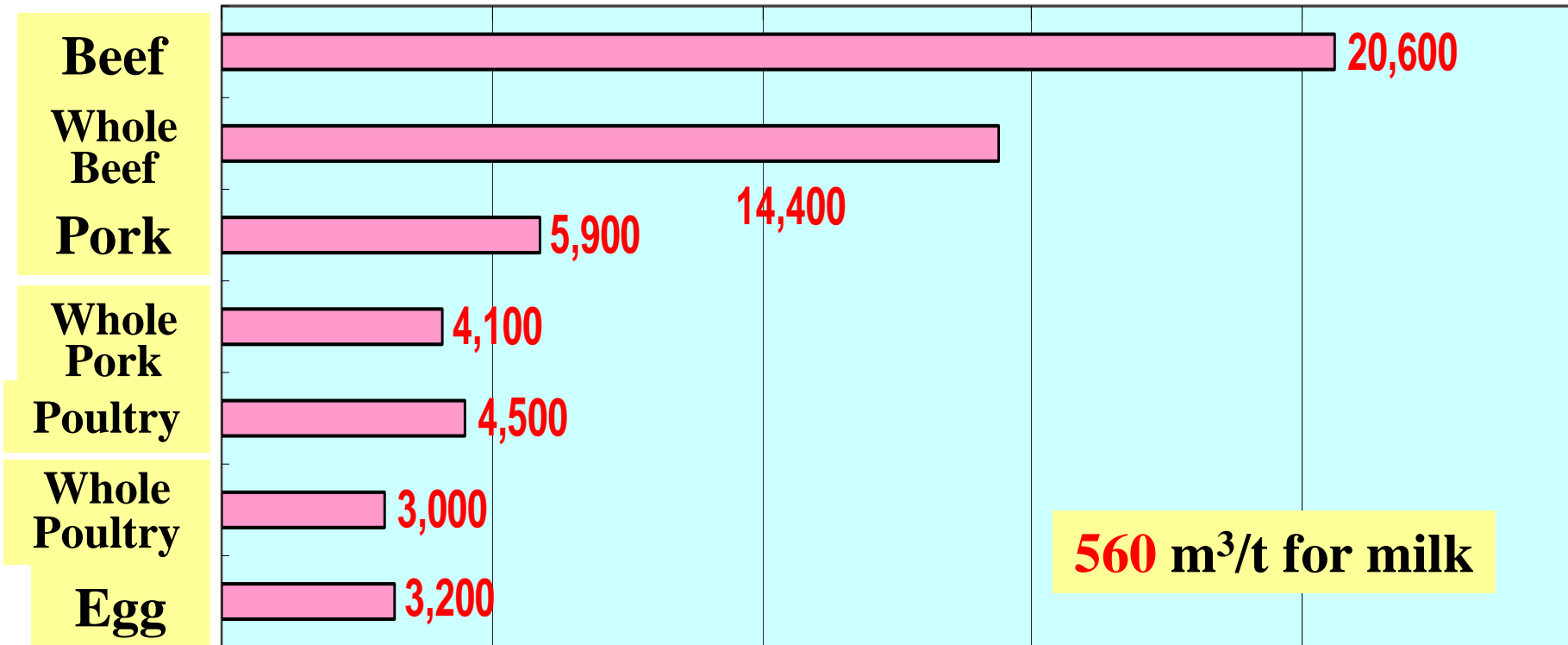


Unit Water Requirement

—Meat—

(m³/t)

0 5,000 10,000 15,000 20,000 25,000



Unit Water Requirement of Major Meat

(based on crop yield and the way of raising in Japan)

(Oki, et. al, 2002, IHE-UNESCO)