

Climate change and water resources allocation: managing users' conflicts through modeling

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INTRODUCTION:

To find effective ways to manage water in regular and extreme conditions and allocate water considering the needs of users, individual and total benefits and losses, different management strategies is useful to simulate and assess their effects over the certain time, and especially over multiyear periods.

Material and method:

The AcquaNet software is used for 5 years simulation of water allocation in the system composed by two reservoirs and four users. System operation is simulated for dry, normal and wet hydrological conditions.

Scheme 1: Res_1 > Res_2 > Dem_2 > Dem_1 > Dem_3 > Dem_4

Scheme 2: Res_1 = Res_2 > Dem_2 > Dem_1 > Dem_3 > Dem_4

Scheme 3: Res_2 > Res_1 > Dem_2 > Dem_1 > Dem_3 > Dem_4

Scheme 4: Res_1 > Res_2 > Dem_4 > Dem_1 = Dem_3 = Dem_2

Scheme 5: Res_1 = Res_2 > Dem_2 = Dem_1 > Dem_3 > Dem_4

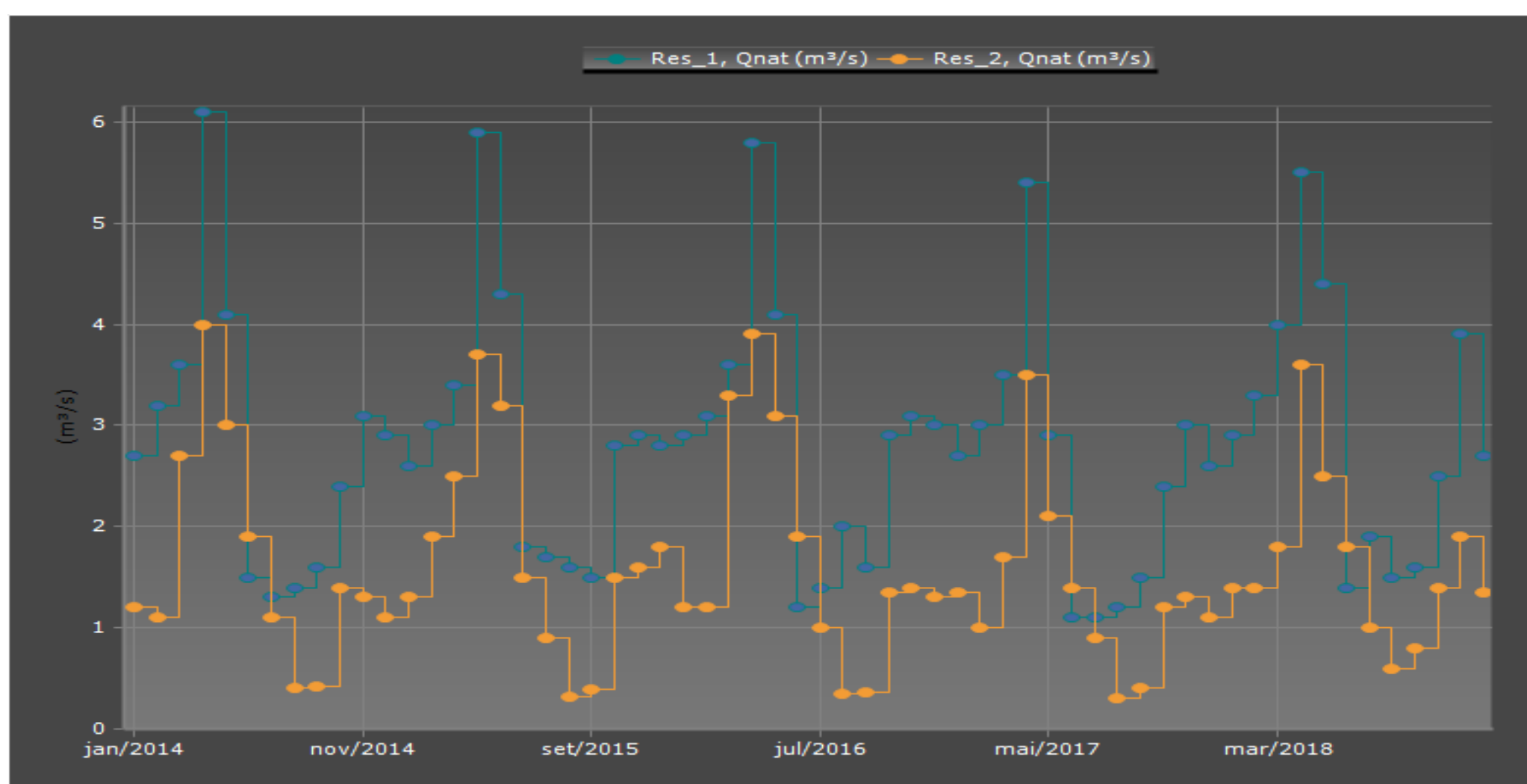


Figure 1. Inflow to reservoirs

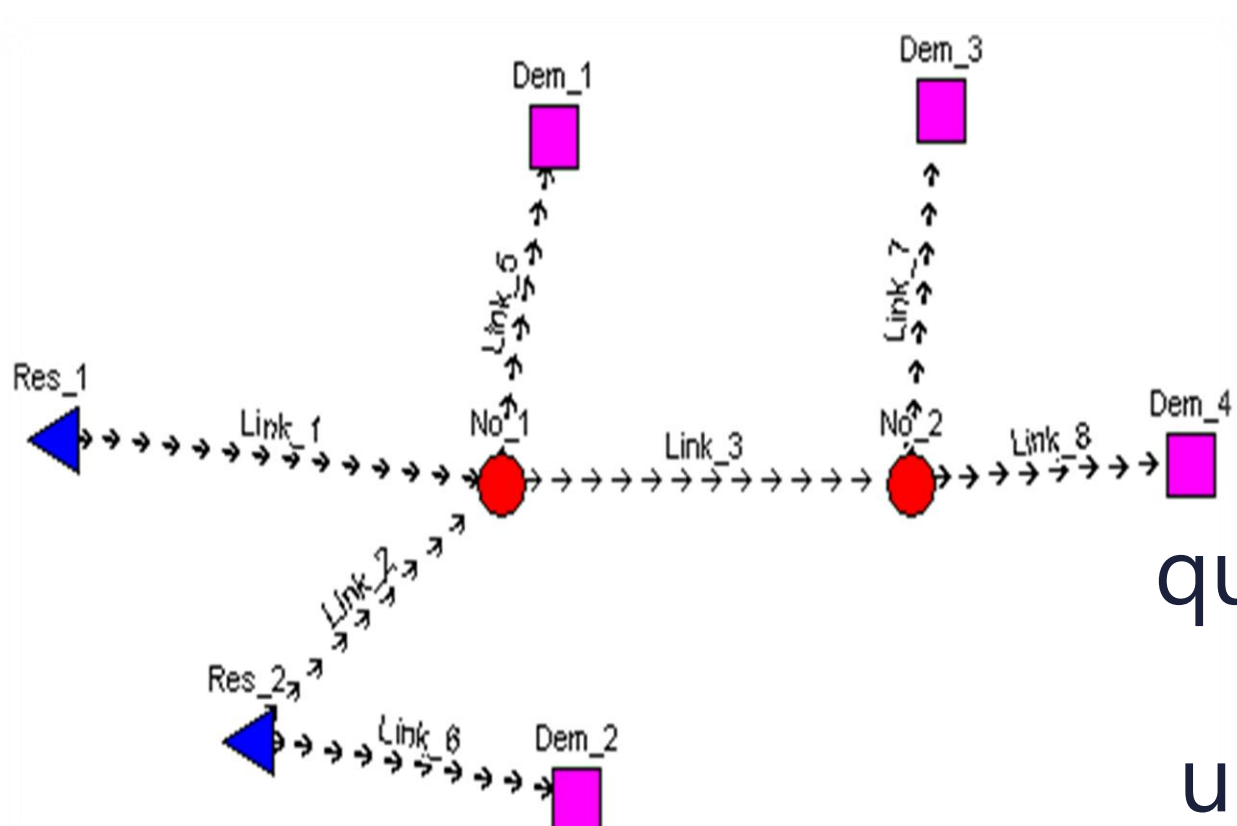


Figure 2. Water management system

Results:

Simulations of 5 strategies (five schemes) showed that provided quantities of required water at different users' points within a system varied in ranges 50.5 - 95%.

Table 1. Percentage of delivered water

	Dem 1	Dem 2	Dem 3	Dem 4
Scheme 1	71.9	88.6	53.5	75.0
Scheme 2	71.3	88.7	54.6	75.0
Scheme 3	69.4	87.1	51.6	73.9
Scheme 4	69.6	75.0	50.5	95.0
Scheme 5	76.6	75.0	53.5	75.0

Conclusion:

Proper modeling can enable predicting possible mutual conflicts of water users, and capacity of reservoirs to distribute required water (along with following their pre-specified long-term operating rules), and all that in different climatic, hydrological and other uncertain conditions. Powerful AcquaNet software is considered as a tool for supporting planning of the management of multipurpose reservoir systems aimed at preventing or mitigating negative effects of climate change.

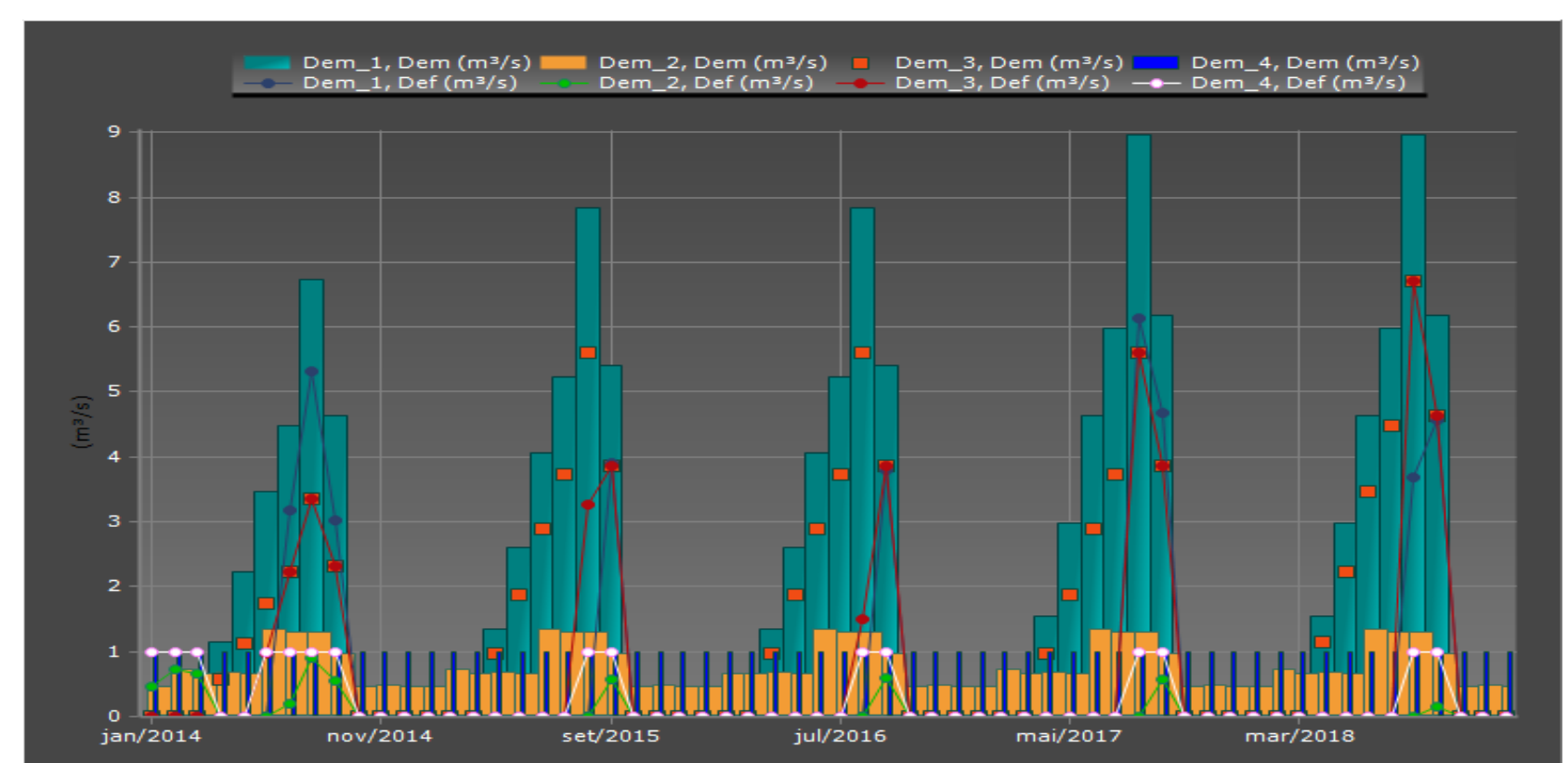


Figure 3. Demands and deficits (scheme 1)

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