Name: _____ Laboratory Section: _____

Date: _____ Score/Grade: _____

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Exercise 16
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LAB EXERCISE 16 Water Balance and Water Resources

Lab Exercise and Activities

SECTION 1

Water Balance Components

1. Can you identify from the two maps' regions where PRECIP *supply* (16.1a) is *higher* than POTET *demand* (16.1b)? Compare the two maps and describe these regions.

   PRECIP is greater than POTET on the northwest coast of North America, and in eastern North America, especially southeastern United States.

2. Can you identify from the two maps' regions where POTET *demand* is *higher* than PRECIP *supply*? Compare the two maps and describe these regions.

   POTET exceeds PRECIP in most of the western United States with the exception of the northwest coast and a few isolated areas at high elevation in the mountains.

3. Based on these maps, why does 95% of the irrigated agriculture in the United States and Canada occur west of the 95th meridian (central Kansas, western Manitoba)?

   The region west of the 95th meridian generally receives less PRECIP (supply) than POTET (demand) and so must supplement with irrigation water.

4. Where you go to college, is the natural water demand usually met by the natural precipitation supply? Or does your region experience a natural shortage? Are there some months of surplus and some months of deficit in the annual pattern?

   Personal answer

5. What kinds of adaptations are made in your area to overcome the natural shortage? For instance, do people have to install sprinkler systems for lawns, or is natural precipitation adequate all year long?

   Personal answer

SECTION 2

Water Budget Calculations for Kingsport, Tennessee

1. Calculate the positive or negative relationship between PRECIP and POTET. Record this plus or minus value in the spaces provided. Note that January and June are already figured. Complete the remainder of the water-balance table, recalling that storage capacity is 100 mm. Data are smoothed over the entire month.

   Student activity

2. When does Kingsport experience a surplus of water? List the months.

   October through May.

3. List the months that soil moisture remains at field capacity (full).

   January through May, December

4. How much surplus is accumulated through these months?

   345 mm

5. According to your calculations, do the soils of Kingsport return to field capacity (full storage) by the end of the year? Are any surpluses generated in December?

   Yes. Yes, 57 mm surplus in December.

   The amount?

6. In which months does POTET exceed PRECIP in Kingsport?

   June through September

TABLE 16.1 Kingsport water balance

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
PRECIP	97	99	97	84	104	97	132	112	66	66	66	99	1119
POTET	7	8	24	57	97	132	150	133	99	55	12	7	781
PRECIP—POTET	+90	*+91*	*+73*	*+27*	*+7*	−35	*−18*	*−21*	*−33*	*+11*	*+54*	*+92*	—
STRGE	100	100	*100*	*100*	*100*	65	*47*	*26*	*0*	*11*	*65*	100	—
ΔSTRGE	0	0	*0*	*0*	*0*	−35	*−18*	*−21*	*−33*	*+11*	*+54*	*+35*	—
ACTET	7	8	*24*	*57*	*97*	132	*150*	*133*	*92*	*55*	*12*	*7*	*774*
DEFIC	0	0	*0*	*0*	*0*	0	*0*	*0*	*−7*	*0*	*0*	*0*	*−7*
SURPL	90	91	*73*	*27*	*7*	0	*0*	*0*	*0*	*0*	*0*	*57*	*345*

(All quantities in millimeters)

SECTION 3

Water Budget Calculations for Sacramento, California

TABLE 16.2 Water balance for Sacramento, California

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
PRECIP	107	74	56	36	10	3	3	3	8	23	58	76	455
POTET	15	23	40	60	85	115	140	127	99	66	30	15	815
PRECIP—POTET	*+92*	*+51*	*+16*	*−24*	*−75*	*−1*	*0*	*0*	*0*	*0*	*28*	*89*	—
STRGE	100	*100*	*100*	*76*	*1*	0	*0*	*0*	*0*	*0*	*28*	89	—
ΔSTRGE	*0*	*0*	*0*	*−24*	*−75*	*−1*	*0*	*0*	*0*	*0*	*+28*	*+61*	—
ACTET	*15*	*23*	*40*	*60*	*85*	*4*	*3*	*3*	*8*	*23*	*30*	*15*	*309*
DEFIC	*0*	*0*	*0*	*0*	*0*	*111*	*137*	*124*	*91*	*43*	*0*	*0*	*506*
SURPL	*92*	*51*	*16*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*159*

(All quantities in millimeters)

Questions and analysis about the water balance of Sacramento, California:

1. Complete the bookkeeping procedure for Sacramento using the monthly and annual average values given in Table 16.2. Calculate PRECIP − POTET, ΔSTRGE, ACTET, DEFIC, and SURPL amounts for each month, as you did for Kingsport.
2. For Sacramento, how many months does POTET exceed PRECIP?

   7 months