

Unit 25

Preamble:

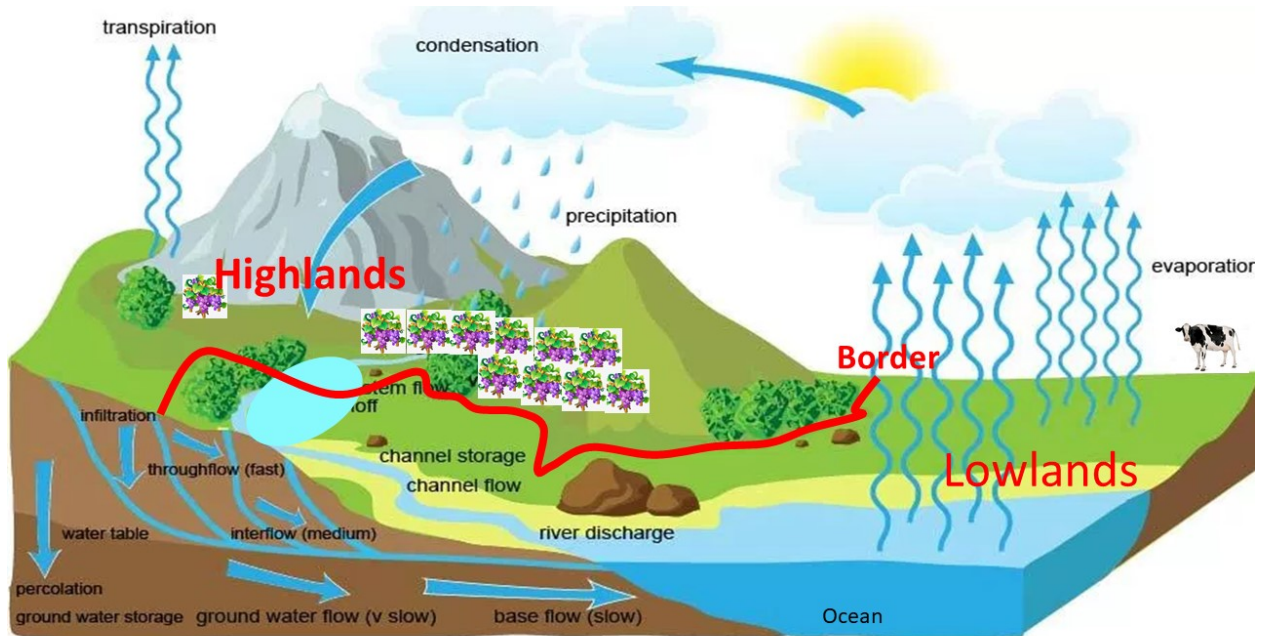
This homework is different from the others as we will have different deadlines highlighted in red. It consists of 3 parts that are due at different times.

Group water managers of the Highlands (undergraduate students)

Part 1

The Highlands are a small state within a federation. They cover 100 km². The main economic branches of your country are tourism (sking in winter, hiking in summer) as well as growing wine on the south exposed slopes. Your country and another country, the Lowlands, share a common lake like shown on the map. The lake is fed by a river from precipitation and a glacier in your country. Typically your water table is at a depth of between 1.20 m close to the lake and up to 20 m depth at high elevations. In areas of vineyards, it is at 2 m depth. The dominant land-use type is grapevine (30%) followed by grassland (25%), coniferous (15%), deciduous (10%) and mixed forest (5%) and above the tree line tundra (1%). Glaciers and urban land cover 2% and 5%. Furthermore, there are along little creeks, the lake, and rivers.

Grapevines have a smaller fraction of their roots in the top 60 cm. Most of the roots are lying at deeper horizons. Grape roots can grow more than 6 m deep. Typically, your cloudiness is 50% in summer.



The wettest conditions persist in the high mountains. Annual mean precipitation, evapotranspiration and runoff are 911 mm, 500 mm, and 400 m/s (observed at the lake inlet). Your country is one watershed, i.e. all creeks and rivers finally contribute water to the main river

that discharges into the lake. For the third year in a row, there is a severe drought in your country with a precipitation deficit of 40%. The deficit is more or less equally distributed over the year. Calculate the water balance for the climatological mean as well as for the drought.

About 50% of your water reserves come from snowmelt. 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 would you need? Coarse estimates are fine.

In the valleys, soils are due to glacial drift, loess, sandy loam to clay. Above the tree line soils are thin if they exist at all due to the steep mountains.

This part 1 is due by Monday 2359 Alaska time via email to me.

Part 2

After this above deadline, the second part of the application is as follows. As you can imagine the Lowlands 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 Lowlands. Your country's and the Lowlands' 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).