Unit 25

Preamble:

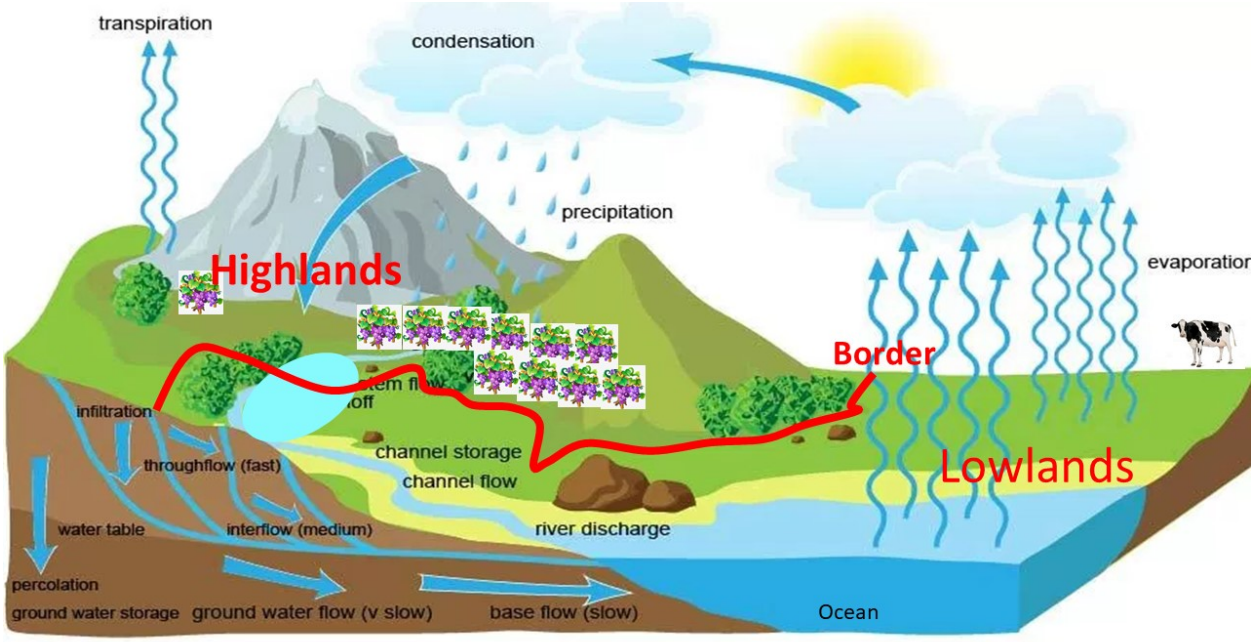
This homework is different from the others as we will have different deadlines highlighted in red. It consists of 3 parts that are due at different times.

Group water managers of the Lowlands (Graduate students)

Part 1

The Lowlands are a small state within a federation. They cover 100 km^2. The main economic branch of your country is the export of cheese and other milk products from cows and some fishing. In your country, it is forbidden to kill a cow. Your coast line is steep with surge unsuitable for any tourism activity and only few places allow for anchoring fishing boats.

Your country and another country, the Highlands, share a common lake like shown on the map. The lake is fed by a river from your neighbor's country. Typically your water table is between 50 and 130 cm depth in many places. The dominant land-use type is grassland (60%) followed by wetlands (25%) and marches (10%).The rest of the land is urban, bogs and some deciduous forest mostly willows along little creeks, the lake, and rivers. The soil is mainly from river deposits with the major soil type being clay. In the somewhat higher regions close to the boarder there are some sandy soils and a few area with boulder clay. The deposits are on average 3 m thick with bedrock underneath that forms the steep coast. The river discharges in a water fall into the ocean.



Given the low income of your country there is only one station with meteorological measurements and one site for runoff measurements. Typically, your cloudiness is 60% and 20%

in summer and winter, respectively. Annual runoff is 500 m/s. Mean relative humidity is about 90% in the cold season and about 77% in the warm season. Use the following climatology to estimate evapotranspiration for your country. To do so, which assumptions do you have to make? Give reasons for your assumptions. Explains which of the data you didn't use for your water balance assessment and why.

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Average high in °C	5	6	10	13	18	20	23	23	19	14	9	6
Average low in °C	-0	-0	2	4	8	11	13	13	10	7	3	1
Av. precipitation - mm	60	51	60	46	64	74	67	58	60	63	66	70
Days with precip.	18	14	17	14	15	15	13	13	14	15	17	18
Hours of sunshine	50	75	107	152	194	174	190	190	133	108	63	41
Daily mean solar radiation W/m^2	250	310	390	440	480	490	480	450	390	310	250	200

For the third year in a row, there is a mild drought in your region with a precipitation deficit of 20% on average. The water table is meanwhile 10 cm lower than normal. This means that in about 40% of the grassland, the about 1 m deep rooting grass is cut off of the water fringe and about to reach the permanent wilting point unless you would irrigate. What is your actual water deficit as compared to climatology? Under this scenario what would be your water management task? Do you need blue or green water? How much water can you take from the river and lake? How much water would you need for irrigation and human consumption? Coarse estimates are fine. How will your water management plan affect the water resources of the Highlands?

This part is due by Monday 2359 Alaska time.

Part 2

After this above deadline, the second part of the application is as follows. As you can imagine the Highlands also have a water problem and made a management plan that may affect your water resources or management plans. Assume you are sent as your states water management experts to negotiate the conflicting water management interests with the experts from the Highlands. Your country's and the Highlands' water managers will meet in **google+** on Tuesday. Explain them your water management situation, challenge and management plan, listen to theirs.

This part 2 is due by Tuesday 2359 Alaska in google+.

Part 3

Discuss with them the conflicts of interests and come up with a solution that works for both. **A civil war is not an option!** Probably you will have to iterate to come up with a plan. Thus, start already on Wednesday, unless you find a time to be online at the same time. Submit your common water management plan in writing to me via email.

This third part's due date is the usual Thursday 2359 Alaska time.

I will grade your initial water management situation analysis including the estimate for your water deficit and your water management plan (letter grade), your contribution and participation in the discussion (letter grade), and the group water management plan (P/F).