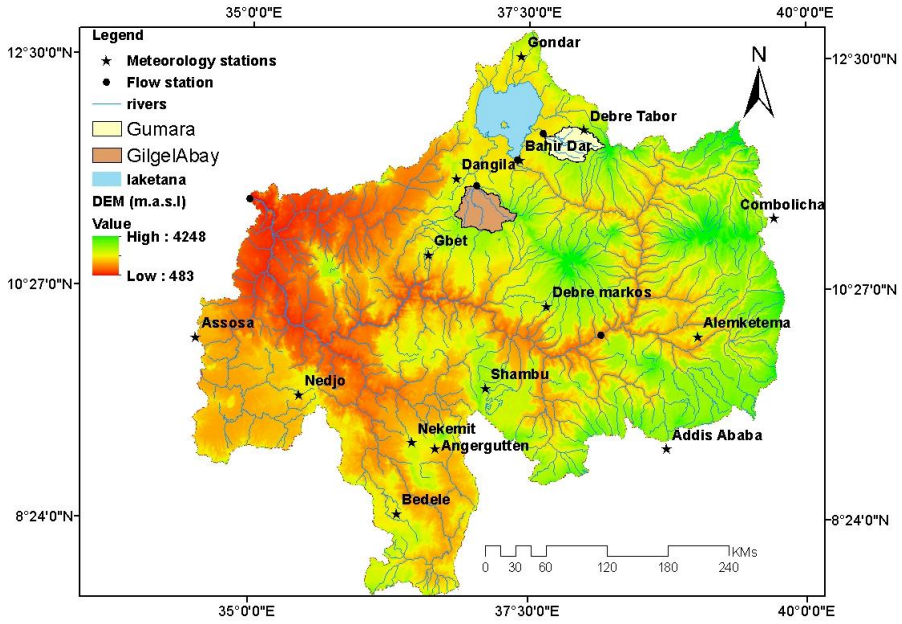


Figure 1: Locations of study area and meteorological and discharge stations, with the Digital Elevation Model (DEM) data as the background

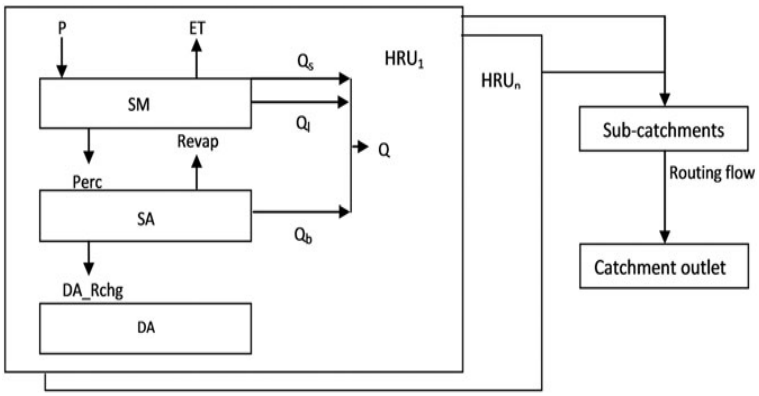
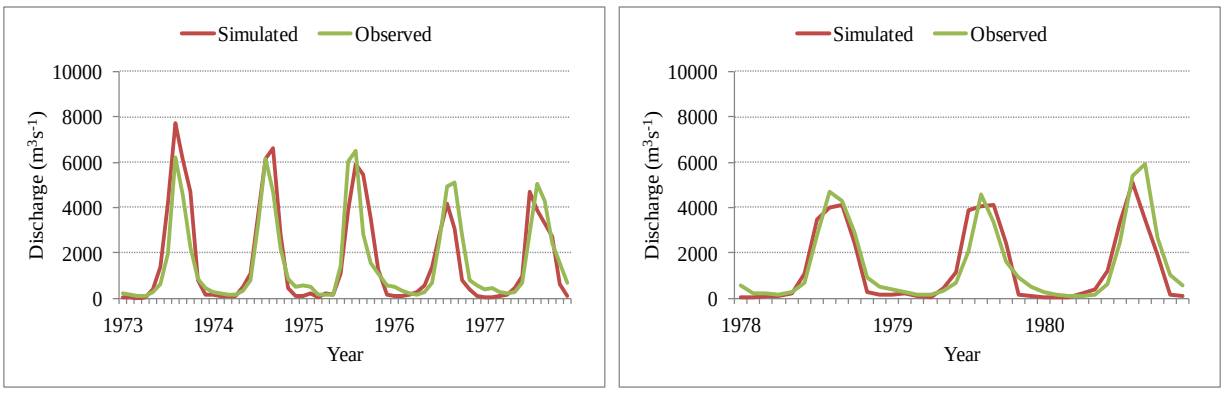
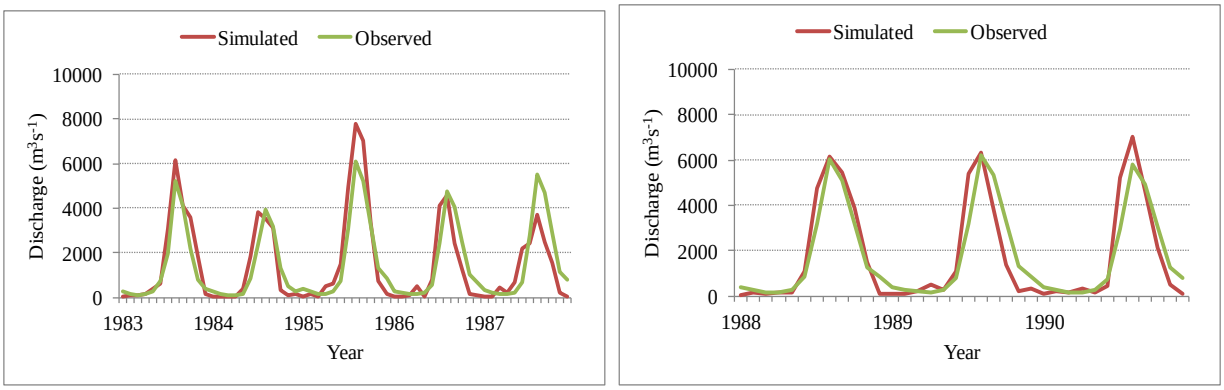


Figure2: Schematic representation of the SWAT model structure from Marhaento *et al.* (2017)

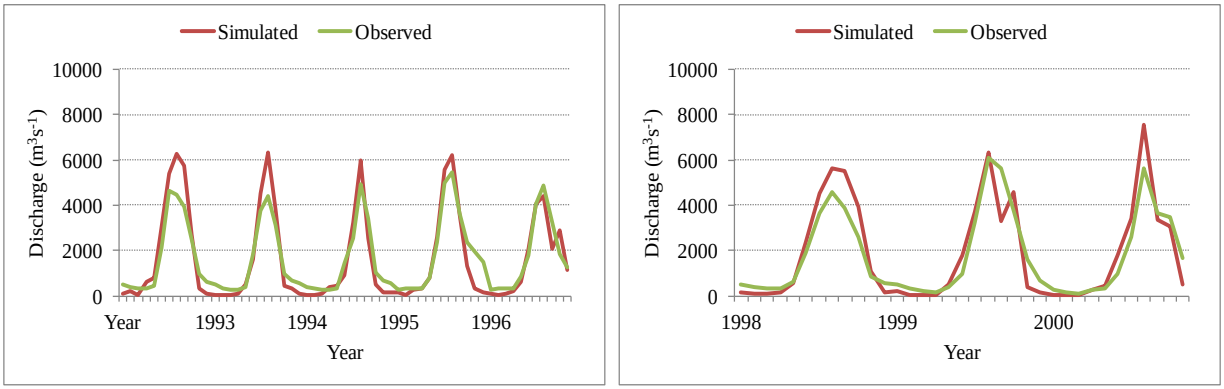
a)



b)



c)



d)

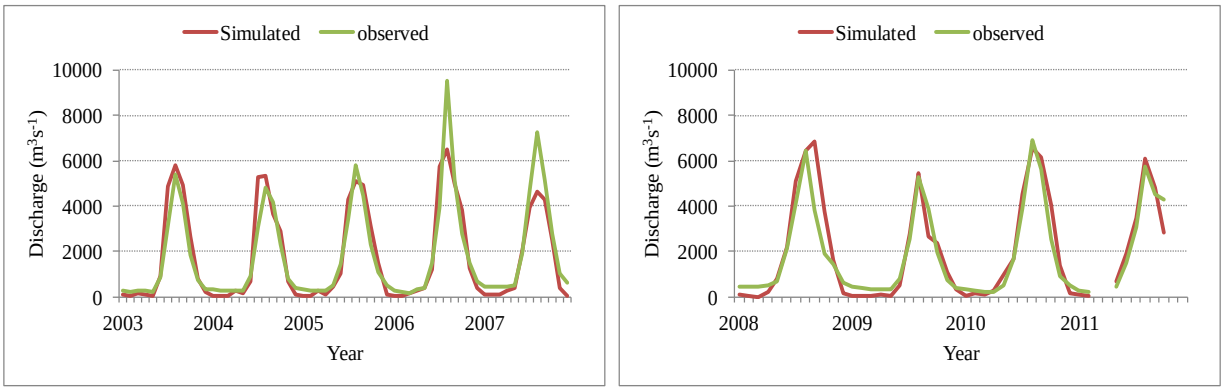


Figure 6: Calibration and validation of the SWAT hydrological model (left and right) respectively
a) 1970s, b) 1980s, c) 1990s and d) 2000s monthly time scale

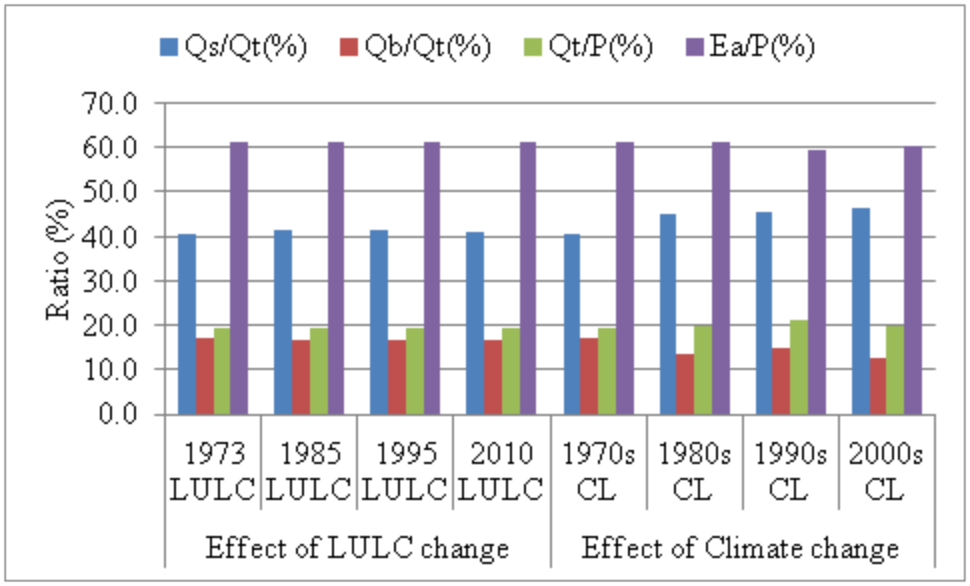


Figure 7: Ratio of water balance component analysis at El Diem station using a single effect (LULC/climate change).

Table S01: List of meteorological stations and percentage gaps

			Location		Rainfall records			Temperature records		
No.	Station Name	Elevation (masl)	Easting	Northing	Start date	End date	% of gaps	Start date	End date	% of gaps
1	Gondar	1967	37.43	12.52	01/01/1952	09/30/2011	7.5	01/01/1952	09/30/2012	10.1
2	Debre Markos	2515	37.67	10.33	01/01/1954	07/31/2012	1.9	01/01/1953	07/31/2012	3.0
3	Debre Tabor	2612	38	11.87	01/01/1954	12/31/2011	27.8	01/01/1951	12/31/2011	28.6
4	Dangila	2116	36.85	11.43	01/01/1954	12/31/2011	34.2	01/01/1954	12/31/2011	31.3
5	Enjibara	2670	36.9	10.97	01/01/1954	12/31/2011	38.7			
6	Debark	1900	37.9	13.16	01/01/1955	12/31/2011	57.7	01/01/1973	12/31/2011	44.9
7	Dejen	2420	38.15	10.17	01/01/1957	11/30/2011	60.8			
8	Gbet	2320	36.6	10.75	01/01/1958	12/31/2011	32.4			
9	Feres bet	2870	37.61	10.85	01/01/1959	12/31/2007	54.7			
10	Bahir Dar	1770	37.42	11.6	01/01/1961	09/30/2012	1.6	01/01/1961	09/30/2012	1.5
11	Shambu	2460	37.12	9.57	01/01/1961	11/30/2014	33.5	05/01/1974	12/31/2014	33.1
12	Ayikel	2150	37.05	12.53	01/01/1968	12/31/2011	37.4	01/01/1969	11/30/2011	31.9
13	Angerguten	1350	36.33	9.27	01/04/1972	10/31/2011	39.5	01/01/1972	10/31/2011	33.0
14	Zege	1800	37.32	11.71	01/01/1974	12/31/2011	38.9	01/01/1974	12/31/2011	20.5
15	Tillili	2570	37.05	10.58	01/01/1974	09/30/2011	31.9			
16	Nedjo	1800	35.45	9.5	01/03/1974	12/31/2014	20.3	03/01/1974	12/31/2014	24.9
17	Abaysheleko	1790	38.16	10.11	01/01/1983	12/31/2011	10.6	01/01/1983	12/31/2011	33.0
18	Alem Ketema	2280	39.03	10.03	01/01/1973	01/31/2013	7.6	01/01/1973	09/30/2013	32.5
19	Mehal Meda	3084	39.66	10.31	01/01/1984	11/30/2014	9.7	01/01/1984	12/31/2014	12.2
20	Gidayana	1850	36.62	9.87	01/01/1970	10/31/2011	7.5	01/01/1989	08/31/2011	33.6
21	Dedessa	1310	36.1	9.38	01/01/1984	10/31/2014	12.7	01/01/1984	10/31/2014	35.0
22	Fiche	2784	38.73	9.77	01/01/1984	02/28/2015	1.4	01/01/1984	12/31/2014	4.3
23	Anger	1350	36.33	9.27	01/01/1984	12/31/2014	14.6	01/01/1984	12/31/2011	37.6
24	Gatira	2358	36.2	7.98	01/01/1984	06/30/2014	14.9	01/01/1990	12/31/2014	47.3
25	Wegel Tena	2952	39.22	11.59	01/01/1984	12/31/2014	21.6	01/01/1984	12/31/2014	35.3
26	Chagni	1614	36.5	10.97	05/27/1973	12/31/2011	14.6	01/01/1984	11/30/2014	26.9

27	Debre Berhan	2750	39.5	9.63	01/01/1984	12/31/2014	1.9	01/01/1984	11/30/2014	1.2
28	Bedele	2011	36.33	8.45	01/02/1970	05/31/2011	10.2	02/01/1970	05/31/2013	17.2
29	Adet	2179	37.49	11.27	01/01/1986	12/31/2014	4.5	01/01/1986	11/30/2014	10.3
30	Pawe	1119	36.41	11.31	01/12/1986	12/31/2014	3.1	12/01/1986	11/30/2014	21.6
31	Aira	1555	35.55	9.1	01/01/1987	10/31/2014	11.4	06/01/1987	12/31/2014	41.5
32	Mekane selam	2605	38.76	10.74	01/01/1988	12/31/2014	29.1	01/01/1988	12/31/2014	29.5
33	Yetnora	2420	38.11	10.24	01/09/1988	11/30/2014	8.7	09/01/1988	12/31/2014	38.4
34	Lay Birr	1707	37.17	10.59	01/01/1989	01/30/2015	7.4	01/01/1989	12/31/2012	21.7
35	Ayehu	1771	36.79	10.66	01/01/1989	12/31/2014	12.9	01/01/1987	12/31/2014	48.1
36	Motta	2417	37.89	11.07	01/01/1990	10/31/2014	5.6	01/01/1988	12/31/2014	6.9
37	Addis Ababa	2354	38.75	9.03	01/01/1970	12/31/2011	0.6	01/01/1970	12/31/2011	1.8
38	Combolicha	1857	39.72	11.08	01/01/1970	12/31/2011	0.4	01/01/1970	12/31/2011	1.2
39	Nekemit	2080	36.46	9.08	01/01/1970	12/31/2011	2.4	12/01/1970	12/31/2011	8.3
40	Assosa	1600	34.52	10.00	01/01/1970	12/31/2011	20.0	01/01/1970	12/31/2011	24.8

Note: The highlighted stations are those stations considered for further analysis.

TableS02: Summary of used Landsat images and their acquisition dates

LULC map year	1985	1995	2010	1973	
1. General information					
Satellite/Sensor	Landsat TM	Landsat TM	Landsat TM	Landsat MSS	
Number of scene	16	16	16	16	
Pixel resolution(m)	30	30	30	60	
2. Image acquisition date					
Paths/Rows	acquisition date	acquisition date	acquisition date	Paths/Rows	acquisition date
168/052	01/18/1985	12/13/1994	11/04/2009	180/053	01/30/1973
168/053	04/22/1985	12/13/1994	11/04/2009	181/052	01/30/1973
168/054	01/18/1985	01/14/1985	12/09/2010	181/053	12/26/1972
169/051	11/12/1986	12/04/1994	01/30/2010	181/054	01/31/1973
169/052	11/09/1985	12/04/1994	01/30/2010	181/055	01/31/1973
169/053	04/15/1985	01/21/1995	01/14/2010	182/051	12/09/1972
169/054	03/14/1985	01/21/1995	01/14/2020	182/052	02/01/1973
170/051	02/17/1985	02/13/1995	12/23/2010	182/053	12/09/1972
170/052	02/17/1985	02/13/1995	01/08/2011	182/054	02/01/1973
170/053	02/01/1985	02/13/1995	01/08/2011	182/055	02/01/1973
170/054	02/01/1985	12/27/1994	01/21/2010	183/051	11/04/1972
170/055	01/19/1986	01/12/1995	11/05/2010	183/052	01/15/1973
171/052	04/13/1985	02/20/1995	01/28/2010	183/053	01/15/1973
171/053	04/13/1985	01/03/1995	01/12/2010	183/054	01/15/1973
171/054	12/28/1985	01/19/1995	01/12/2010	184/051	12/11/1972
171/055	04/16/1985	04/09/1995	11/05/2010	184/052	11/05/1972

Marhaento, H., Booij, M.J., Rientjes, T., Hoekstra, A.Y., 2017. Attribution of changes in the water balance of a tropical catchment to land use change using the SWAT model. Hydrological Processes, 31(11): 2029-2040.