Can and should the Litani River Basin quench most of Lebanon?

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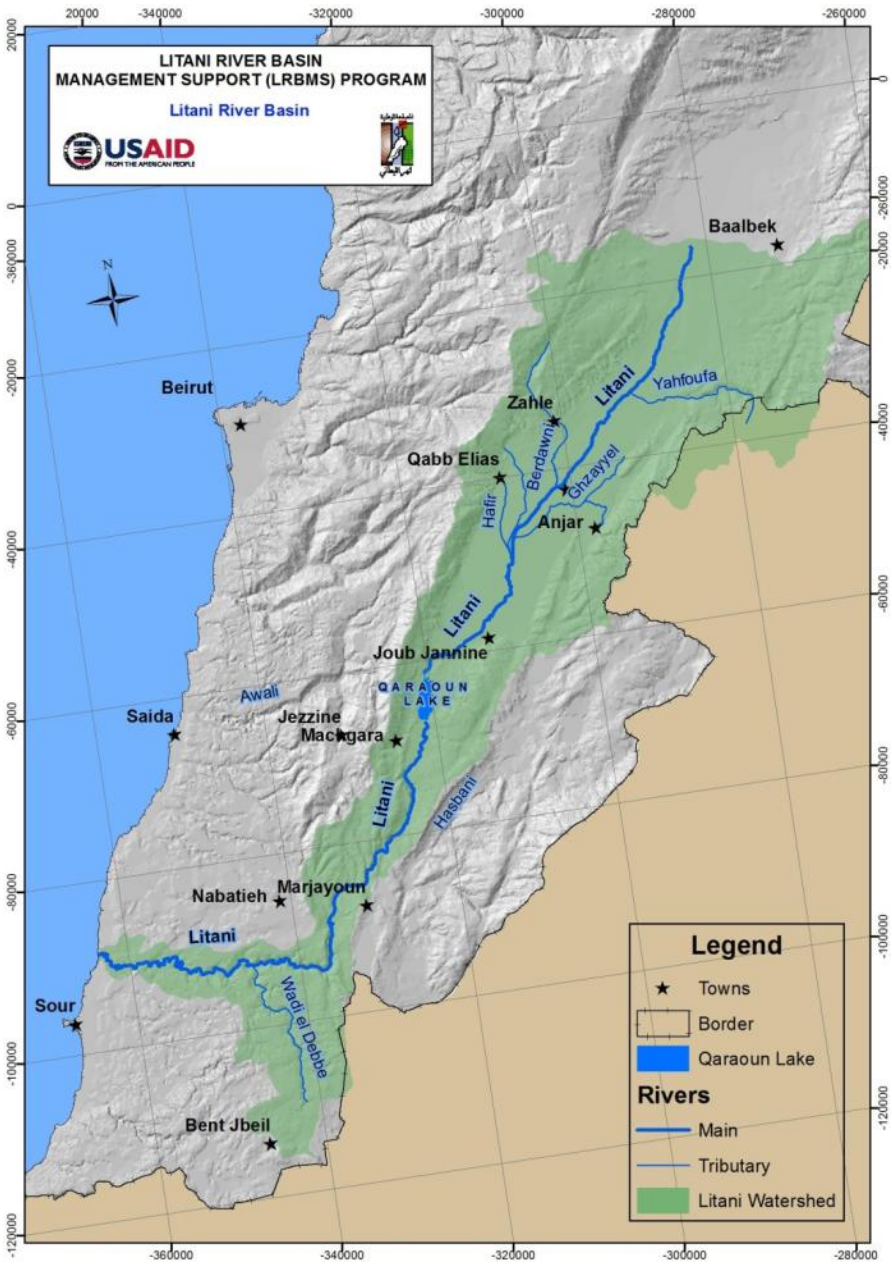
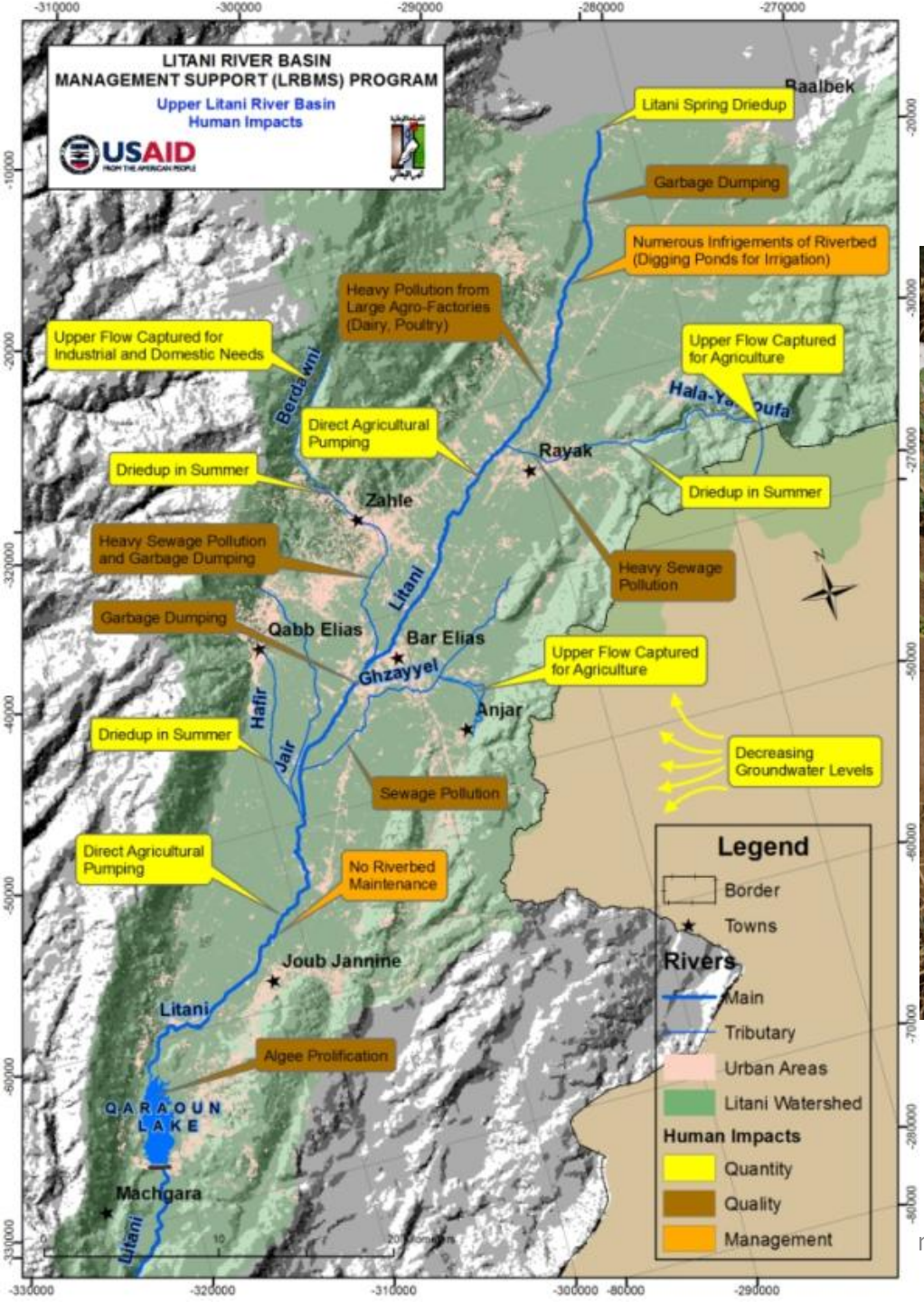
Eric Viala, Sr. Water Manager, AECOM

AECOM



Presentation overview

1. The Litani River Basin today
2. Water Balance of the LRB
3. Legal allocation of LRB water resources
4. Upcoming transfer projects
5. International criteria for basin transfer
6. Conclusion


LITANI RIVER BASIN
MANAGEMENT SUPPORT (LRBMS) PROGRAM
Upper Litani River Basin
Human Impacts
USAID
Baalbek
Litani Spring Driedup
Garbage Dumping
Numerous Infrigements of Riverbed (Digging Ponds for Irrigation)
Heavy Pollution from Large Agro-Factories (Dairy, Poultry)
Upper Flow Captured for Industrial and Domestic Needs
Upper Flow Captured for Agriculture
Berdawni
Direct Agricultural Pumping
Rayak
Driedup in Summer
Driedup in Summer
Zahle
Heavy Sewage Pollution and Garbage Dumping
Litani
Heavy Sewage Pollution
Garbage Dumping
Qabb Elias
Bar Elias
Ghzayyel
Upper Flow Captured for Agriculture
Hafir
Anjar
Driedup in Summer
Jair
Decreasing Groundwater Levels
Sewage Pollution
Direct Agricultural Pumping
No Riverbed Maintenance
Joub Jannine
Litani
Algee Protification
QARAOUN LAKE
Machgara
Litani
Legend
Border
Towns
Rivers
Main
Tributary
Urban Areas
Litani Watershed
Human Impacts
Quantity
Quality
Management

nager, AECOM

LRB water issues

1. Pollutions (residential & industrial sewage, garbage, agriculture)

2. Water over-allocation/scarcities (surface and groundwater)

3. Water management issues: weak horiz/vertic. coordination, lack of enforcement (releases), little awareness and demand management (GW), etc.

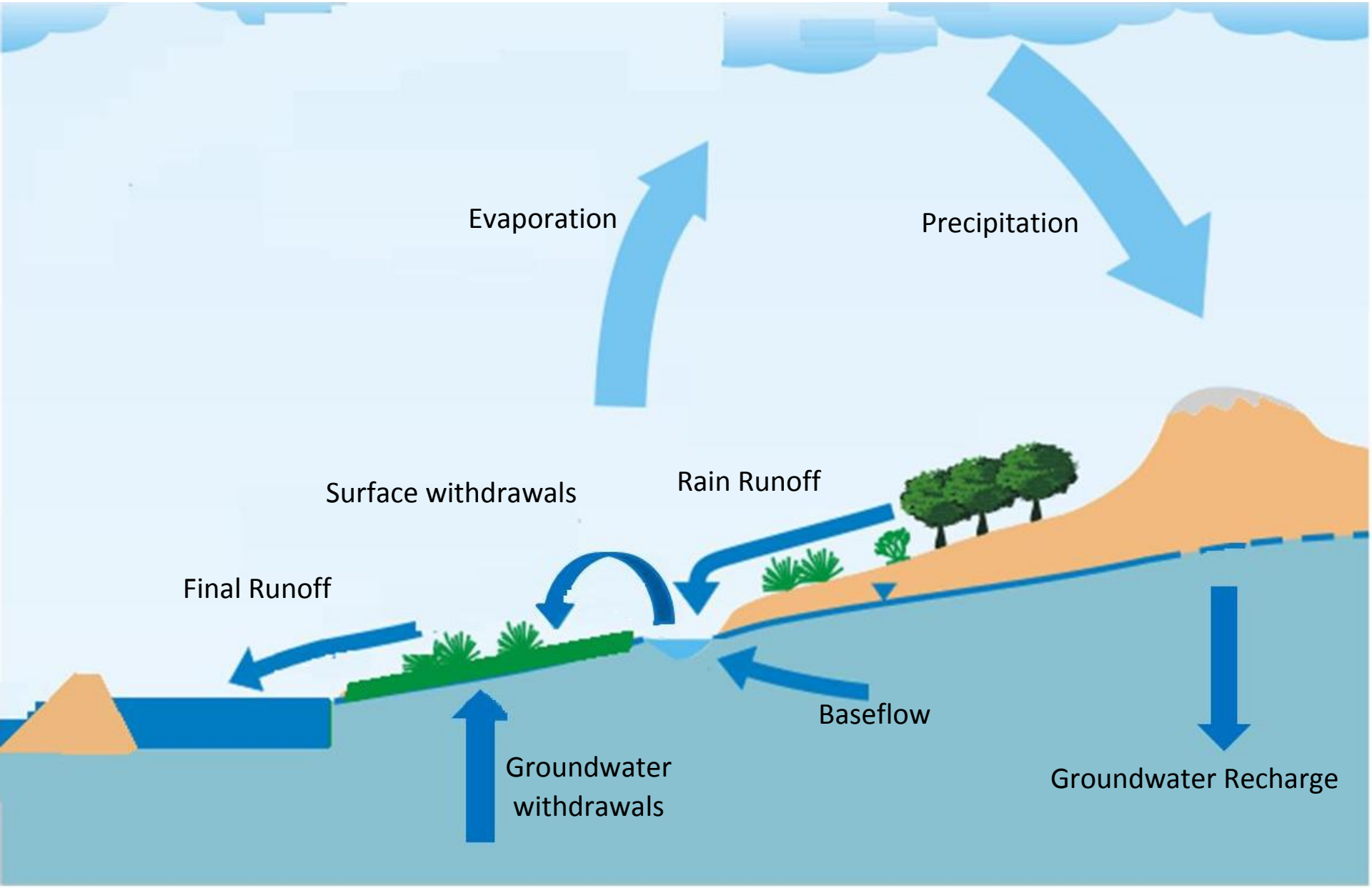
Availability

• Some dry years (1999-2001, 2014), some wet years (2003)

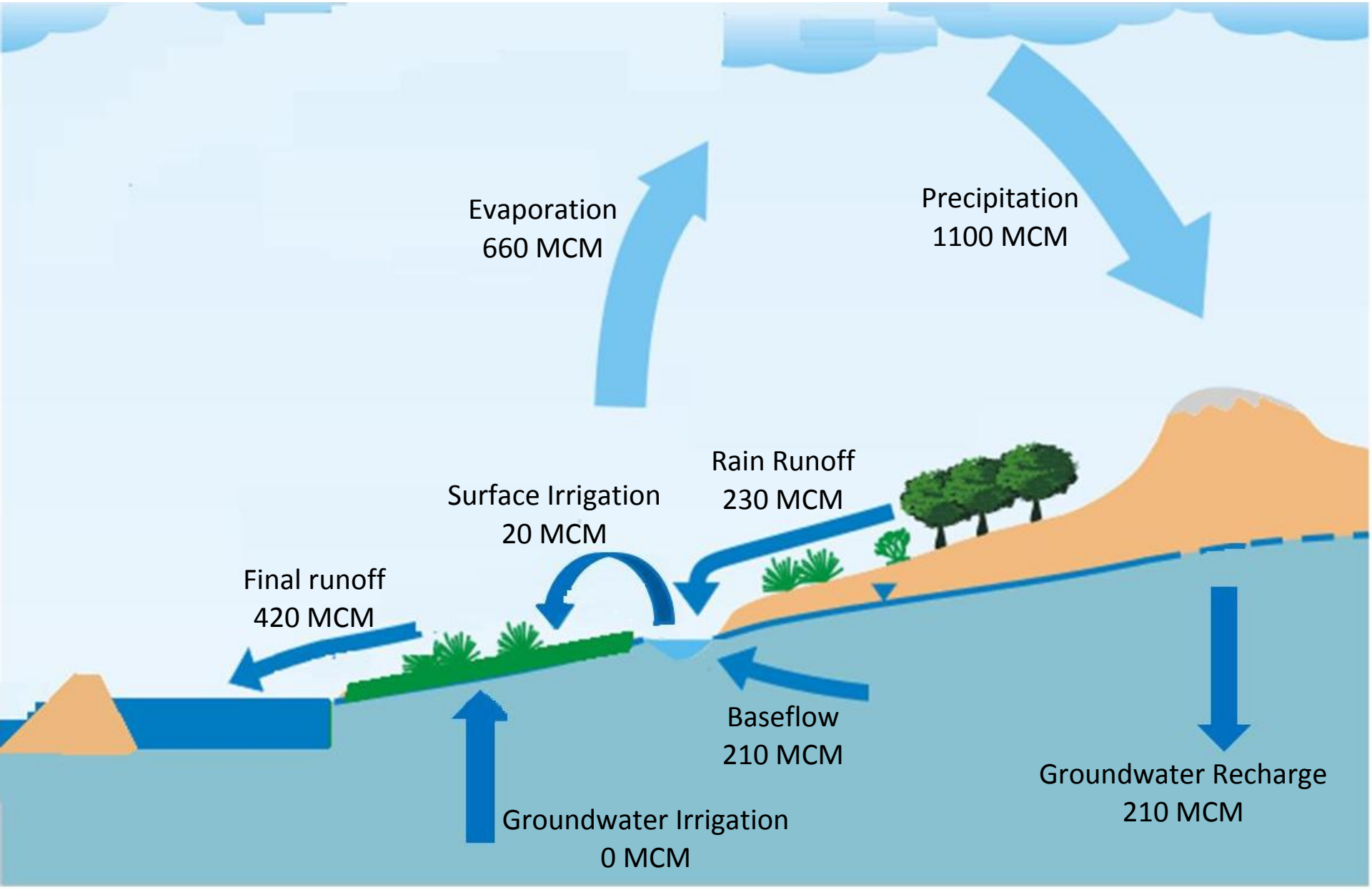
• On average, upper LRB receives 1100 Mm3/ yr; most evaporates, only 440 Mm3/yr available, only 300 Mm3/yr reaches Qaraoun Dam

- Minimum needs for one human being:
  - 900 m3/yr to grow food
  - 100 m3/yr for domestic/industrial needs

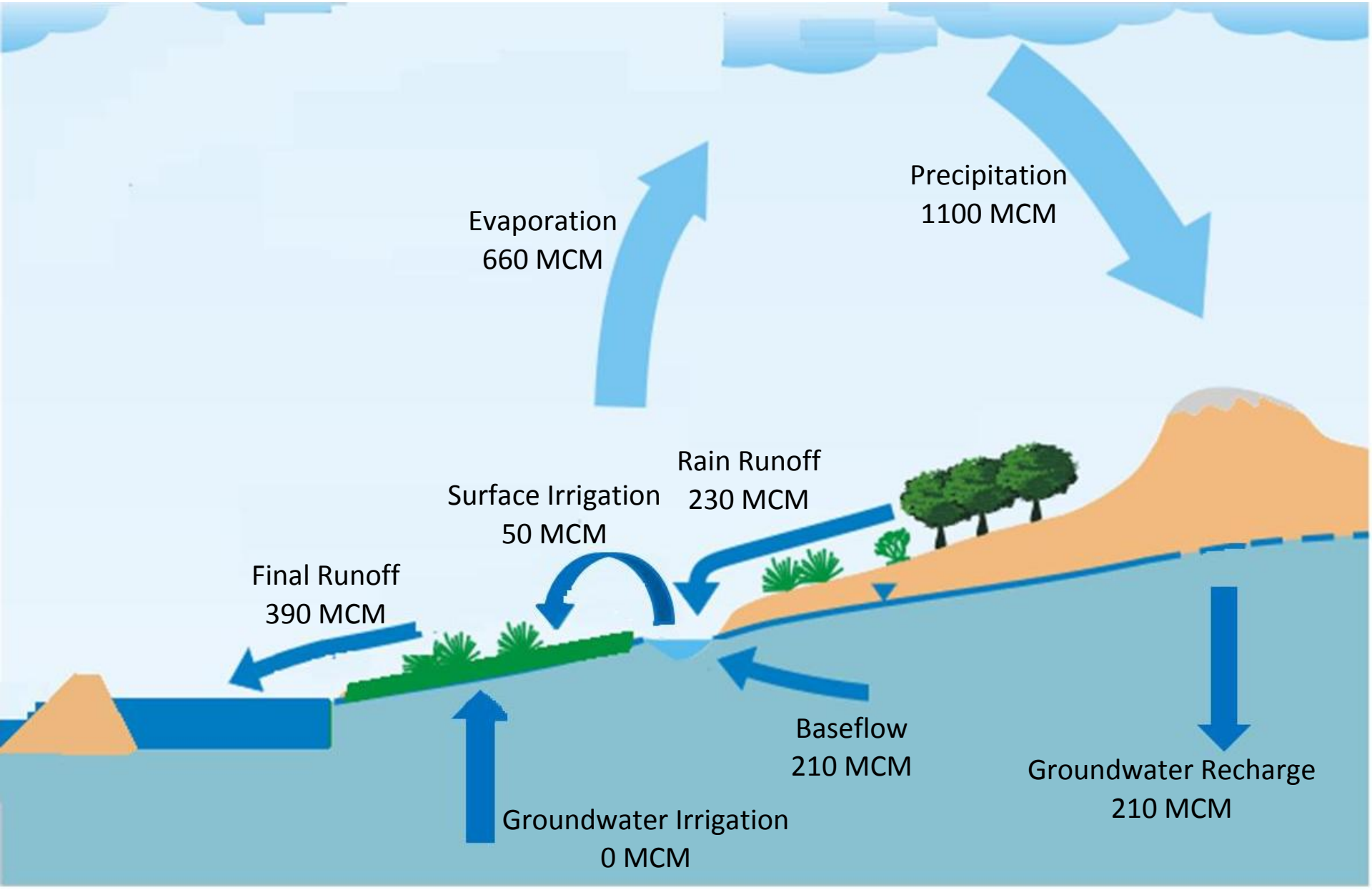
Water Balance



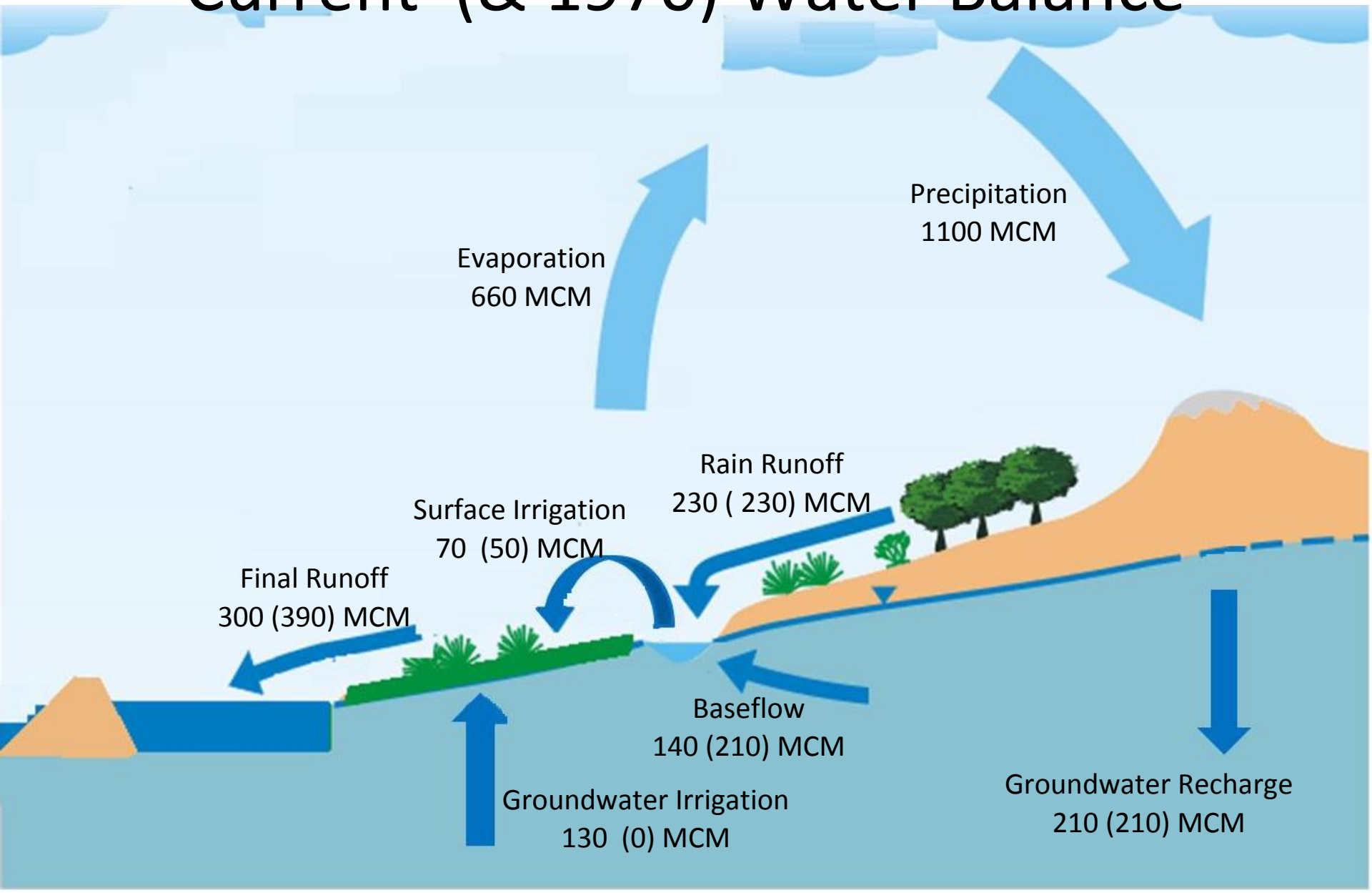
1940s Water Balance



1970s Water Balance



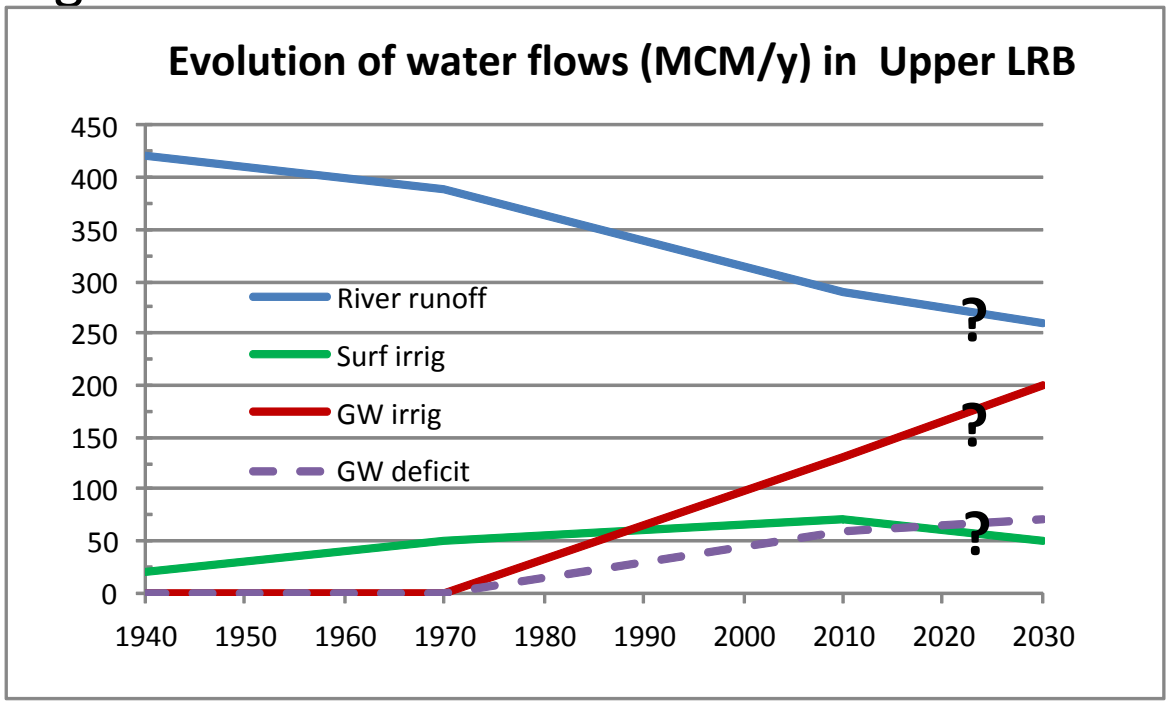
Current (& 1970) Water Balance



Human pressures on water resources have increased drastically since 1970s

- Significant decrease of surface flows due to increased withdrawals for irrigation (diversions of springs and direct river pumping)
- Substantial groundwater depletion, due to extensive pumping both for domestic and irrigation needs

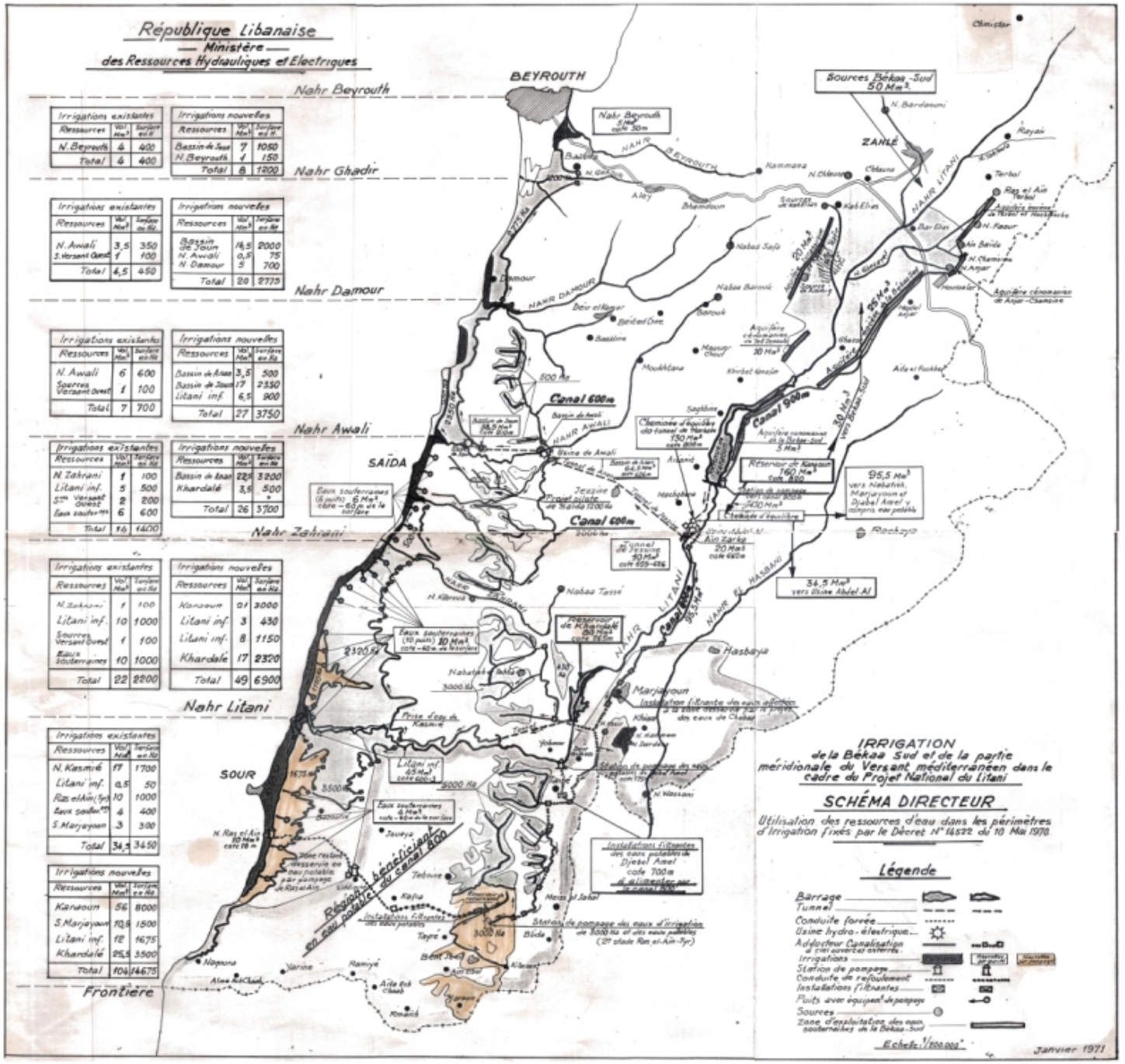
Demands are outpacing availability



Litani Waters are already over-allocated

but remember AbulAbed, 2+2 can add up to 5 if not more !!

Allocation decree 14522 of 1970



Irrigations existantes		
Ressources	Vol/Mm³	Surface en Ha
N. Beyrouth	4	400
Total	4	400

Irrigations nouvelles		
Ressources	Vol/Mm³	Surface en Ha
Bassin de Jaar	7	1050
N. Beyrouth	1	150
Total	8	1200

Irrigations existantes		
Ressources	Vol/Mm³	Surface en Ha
N. Awali	3,5	350
S. Versant Ouest	1	100
Total	4,5	450

Irrigations nouvelles		
Ressources	Vol/Mm³	Surface en Ha
Bassin de Jaar	14,5	2000
N. Awali	0,5	75
N. Damour	5	700
Total	20	2775

Irrigations existantes		
Ressources	Vol/Mm³	Surface en Ha
N. Awali	6	600
Sources Versant ouest	1	100
Total	7	700

Irrigations nouvelles		
Ressources	Vol/Mm³	Surface en Ha
Bassin de Araas	3,5	500
Bassin de Jaar	17	2550
Litani inf.	6,5	900
Total	27	3750

Irrigations existantes		
Ressources	Vol/Mm³	Surface en Ha
N. Zahrani	1	100
Litani inf.	5	500
S.ème Versant Ouest	2	200
Eaux souterraines	6	600
Total	16	1400

Irrigations nouvelles		
Ressources	Vol/Mm³	Surface en Ha
Bassin de Aaas	22,4	3200
Khardalé	3,6	500
Total	26	3700

Irrigations existantes		
Ressources	Vol/Mm³	Surface en Ha
N. Zahrani	1	100
Litani inf.	10	1000
Sources Versant Ouest	1	100
Eaux Souterraines	10	1000
Total	22	2200

Irrigations nouvelles		
Ressources	Vol/Mm³	Surface en Ha
Karaoun	21	3000
Litani inf.	3	430
Litani inf.	8	1150
Khardalé	17	2320
Total	49	6900

Irrigations existantes		
Ressources	Vol/Mm³	Surface en Ha
N. Kasmié	17	1700
Litani inf.	0,5	50
Ras el Ain (Syr)	10	1000
Eaux souterr.	4	400
S. Marjayoun	3	300
Total	34,5	3450

Irrigations nouvelles		
Ressources	Vol/Mm³	Surface en Ha
Karaoun	56	8000
S. Marjayoun	10,5	1500
Litani inf.	12	1675
Khardalé	25,5	3500
Total	104	14675

Decree 14522 of 1970

- 45 y old (things have changed since)
- Based on Litani being the only national perennial river
- Supply side: only considers storage (Qaraoun, Khardale)+ summer flows
- Demand side : only summer needs, April 15 till end of October
- Assumes that most West Bekaa needs will be satisfied from groundwater

Areas		Western slopes								Lower Litani	Khardale	Qaraoun				Bekaa		
		N. Beyrouth	N. Awali	N. Damour	N. Zahrani	N. Qasmie	W springs	Ras el Ain (Sour)	W. GWater			Ain Zarka+Tun Jezzine+34.5 Basin Anan	Basin Joun	Canal 900	Canal 800	Springs Bekaa	GWater	Springs Marj
Nahr Beyrouth																		
Nahr Ghadir	12	5											7					
Nahr Damour	24.5		4	5			1						14.5					
Nahr Awali	34		6				1			6.5		3.5	17					
Nahr Zahrani	40				1		2		6	5	3.5	22.5						
Nahr Litani	71				1		1		10	21	17				21			
	138.5					17		10	4	12.5	25.5				56			13.5
W Bekaa	110															50	60	
Canal 900	30													30				
Canal 800	0																	
Potable??	52.5										34				18.5			

Decree 14522 of 1970

Areas	Generated Waters (Mm3/y)	Allocated Waters (Mm3/y)
Western slopes	**75**	**320**
Lower Litani (incl. Khardale)	**125**	**0**
LRB	**270**	**140**

Basin transfers !

Recent projects

- Canal 800: transfer from Litani RB to Marjayoun and South, cost $300M +
- Canal Beirut-Awali (Greater Beirut Water Supply Project), cost $370M (+ Bisri Dam!)

- Both approved and started

- Basin transfers

Allocation of Qaraoun Lake (Mm3/yr)

Projects	Today	Min decision 11/10 2011	
Canal 900 (Joub Jenine)	**10**	**10**	Used to be 30
Drinking water in West Bekaa	**10 (?)**	**25**	
Canal 800 (Marjayoun, Tebnine)	0	110	Used to be 95
Kasmiye	30	30	
Drinking water in Saida	0	20	
Irrigation Lebaa (Jezzine)	10	10	
Canal 600 (Nabatiye)	0	40	
Drinking water Beirut	0	80-120	Used to be 0
Hydropower	*200+*	*200??*	Not discussed but will decrease
TOTAL	250+	326-366	More than available

Conveniently overlooked/ignored issues

- Canal 900 will not be extended
- Need 326-366 Mm3/yr in Qaraoun while today only 300 Mm3/yr and decreasing
- Big decrease of hydropower, how compensated (+big revenue loss for LRA)
- No drought planning

What are Basin Transfers?

- Designed to supply water through artificial conveyance to needy areas
- Typically supply oriented engineering measures, engineering works frequently daunting, involving diversion works, tunnels and/or large pumping schemes and reservoirs, with thus large costs
- Often trigger pertinent questions from different interests groups and communities involved and affected.

Are basin transfers justified?

Commonly accepted criteria

1. Current and future needs of donor basin are fully met (there is a real surplus)
2. Receiving basin uses water efficiently (there is a real deficit)
3. Receiving basin has no other alternative sources of water
4. Benefits shared equitably; and costs fairly compensated
5. Environmental impacts minimized
6. Socio-cultural impacts minimized
7. Sustainable project (resilient and/or adaptive to natural and social stresses)
8. Project adopts participatory decision-making and accountable to public
9. Existing (local, national and international) rights & responsibilities are respected
10. Uncertainty and risk, and gaps in knowledge, are adequately addressed

Do Canal 800 and Awali-Beirut meet most criteria?

Your guess!

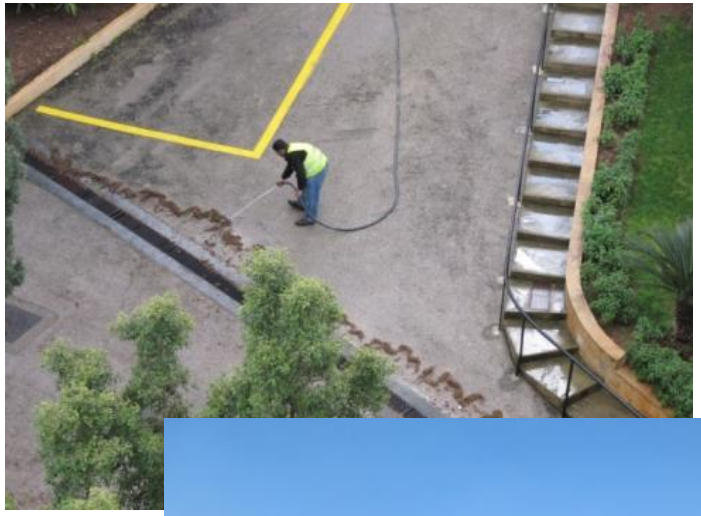
Canal Awali-Beirut: transferring without compensation from a drier, less developed, water-deficient region to a much wealthier and coastal city where water is commonly wasted

Canal 800: transferring without compensation from an agricultural plain (Bekaa was a Roman granary) to Marjayoun and southern hills for small-scale farming

Where will Bekaa get its water?

What project next?

Does not address the fundamental challenge: who causes water issues (pollutions and wastages)?



Ignorance and Self-interest

Need to adopt (and practice) IWRM-IRBM

		Infrastructure	Monitoring	Enforcement	Awareness/ Participation
Governance					
Quality	Urban sewage				
	Industrial sewage				
	Solid **W**aste				
	Agriculture				
Quantity					

Thank you