ASSESSING THE WATER-FOOY-ECOSYSTEM NEXUS IN TRANSBOUNDARY BASINS UNDER THE WATER CONVENTION

Kachretii, 25-27 November 2013

Alazani/Ganih pilot project

CLIMATE CHANGE PREDICTIONS IN THE ALZANI/GANIH BASIN

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Presentation Outline

- Historical observations and data
- Climate change scenarios
- Projections for climatic parameters
- Projections for streamflow for the Alazani
- Conclusions

Historical observations and data

Stations

Hydrological stations	Meteorological stations
Birkiani	Jokholo
Shakriani	Akhmeta
Chiauri	Telavi
Zemo (upper) Kedi	Khvareli
Agrichay	Gurjaani
	Tsnori
	Lagodekhi
	Zakatala (Az)

Length: 375 km, from Mt.Borbalo (alt.3000m) to Mingechauri reservoir

Upper Alazani projections

	Base Period (1960-1990) mio.m^3	ECHAM (2021-2050) Δ, mio.m^3	HADCM3 (2021-2050) Δ, mio.m^3	GISS ER (2021-2050) Δ, mio.m^3	Average Δ, mio.m^3
Upper Alazani	1336.28	-103.24	-140.68	-235.79	-159.90
%		-7.7%	-10.5%	-17.6%	-12.0%

Upper Alazani projections (2)

	Base Period (1960-1990) mio.m^3	PRECIS A2 (2021-2050) Δ mio.m^3	PRECIS B1 (2021-2050) Δ mio.m^3
Upper Alazani	1336.28	21.79	-10.47
%		1.6%	-0.8%

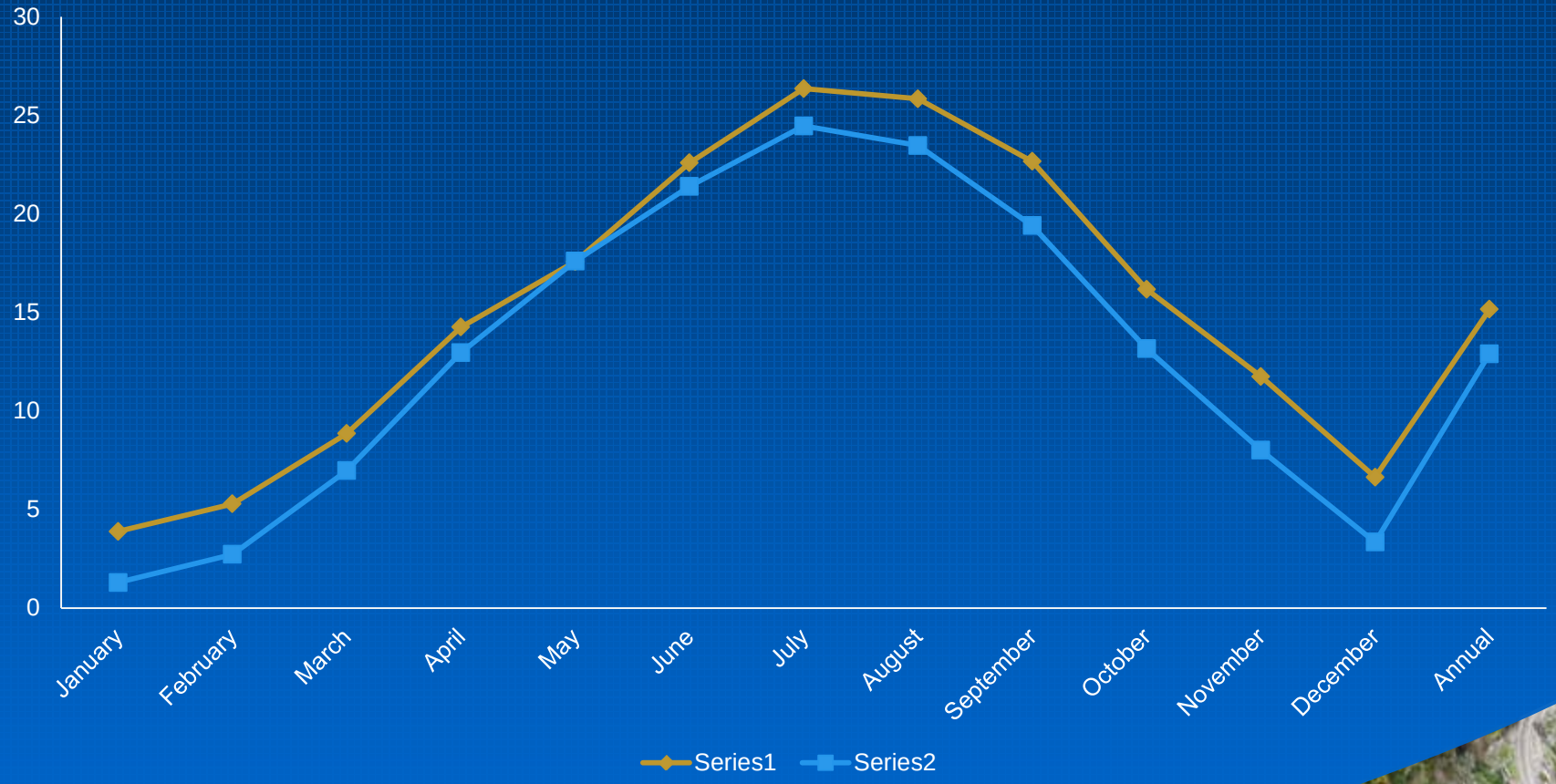
Historical climatic data (1960-1990)

	Mean Temperatures (°C)				Precipitation sums (mm)			
	Tsnori	Gurjaani	Kvareli	Lagodekhi	Tsnori	Gurjaani	Kvareli	Lagodekhi
January	0.60	1.44	1.52	1.63	24.00	30.82	38.57	39.46
February	2.46	2.66	2.78	3.01	33.07	42.21	51.68	50.17
March	7.16	6.81	6.80	7.13	44.18	58.15	70.02	71.53
April	13.27	12.78	12.69	13.09	61.06	82.85	103.28	98.80
May	18.05	17.36	17.24	17.75	92.09	112.16	128.64	125.65
June	21.98	21.12	20.94	21.54	84.49	100.98	127.94	117.34
July	24.96	24.14	24.05	24.67	53.14	75.58	87.44	91.54
August	23.90	23.13	23.12	23.70	46.91	70.70	89.34	84.01
September	19.71	19.08	19.17	19.66	41.11	62.02	97.86	91.30
October	13.20	12.97	13.04	13.43	57.19	69.44	80.76	95.33
November	7.55	8.07	8.12	8.31	35.47	50.94	62.25	64.92
December	2.66	3.51	3.58	3.65	24.65	29.76	39.24	37.22
Annual	**12.96**	**12.76**	**12.75**	**13.13**	**597.38**	**785.62**	**977.01**	**967.27**

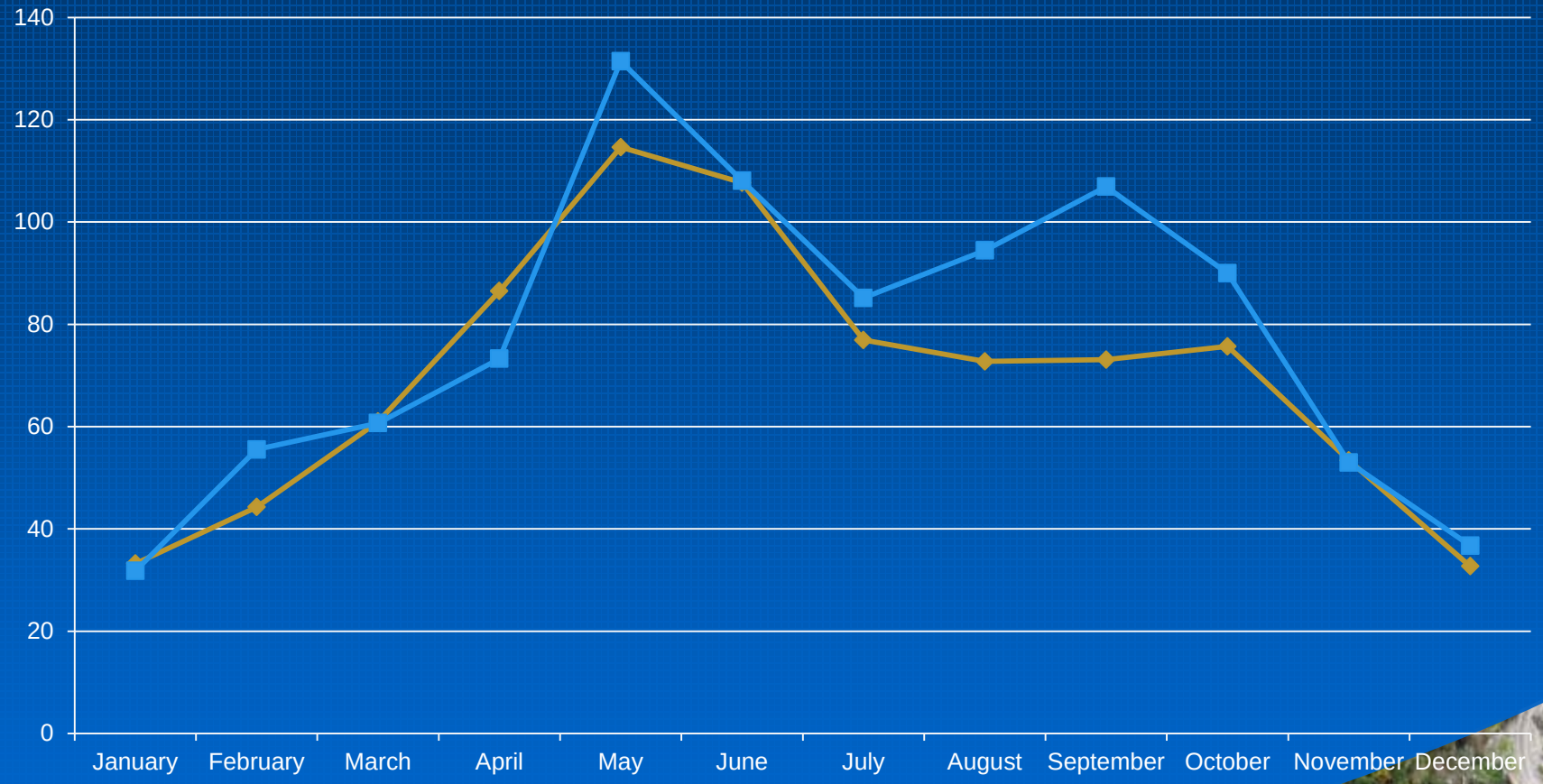
Projections of climate parameters and streamflow

- Climatic scenario A2 and B1
- GCM
- RCM *Precis*
- *WEAP model*

Changes in temperature (A2, Precis) : 2020-2050 VS 1960-1990

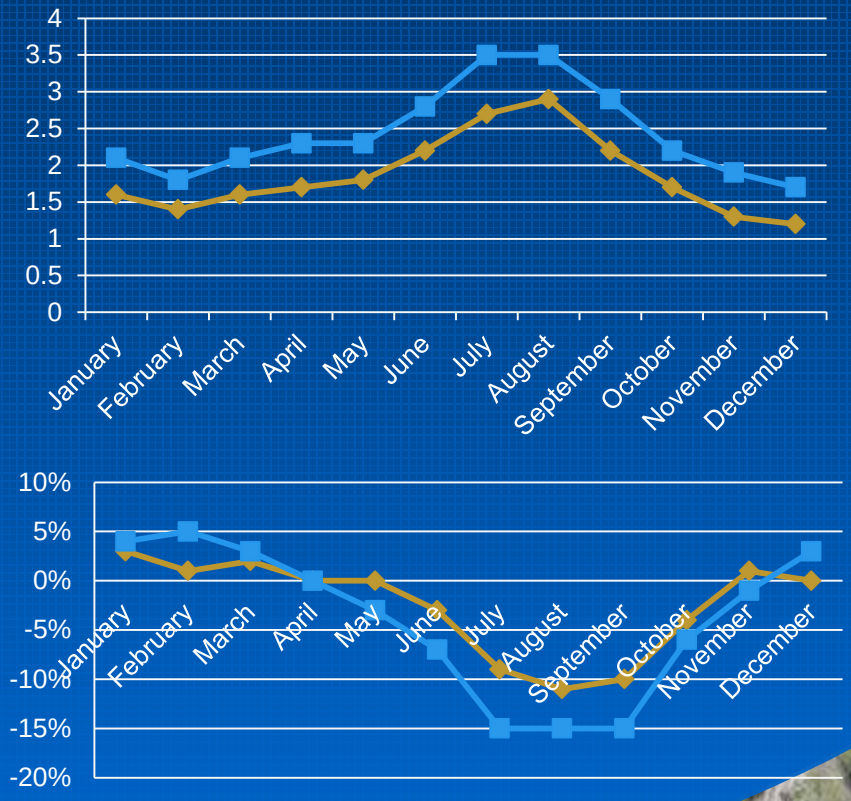


Changes in precipitation (A2, Precis) : 2020-2050 VS 1960-1990



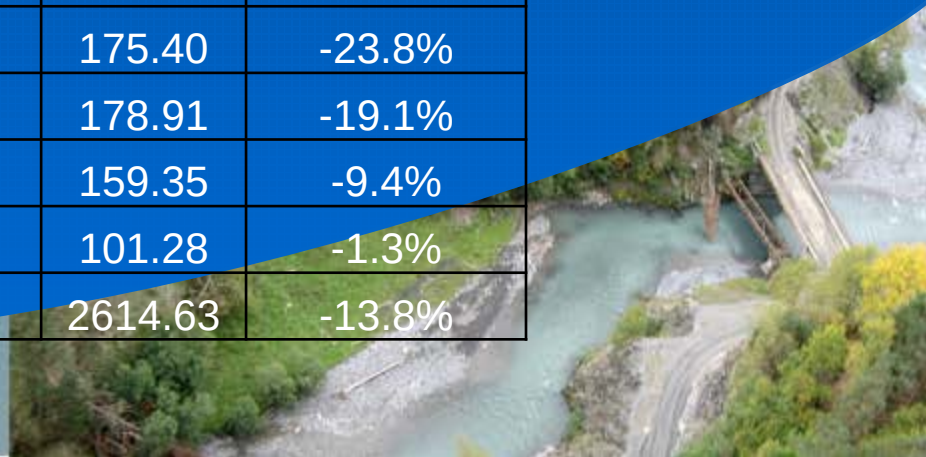
Changes in Temperature and precipitation (A2 and B1, ENSEMBLES) for 2020-2050 VS 1960-1990

	T^0 change, 2020-2050, ^0C		Precipitation Change, %	
	B1	A2	B1	A2
January	1.6	2.1	3%	4%
February	1.4	1.8	1%	5%
March	1.6	2.1	2%	3%
April	1.7	2.3	0%	0%
May	1.8	2.3	0%	-3%
June	2.2	2.8	-3%	-7%
July	2.7	3.5	-9%	-15%
August	2.9	3.5	-11%	-15%
September	2.2	2.9	-10%	-15%
October	1.7	2.2	-4%	-6%
November	1.3	1.9	1%	-1%
December	1.2	1.7	0%	3%

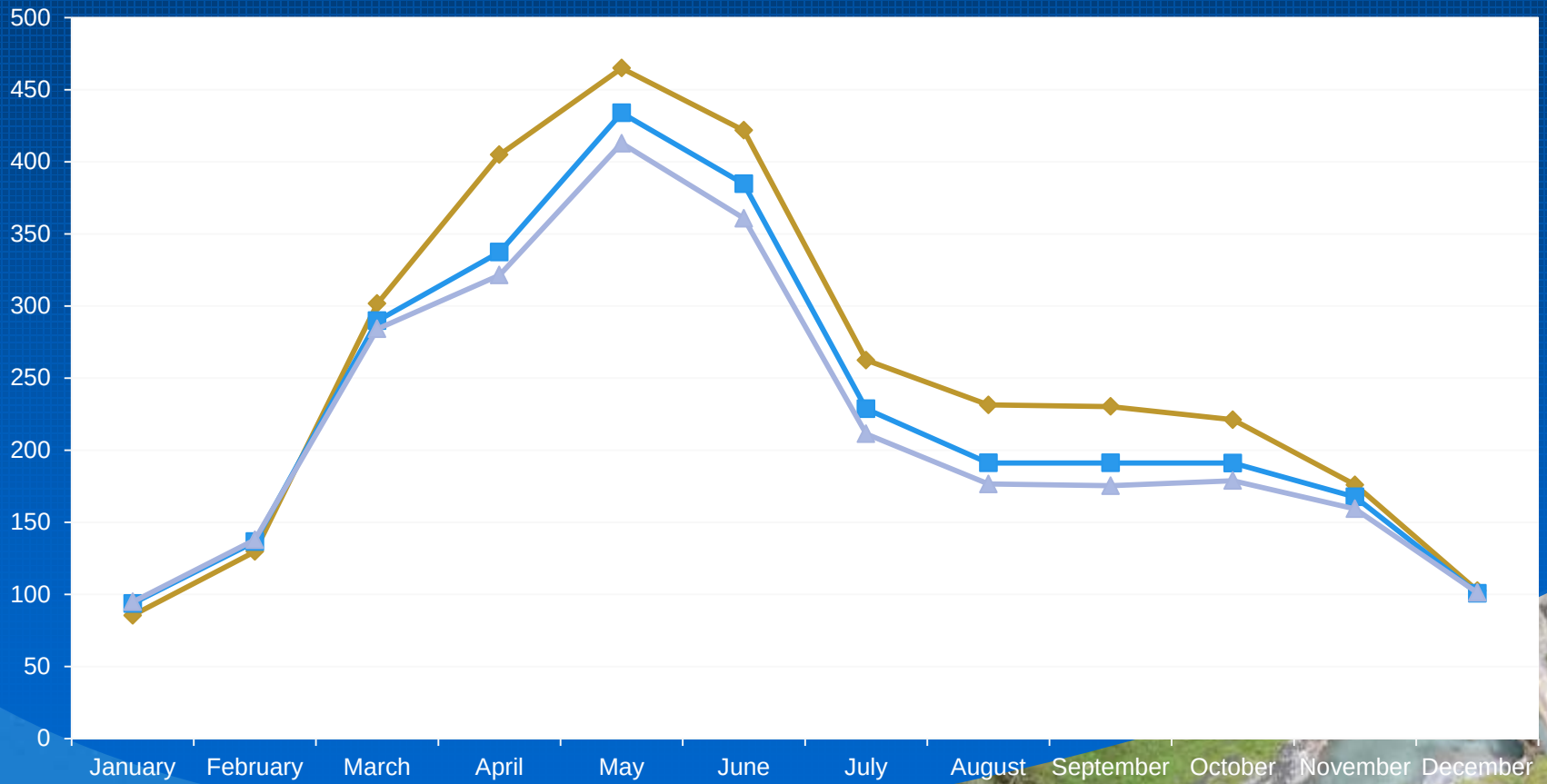


Projections of the streamflow and changes (2035-2065 VS 1960-1990, (B1 and A2, WEAP, ENSEMBLES)

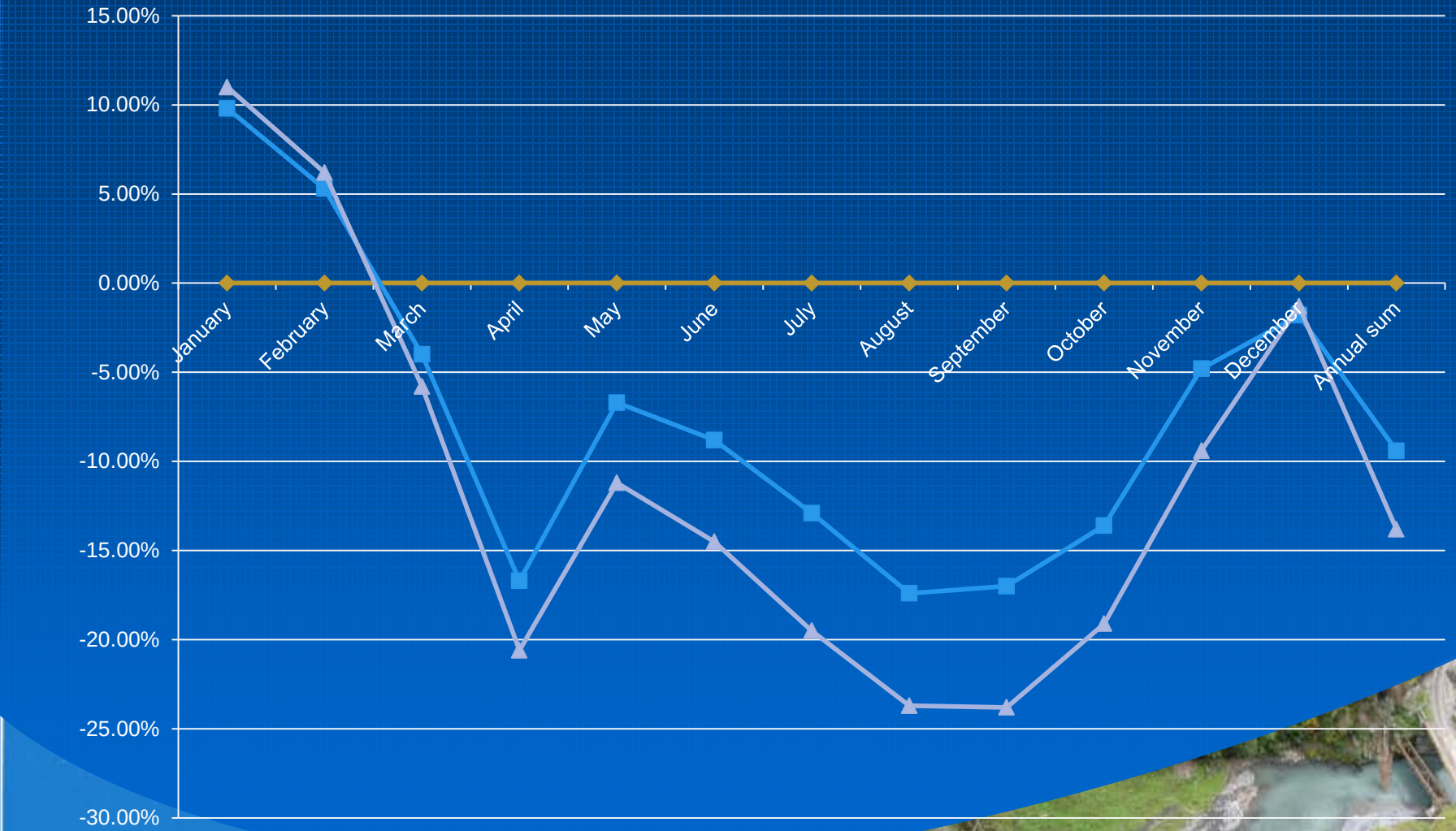
	1966-1990	2035-2065 B1		2035-2065 A2	
Stream Flow	Mio.m3	Mio.m3	Change,%	mlo.m3	Change,%
January	85.41	93.75	9.8%	94.78	11.0%
February	129.74	136.59	5.3%	137.83	6.2%
March	301.61	289.70	-4.0%	284.11	-5.8%
April	404.86	337.27	-16.7%	321.38	-20.6%
May	464.95	433.90	-6.7%	412.85	-11.2%
June	421.74	384.67	-8.8%	360.80	-14.5%
July	262.44	228.69	-12.9%	211.34	-19.5%
August	231.39	191.17	-17.4%	176.61	-23.7%
September	230.25	191.20	-17.0%	175.40	-23.8%
October	221.16	191.05	-13.6%	178.91	-19.1%
November	175.96	167.57	-4.8%	159.35	-9.4%
December	102.57	100.75	-1.8%	101.28	-1.3%
Annual	3032.08	2746.30	-9.4%	2614.63	-13.8%



Projections of the streamflow (absolute values): 2035-2065 A2 and B1 VS 1960-1990



Projections of the streamflow - changes (%): for 2035-2065 A2 and B1 VS 1960-1990



Other impacts of CC on the basin: flash-floods in the tributaries

- According to the statistics, 30 flash-floods in 1996-2010 took away 11 human lives and material losses exceeded 100 mio laris.
- Frequented flash-floods in tributaries is another cause for decreasing stream-flow in the Alazani.
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Conclusions

THE ALAZANI BASIN DEMONSTRATES VULNERABILITY TO CLIMATE CHANGE
WITH PROJECTED INCREASE OF TEMPERATURE AND DECREASE OF PRECIPITATION

VERY LIKELY CC WILL CAUSE DECREASE OF STREAM FLOW IN THE ALAZANI IN THE MID-CENTURY

ONE OF THE SIGNIFICANT CAUSES OF THE WATER MASS DECREASE IS WATER LOSS IN FLESH-FLOODS IN TRIBUTARIES OF THE ALAZANI.

Thank you!

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