Malaysia 2016 SEEA Training
Water Asset Exercise

Regional Training Workshop on the System of Environmental-Economic Accounting with a Focus on Water Accounting

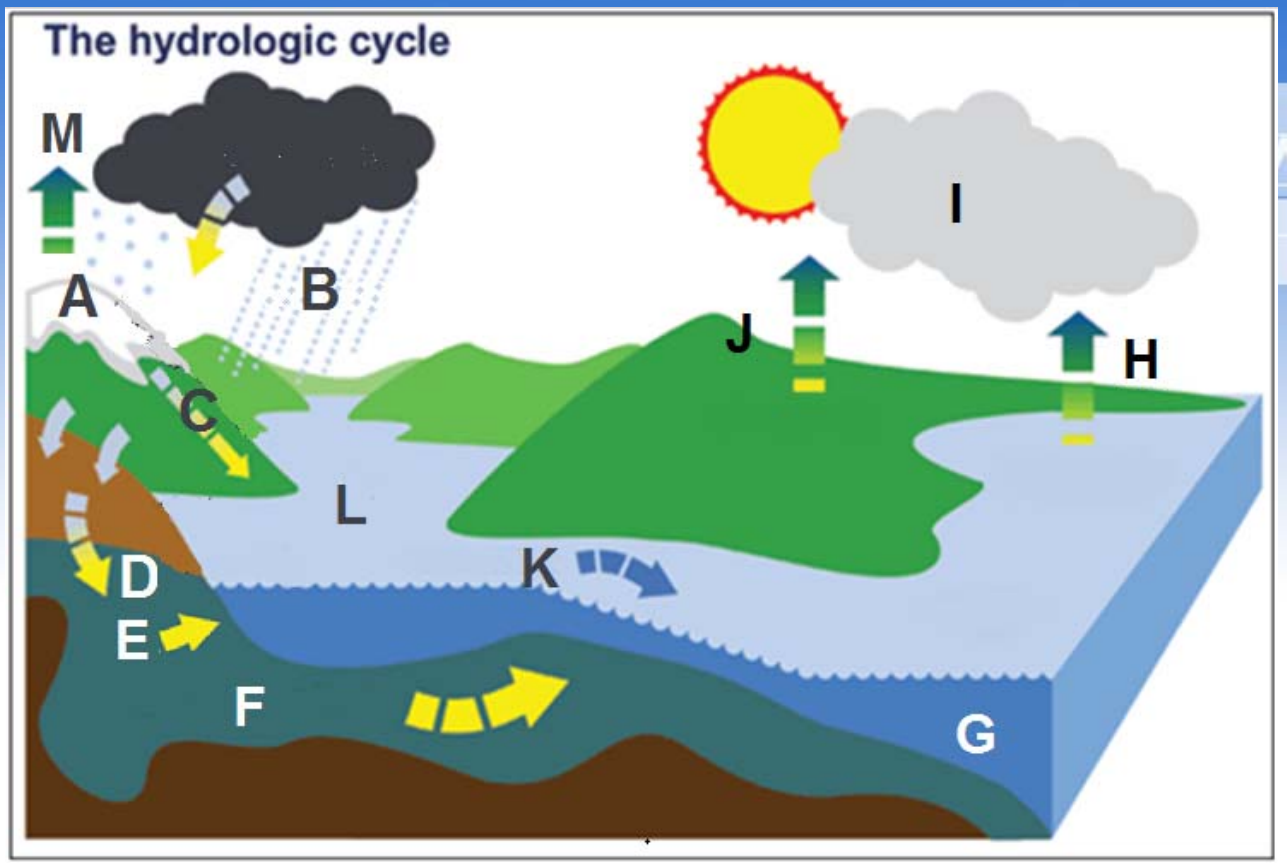
September 26-30, 2016
Putrajaya, Malaysia

François Soulard Ph.D.

Environment, Energy and Transportation Statistics Division

Statistics Canada

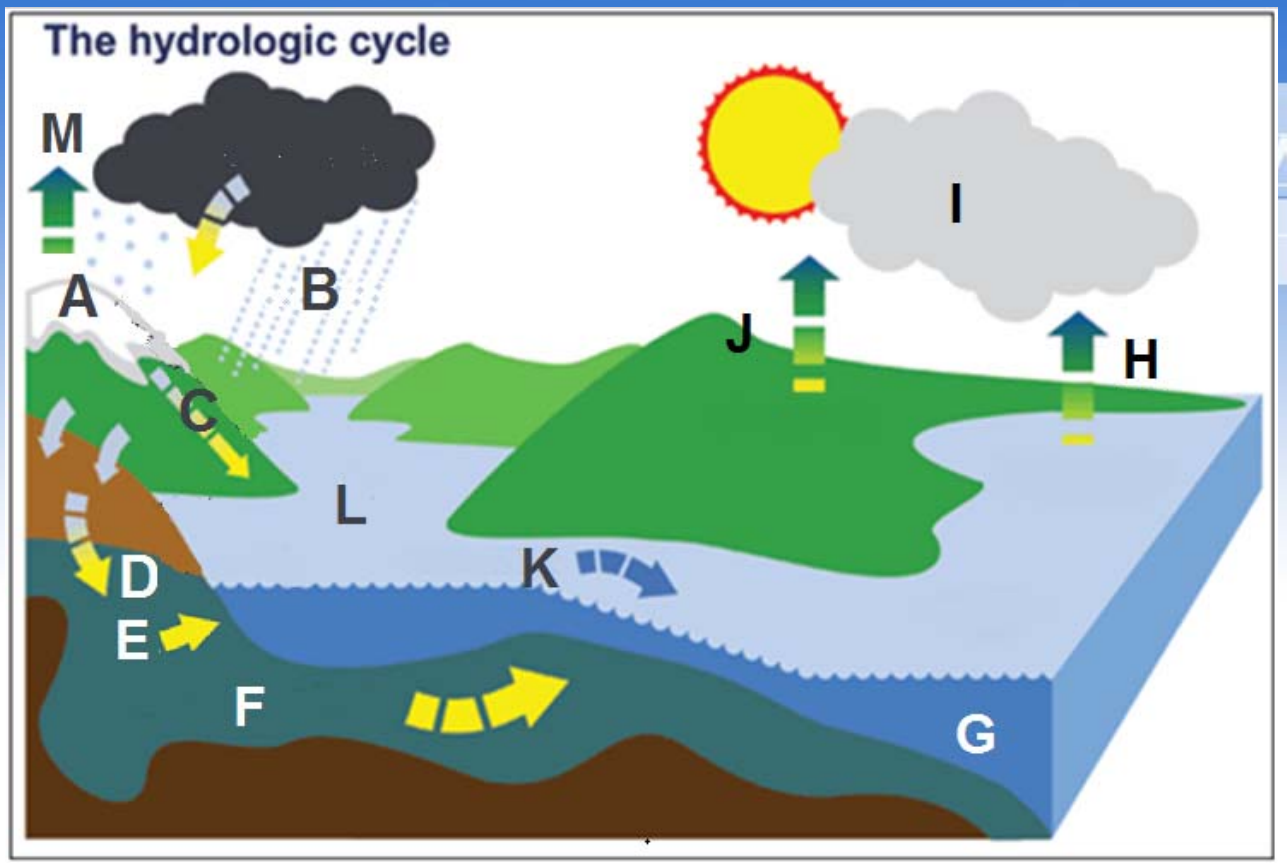
Group exercise 1: The water cycle



A -
B -
C -
D -
E -
F -
G -
H -[2]

I -
J -
K -
L -
M -

Group exercise 1: The water cycle



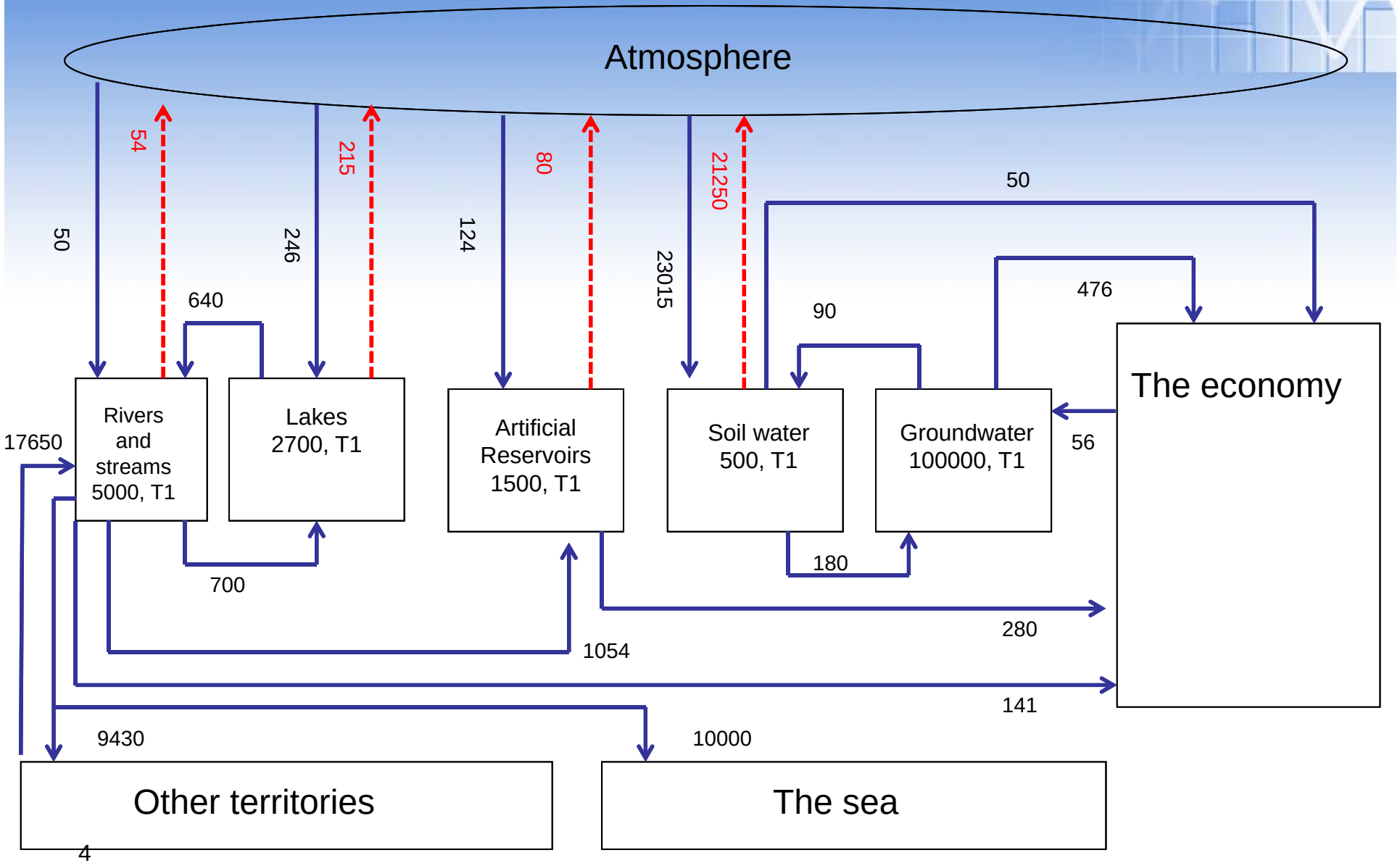
A - Storage in ice and snow
B - Precipitation
C - Snowmelt runoff to streams
D - Infiltration
E - Groundwater discharge
F - Groundwater storage
G - Water storage in oceans
H - Evaporation

I - Water storage in the atmosphere
J - Evapotranspiration

K - Streamflow

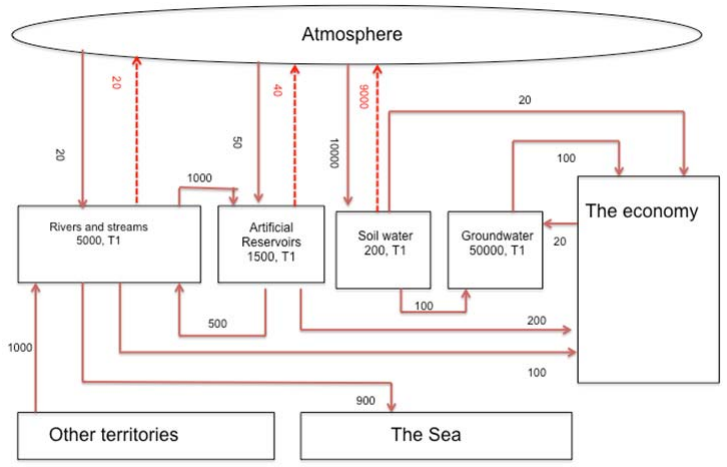
L - Freshwater storage
M - Sublimation

Water cycle schematic



Group exercise 2: Transcribe stock and flow data

Stock and flow diagram



Water asset account

		Type of water resource						Total
		Surface water				Groundwater	Soil water	
		Artificial reservoirs	Lakes	Rivers and streams	Glaciers, snow and ice			
Opening								
Additions to								
	Returns							
	Precipitation							
	Inflows from other territories							
	Inflows from other inland water resources							
	Discoveries of water in aquifers							
	Total additions to stock							
Reductions								
	Abstraction							
	for hydro power generation							
	for cooling water							
	Evaporation & actual evapotranspiration							
	Outflows to other territores							
	Outflows to the sea							
	Outflows to other inland water resources							
	Total reductions in stock							
Closing								

Group exercise 2:

Transcribe stock and flow data

- Is everyone clear on the objectives?
- 30 minutes group work
- Please ask questions!

			Type of water resource						Total
			Surface water				Groundwater	Soil water	
			Artificial reservoirs	Lakes	Rivers and streams	Glaciers, snow and ice			
Opening									
Additions to									
	Returns								
	Precipitation								
	Inflows from other territories								
	Inflows from other inland water resources								
	Discoveries of water in aquifers								
	Total additions to stock								
Reductions									
	Abstraction								
		for hydro power generation							
		for cooling water							
	Evaporation & actual evapotranspiration								
	Outflows to other territores								
	Outflows to the sea								
	Outflows to other inland water resources								
	Total reductions in stock								
Closing									

- Each group report:
  - Opening and closing stock

- Bonus questions:
  - What was the largest source of reductions in stock?

Group exercise 2: Transcribe stock and flow data

		Type of water resource						Total
		Surface water				Groundwater	Soil water	
		Artificial reservoirs	Lakes	Rivers and streams	Glaciers, snow and ice			
Opening								
Additions to								
	Returns							
	Precipitation							
	Inflows from other territories							
	Inflows from other inland water resources							
	Discoveries of water in aquifers							
	Total additions to stock							
Reductions								
	Abstraction							
	for hydro power generation							
	for cooling water							
	Evaporation & actual evapotranspiration							
	Outflows to other territores							
	Outflows to the sea							
	Outflows to other inland water resources							
	Total reductions in stock							
Closing								

Group Exercise 3: The Unu-Water

- According to MeteoU, the average precipitation in Unu is 800 mm/year, which in volume is equivalent to 12 800 million cubic meters of water per year (MCM/year).
  - This is the result of multiplying the average precipitation by the total area of the country (800 mm/year x 16 000 km^2 x 1/1 000).

- UMWR estimates that 20% of the precipitation becomes surface runoff and 5% infiltrates to the aquifers, the rest evaporates or is transpired by vegetation.
  - Evapotranspiration in the country is estimated at about 50% and evaporation, at 5%.

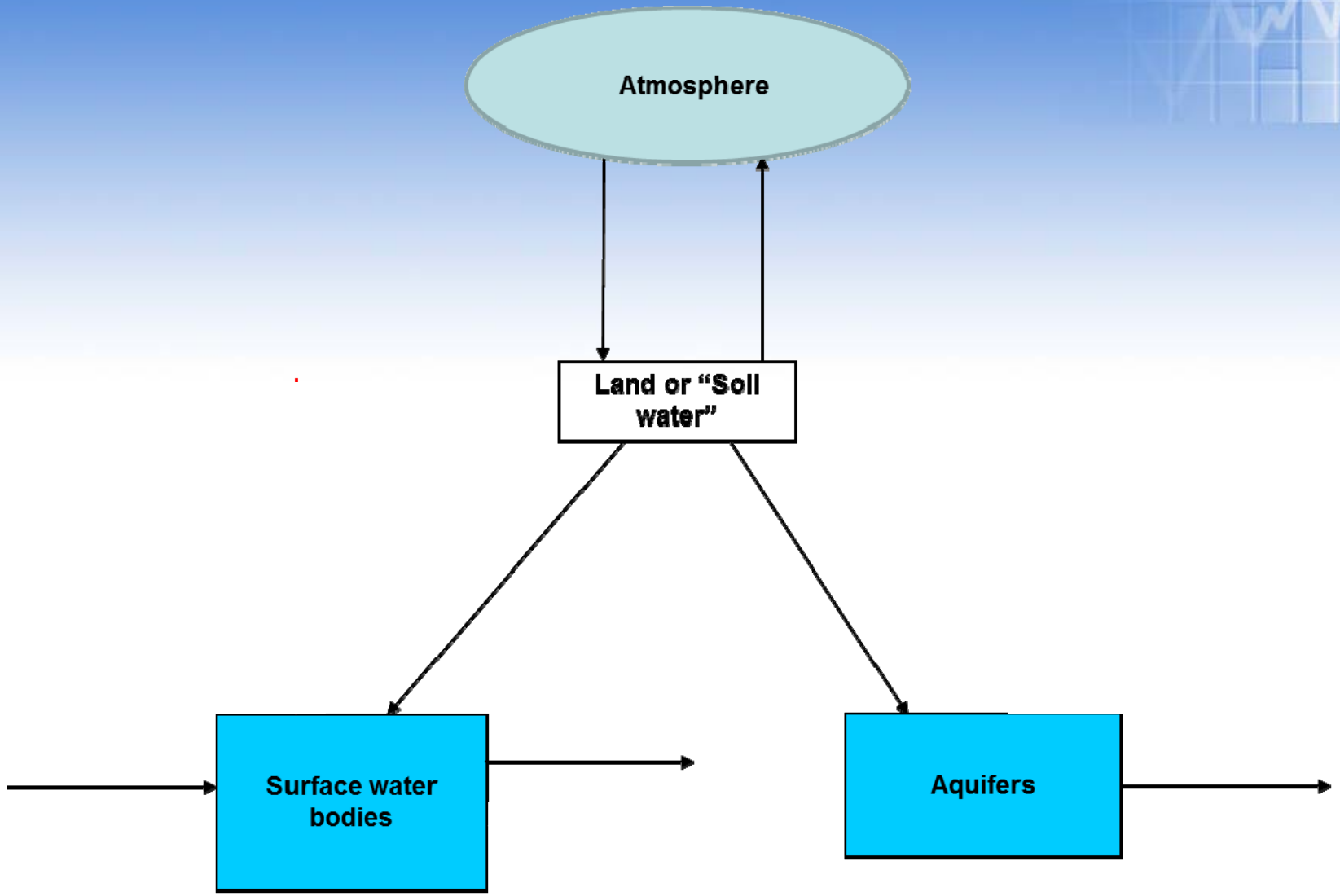
- There is also a transboundary river that brings 1 000 hm^3/year of surface water to Unu from upstream territories. Another transboundary river flows from Unu to downstream countries taking 700 hm^3/yr.

Group Exercise 3: The Unu-Water

- Draw the flows on the following schematic

Discussion

- Identify which flows are missing from this simplified world
- Which flows are likely to be affected by climate change, and why?
- Which are affected by economic development, and why?


Atmosphere
Land or "Soil water"
Surface water bodies
Aquifers

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Thank you for your attention

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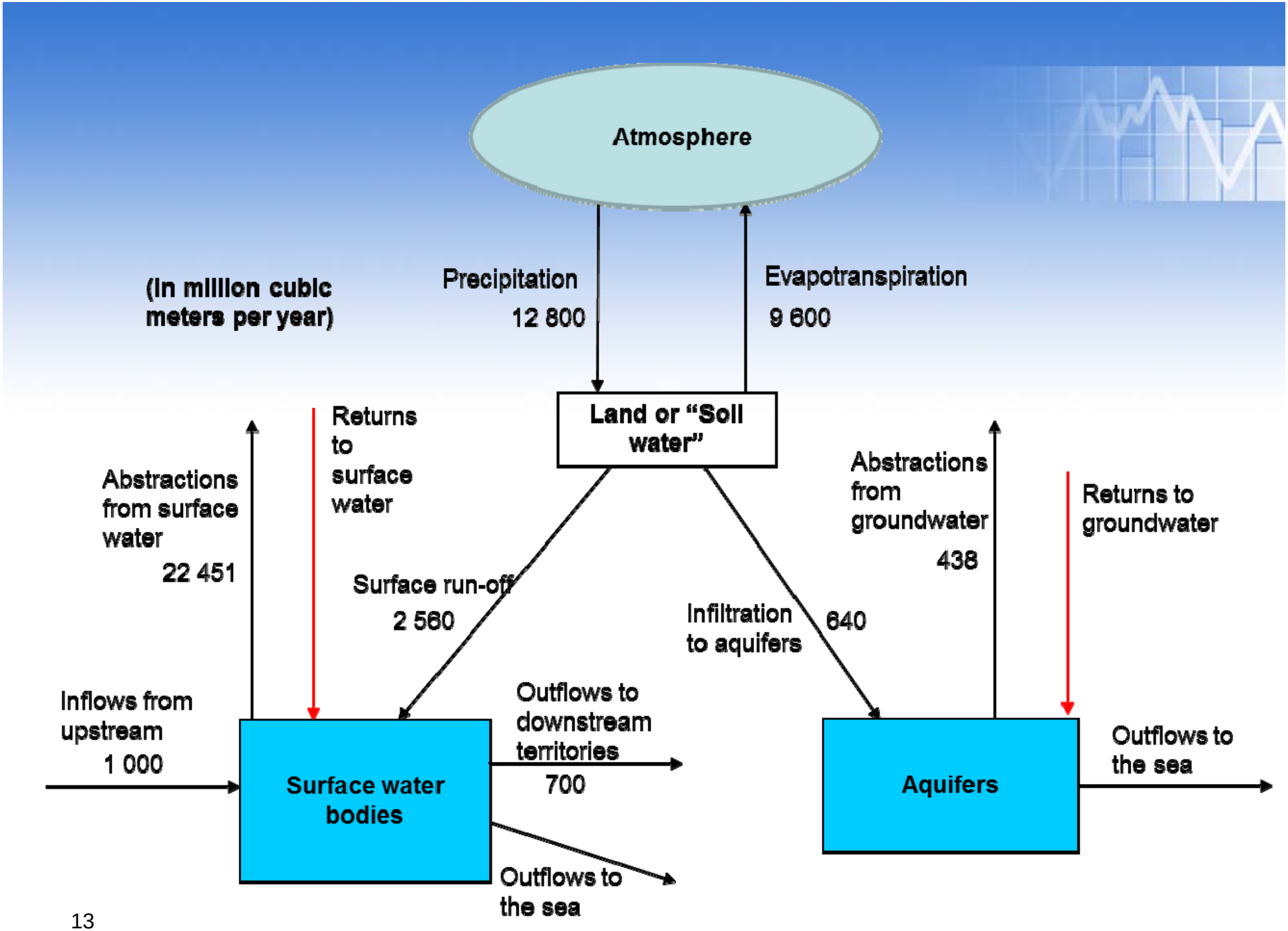
Solution to group exercice 1

			Type of water resource						Total
			Surface water				Groundwater	Soil water	
			Artificial reservoirs	Lakes	Rivers and streams	Glaciers, snow and ice			
Opening			1500	2700	5000	0	100000	500	109700
Additions									
	Returns						56		56
	Precipitation		124	246	50			23015	23435
	Inflows from other territories				17650				17650
	Inflows from other inland water resources		1054	700	640		180	90	2664
	Discoveries of water in aquifers								0
	Total additions to stock		*1178*	*946*	*18340*	*0*	*236*	*23105*	43805
Reductions									
	Abstraction		280		141		476	50	947
		for hydro power generation							0
		for cooling water							0
	Evaporation & actual evapotranspiration		80	215	54			21250	21599
	Outflows to other territores				9430				9430
	Outflows to the sea				10000				10000
	Outflows to other inland water resources		890	640	1754		90	180	3554
	Total reductions in stock		*1250*	*855*	*21379*	*0*	*566*	*21480*	45530
Closing			1428	2791	1961	0	99670	2125	107975


Atmosphere
(In million cubic meters per year)
Precipitation
12 800
Evapotranspiration
9 600
Land or "Soil water"
Returns to surface water
Abstractions from surface water
22 451
Surface run-off
2 560
Infiltration to aquifers
640
Abstractions from groundwater
438
Returns to groundwater
Inflows from upstream
1 000
Surface water bodies
Outflows to downstream territories
700
Outflows to the sea
Aquifers
Outflows to the sea