

Appendix 1

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Mean monthly and maximum daily river flow of the historical and synthetic series

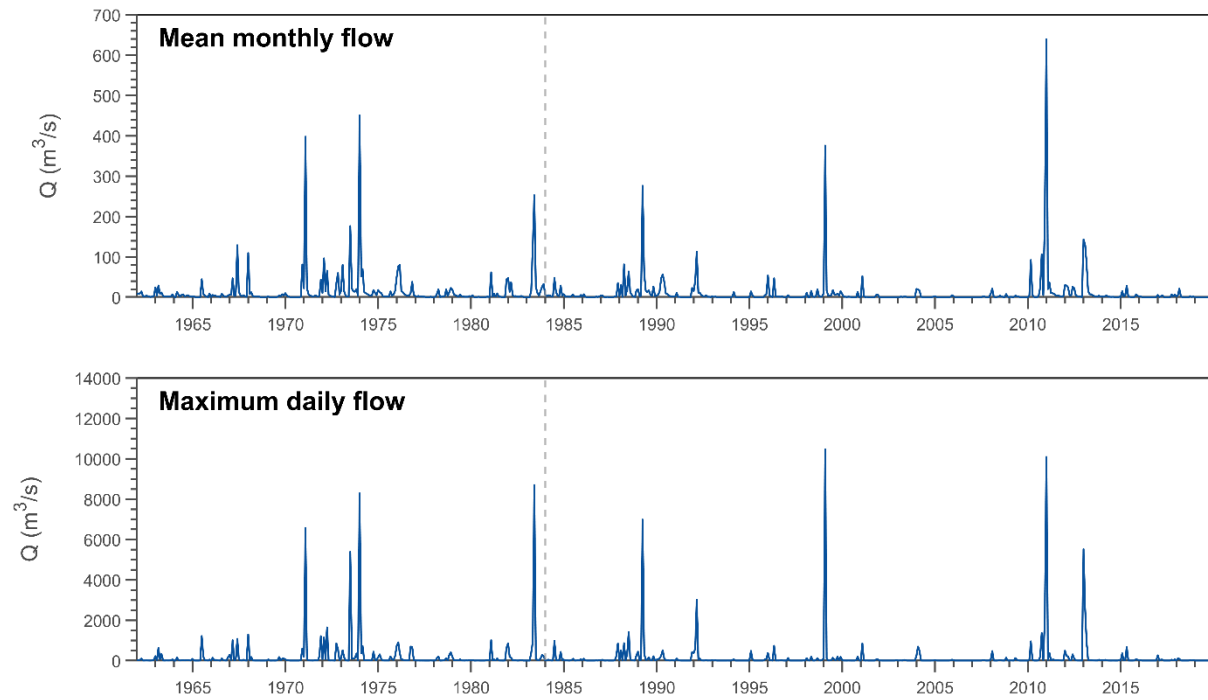


Figure A1. Mean monthly (top) and maximum daily (top) observed inflow hydrographs of the Brisbane River at Gregors Creek. The dashed line indicates the construction of the Wivenhoe Dam.

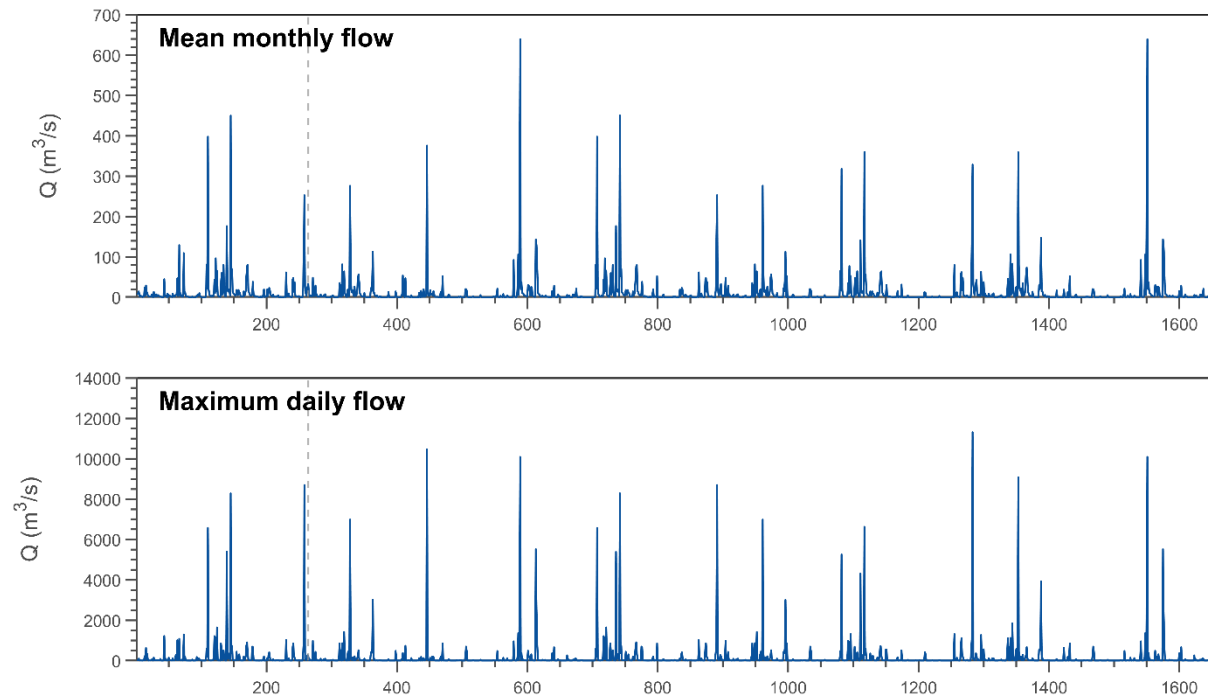


Figure A2. Mean monthly (top) and maximum daily (bottom) synthetic inflow hydrographs. The dashed line indicates the construction of the Wivenhoe Dam.

Percent Error in the variation (PE), and Discrepancy Coefficient (DC) between observed water level (WL), reservoir volume (V), and population (P) with the simulated ones.

Table A1. Percent error in the variation and discrepancy coefficient values of water level (WL), reservoir volume (V), and population (P) for the different water management strategies (NA: No Actions; FF: Fighting Floods; WC: Water Conservation; WE: Water Exploitation)

Model variable	Percent error in the variation				Discrepancy coefficient			
	NA	FF	WC	WE	NA	FF	WC	WE
WL	0.66	0.64	0.63	0.67	0.75	0.74	0.73	0.75
V	0.12	0.01	0.22	0.18	0.44	0.45	0.43	0.44
P	0.08	0.12	0.00	0.08	0.06	0.06	0.09	0.06

Maximum monthly and daily river flow of additional six river flow scenarios

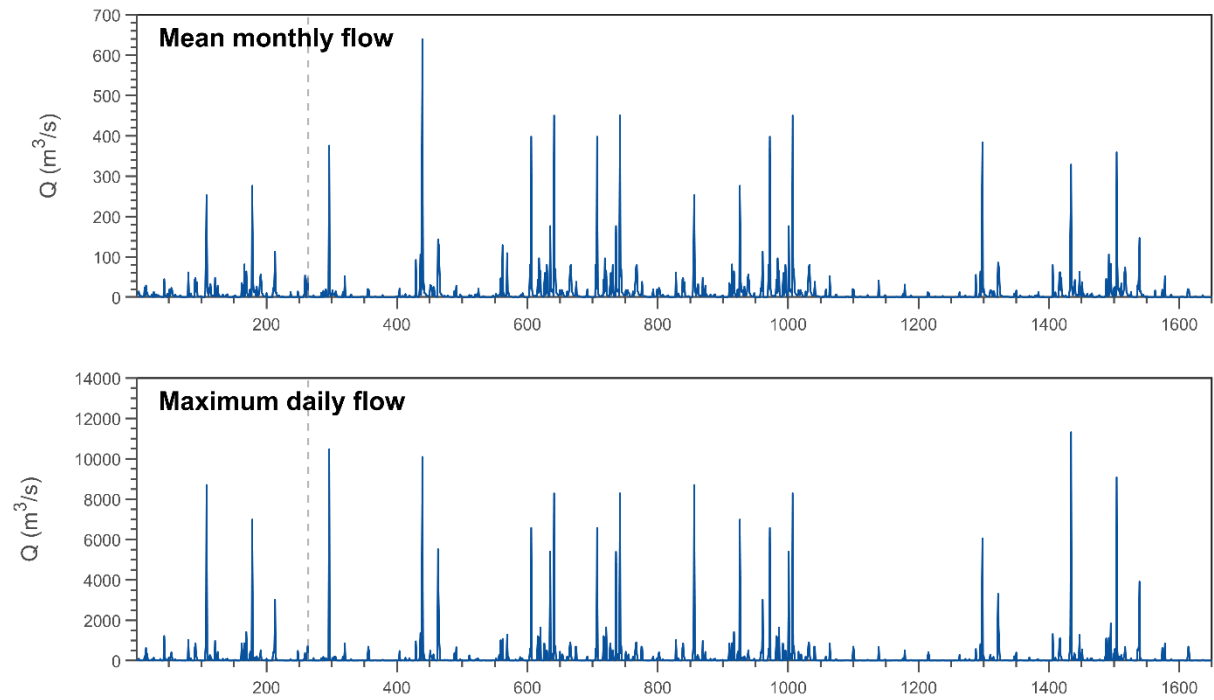


Figure A3. Mean monthly (top) and maximum daily (bottom) synthetic inflow hydrographs of additional scenario #1. The dashed line indicates the construction of the Wivenhoe Dam.

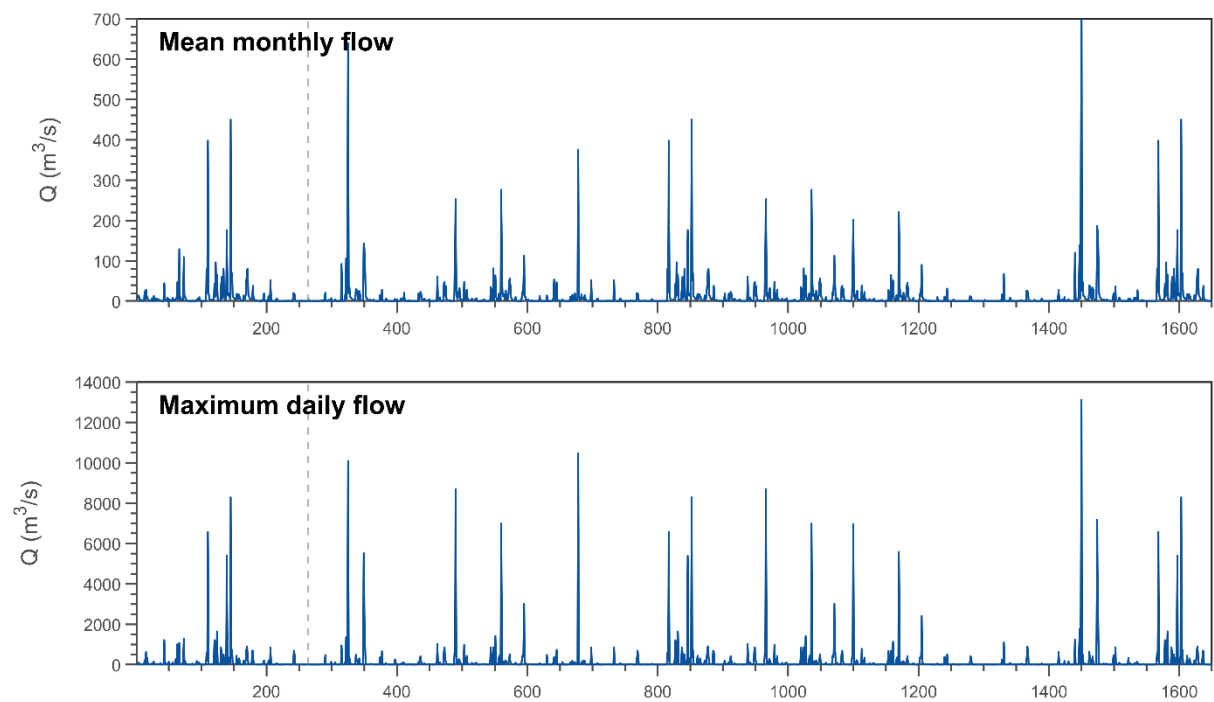


Figure A4. Mean monthly (top) and maximum daily (bottom) synthetic inflow hydrographs of additional scenario #2. The dashed line indicates the construction of the Wivenhoe Dam.

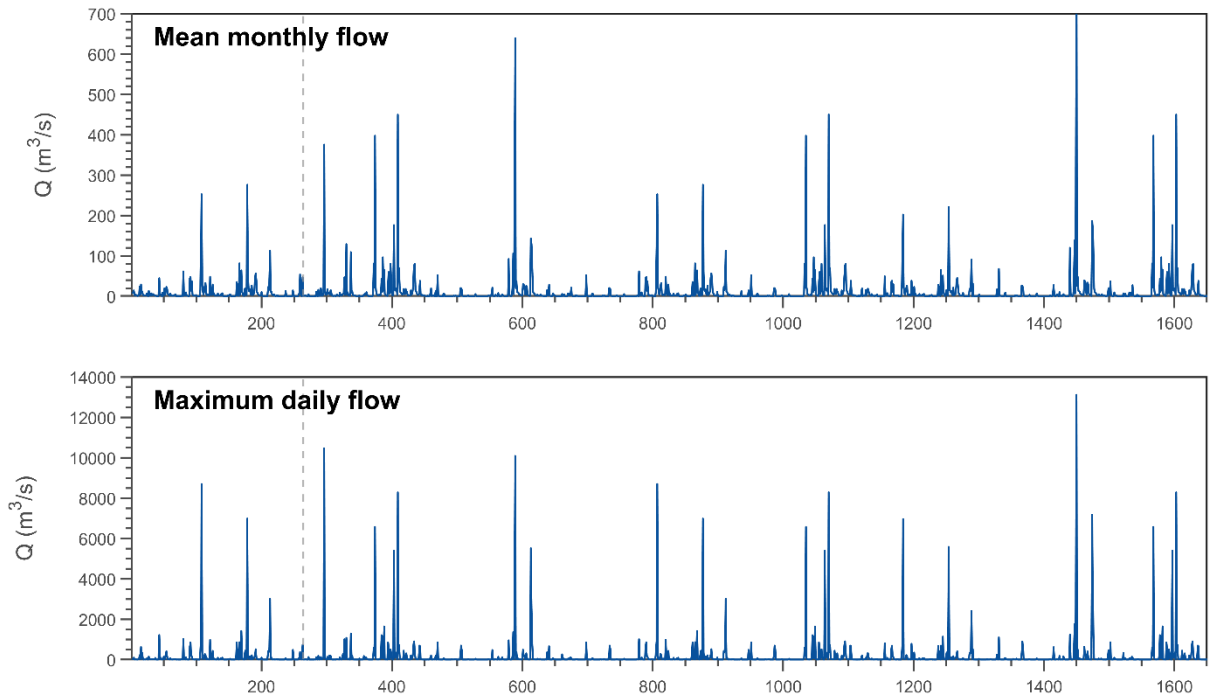


Figure A5. Mean monthly (top) and maximum daily (bottom) synthetic inflow hydrographs of additional scenario #3. The dashed line indicates the construction of the Wivenhoe Dam.

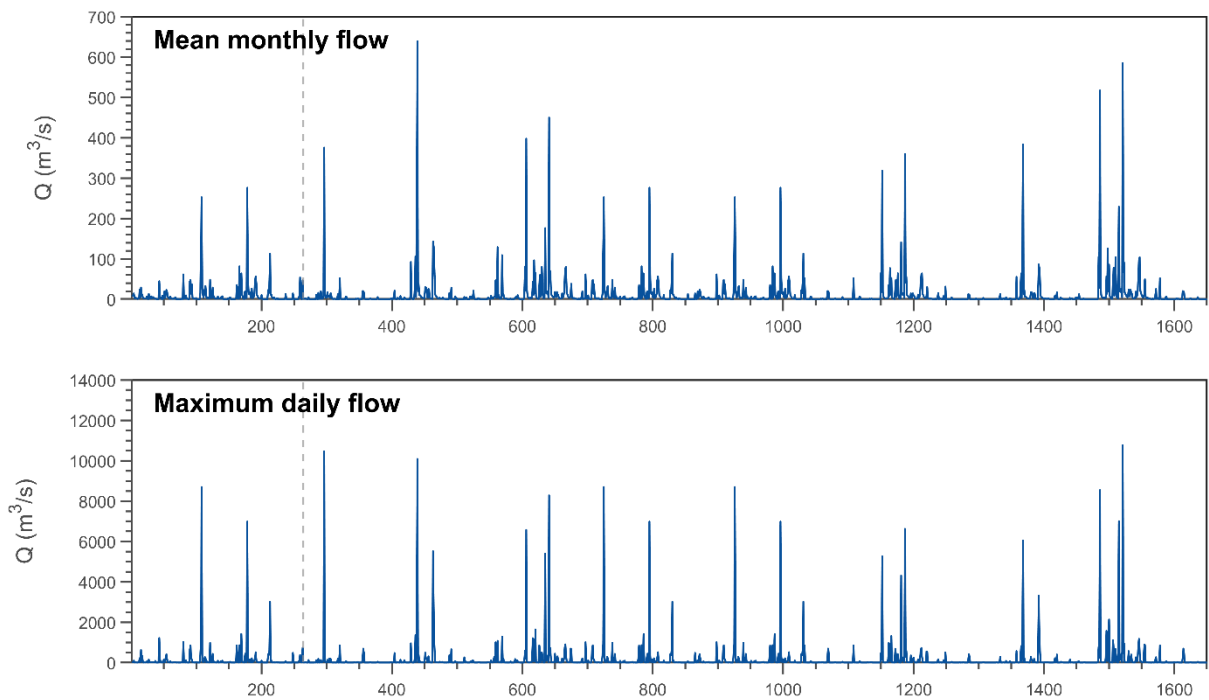


Figure A6. Mean monthly (top) and maximum daily (bottom) synthetic inflow hydrographs of additional scenario #4. The dashed line indicates the construction of the Wivenhoe Dam.

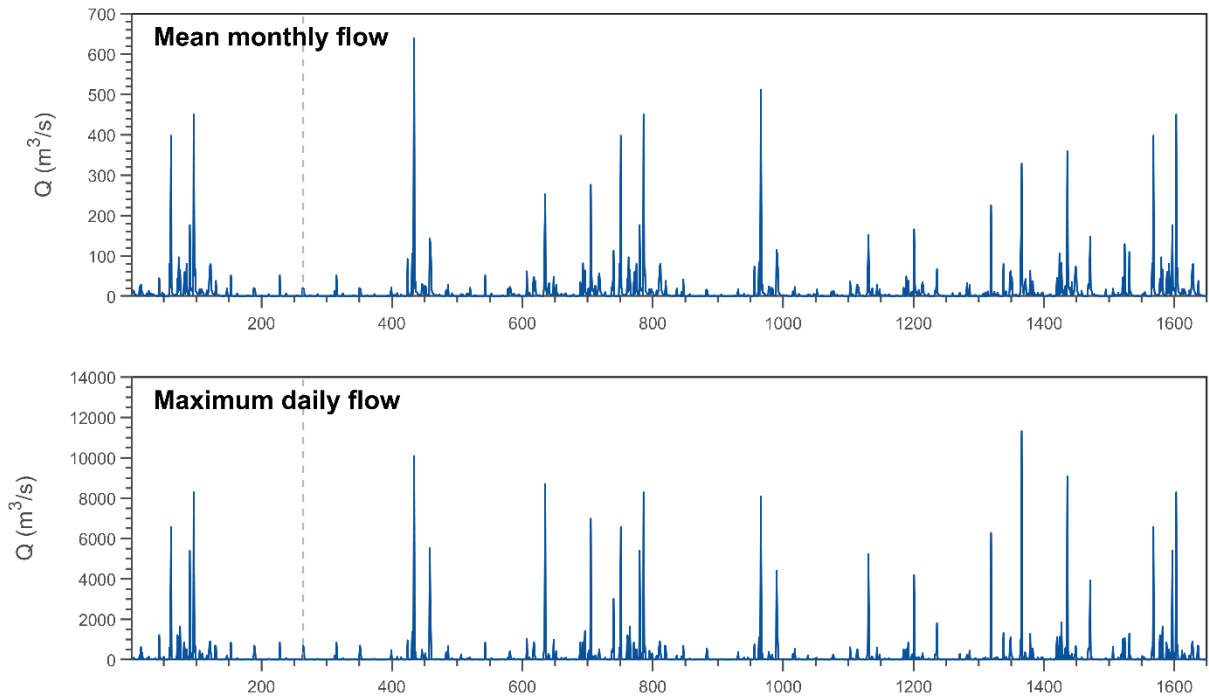


Figure A7. Mean monthly (top) and maximum daily (bottom) synthetic inflow hydrographs of additional scenario #5. The dashed line indicates the construction of the Wivenhoe Dam.

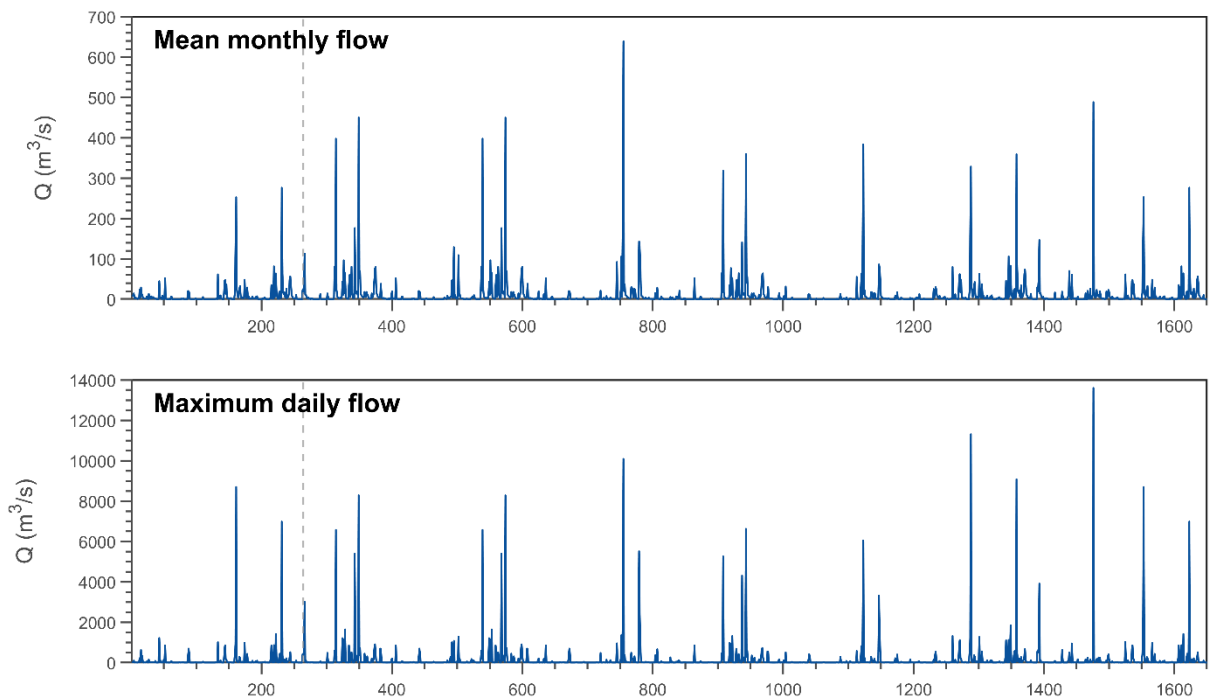


Figure A8. Mean monthly (top) and maximum daily (bottom) synthetic inflow hydrographs of additional scenario #6. The dashed line indicates the construction of the Wivenhoe Dam.

Results of the analyses with the additional six river flow scenarios

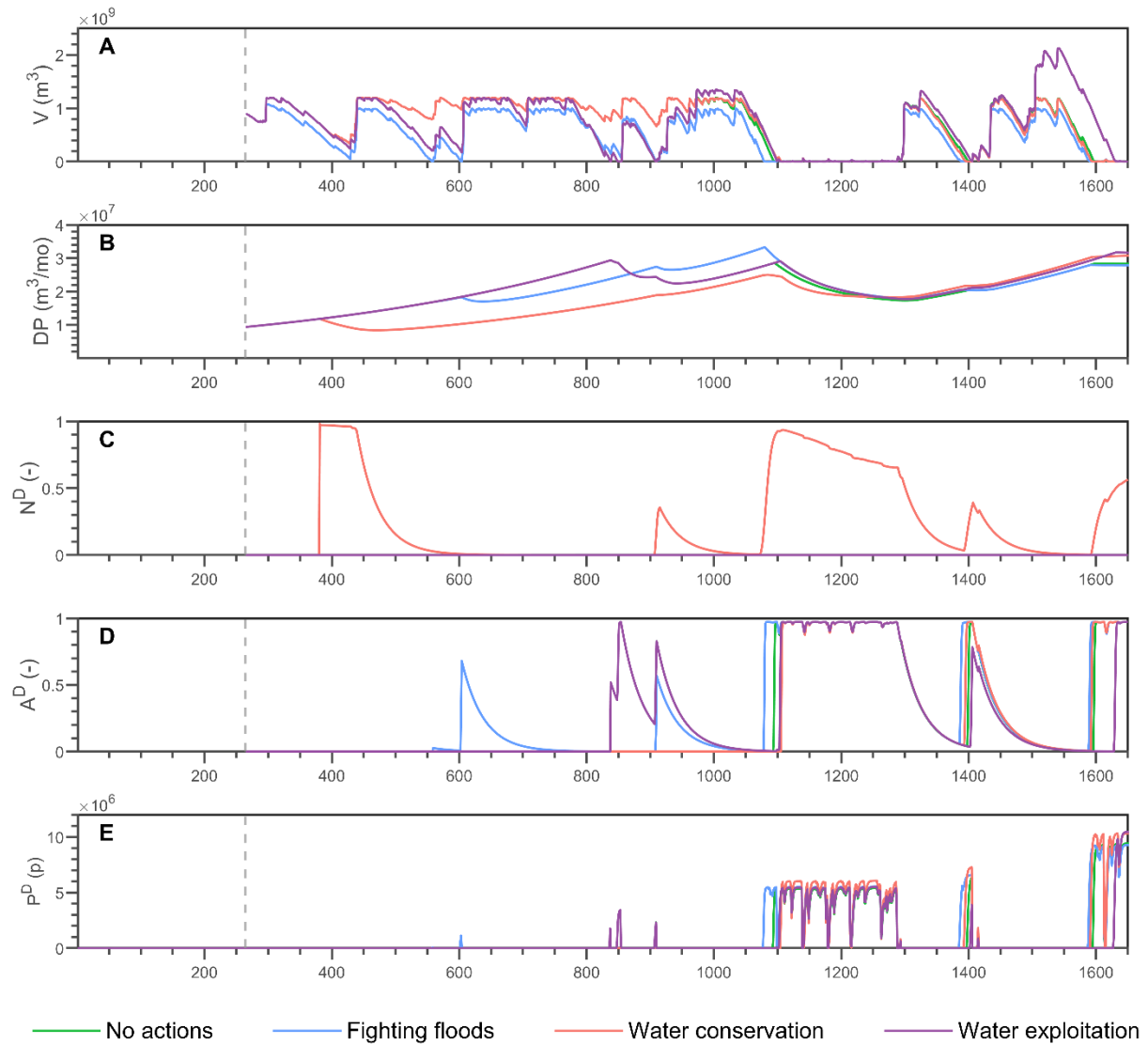


Figure A9. Water shortage-based variables of the synthetic experiments additional scenario #1 considering dam construction and human-flood interactions with the four water management strategies introduced in this study. (A) reservoir volume (V), (B) total water demand (DP), (C) willingness to the new per-capita demand (ND), (D) drought awareness (AD), and (E) population affected by droughts (PD). The grey dashed line indicates the construction of the Wivenhoe Dam.

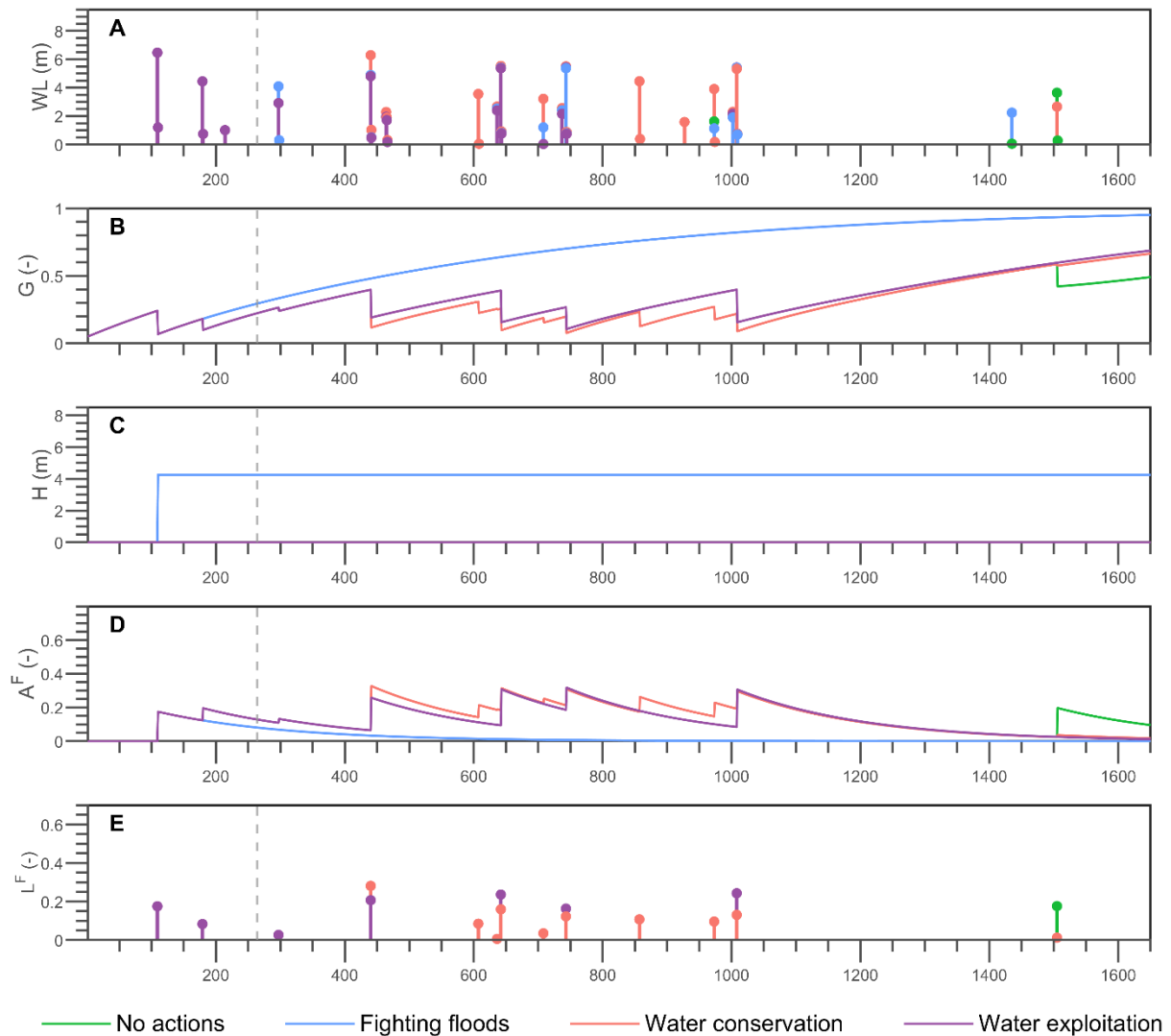


Figure A10. Flooding-based variables of the synthetic experiments additional scenario #1 considering dam construction and human-flood interactions with the four water management strategies introduced in this study. (A) Water level (WL), (B) proportion of population in floodplain (G), (C) levee height (H), (D) flood awareness (AF), and (E) flood losses (LF). The grey dashed line indicates the construction of the Wivenhoe Dam.

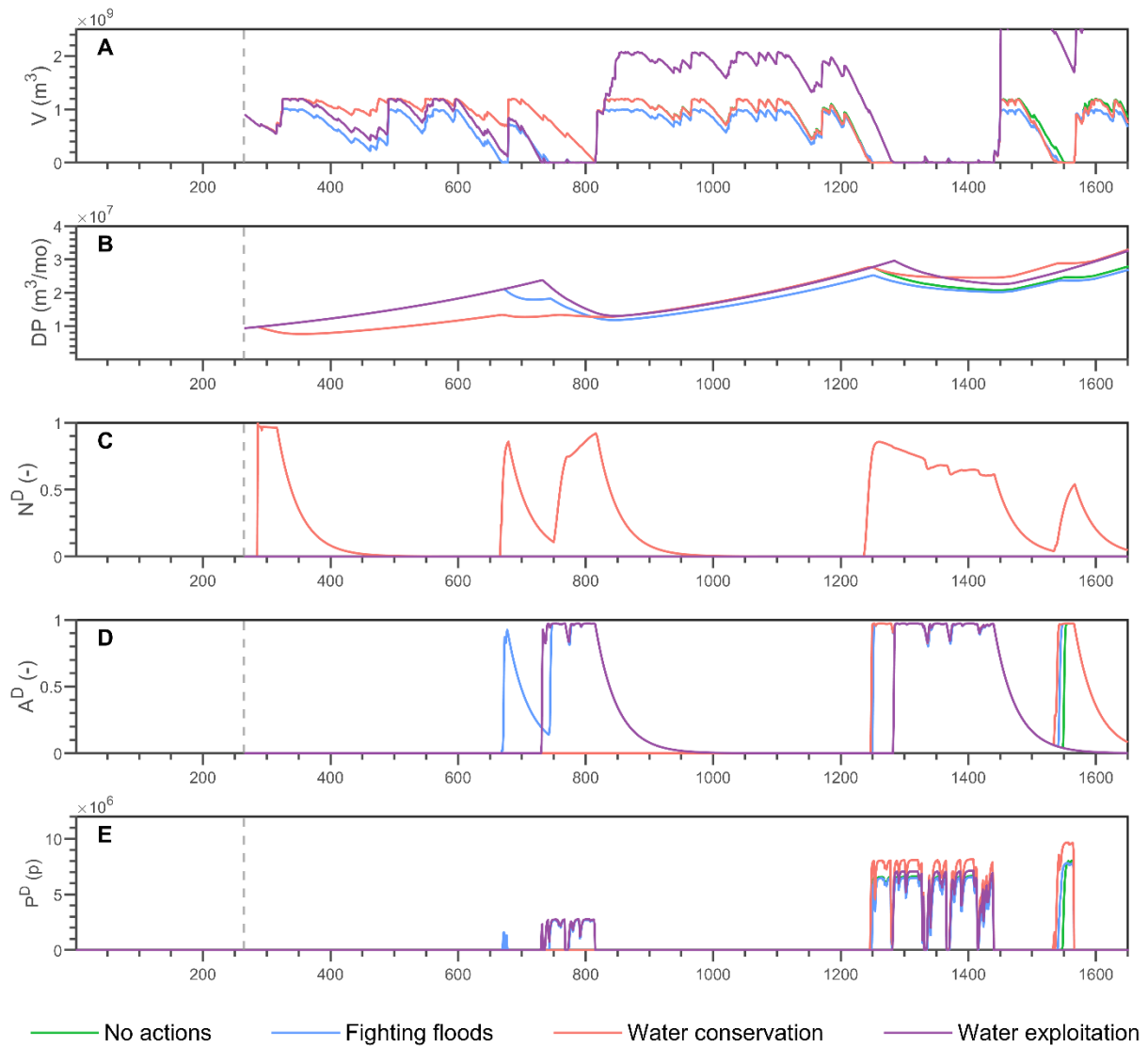


Figure A11. Water shortage-based variables of the synthetic experiments additional scenario #2 considering dam construction and human-flood interactions with the four water management strategies introduced in this study. (A) reservoir volume (V), (B) total water demand (DP), (C) willingness to the new per-capita demand (ND), (D) drought awareness (AD), and (E) population affected by droughts (PD). The grey dashed line indicates the construction of the Wivenhoe Dam.

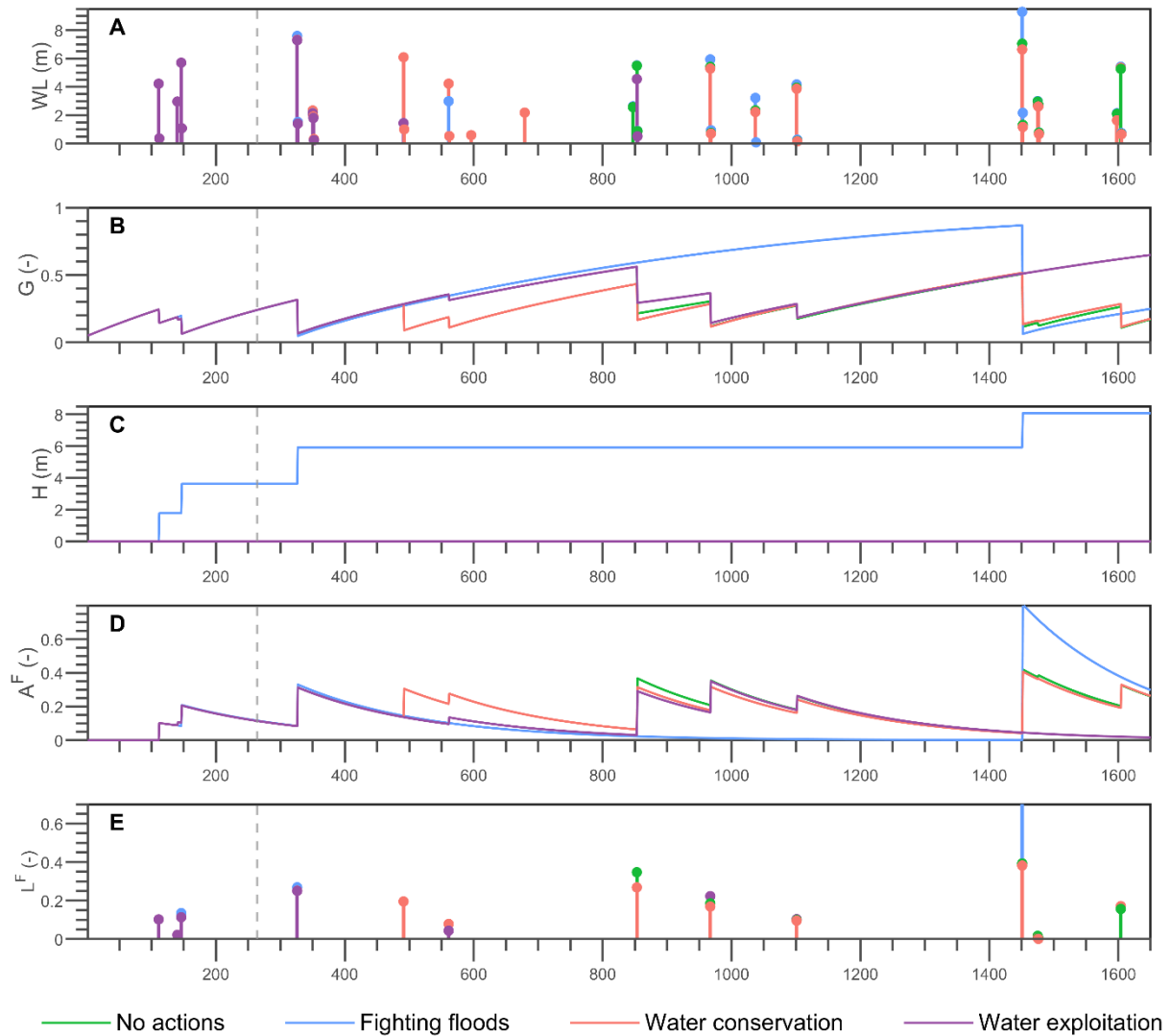


Figure A12. Flooding-based variables of the synthetic experiments additional scenario #2 considering dam construction and human-flood interactions with the four water management strategies introduced in this study. (A) Water level (WL), (B) proportion of population in floodplain (G), (C) levee height (H), (D) flood awareness (AF), and (E) flood losses (LF). The grey dashed line indicates the construction of the Wivenhoe Dam.

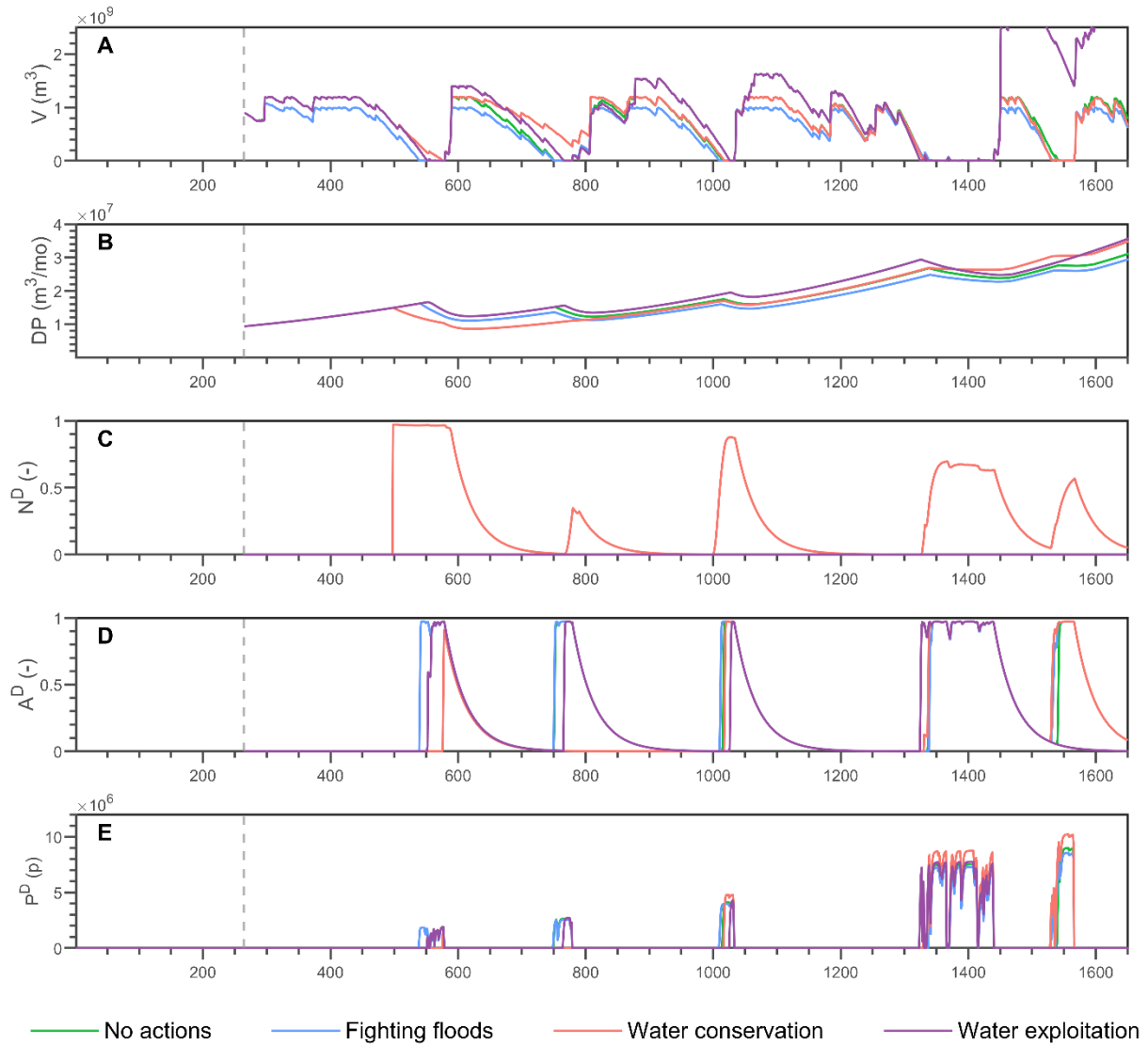


Figure A13. Water shortage-based variables of the synthetic experiments additional scenario #3 considering dam construction and human-flood interactions with the four water management strategies introduced in this study. (A) reservoir volume (V), (B) total water demand (DP), (C) willingness to the new per-capita demand (ND), (D) drought awareness (AD), and (E) population affected by droughts (PD). The grey dashed line indicates the construction of the Wivenhoe Dam.

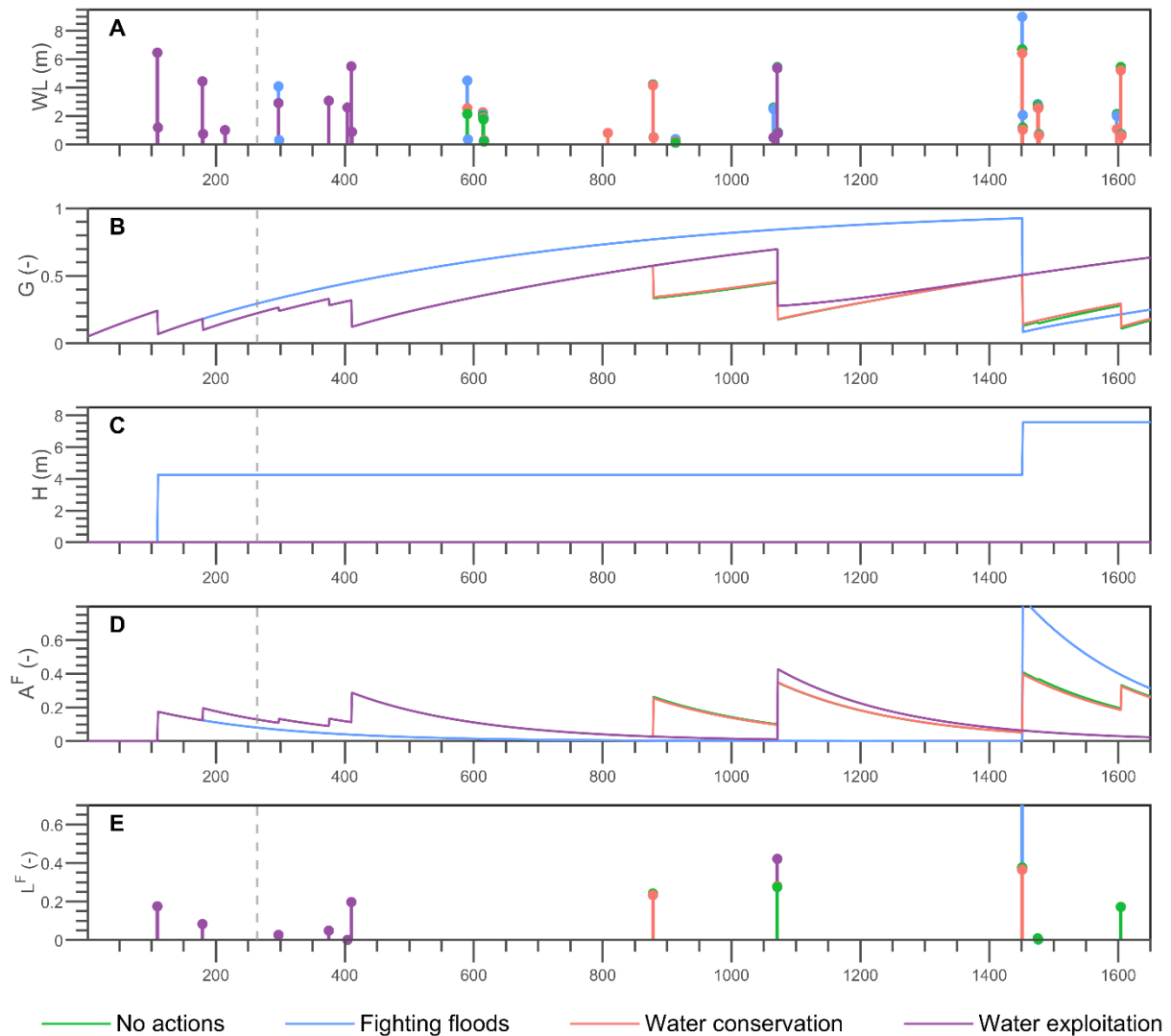


Figure A14. Flooding-based variables of the synthetic experiments additional scenario #3 considering dam construction and human-flood interactions with the four water management strategies introduced in this study. (A) Water level (WL), (B) proportion of population in floodplain (G), (C) levee height (H), (D) flood awareness (AF), and (E) flood losses (LF). The grey dashed line indicates the construction of the Wivenhoe Dam.

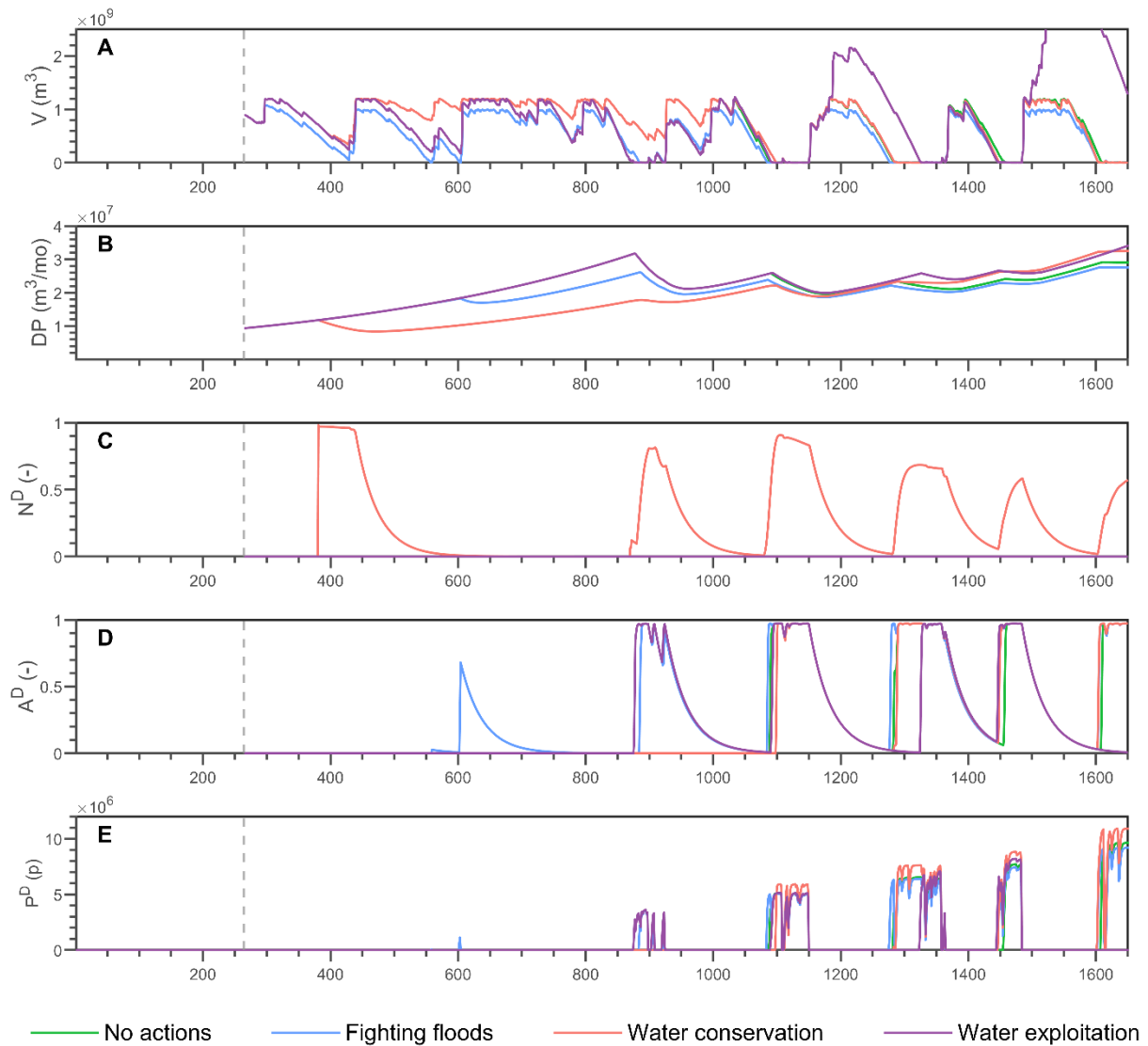


Figure A15. Water shortage-based variables of the synthetic experiments additional scenario #4 considering dam construction and human-flood interactions with the four water management strategies introduced in this study. (A) reservoir volume (V), (B) total water demand (DP), (C) willingness to the new per-capita demand (ND), (D) drought awareness (AD), and (E) population affected by droughts (PD). The grey dashed line indicates the construction of the Wivenhoe Dam.

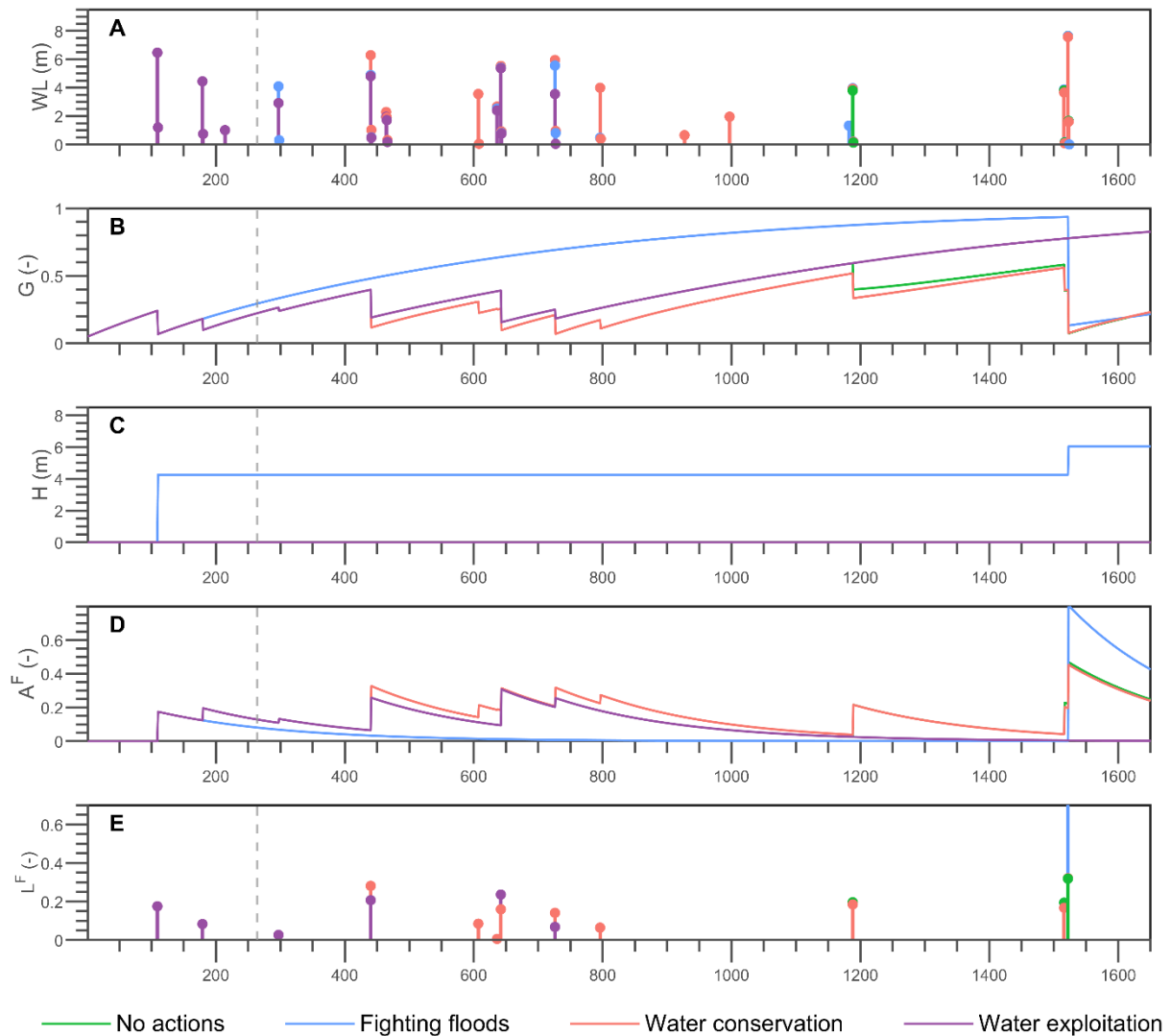


Figure A16. Flooding-based variables of the synthetic experiments additional scenario #4 considering dam construction and human-flood interactions with the four water management strategies introduced in this study. (A) Water level (WL), (B) proportion of population in floodplain (G), (C) levee height (H), (D) flood awareness (AF), and (E) flood losses (LF). The grey dashed line indicates the construction of the Wivenhoe Dam.

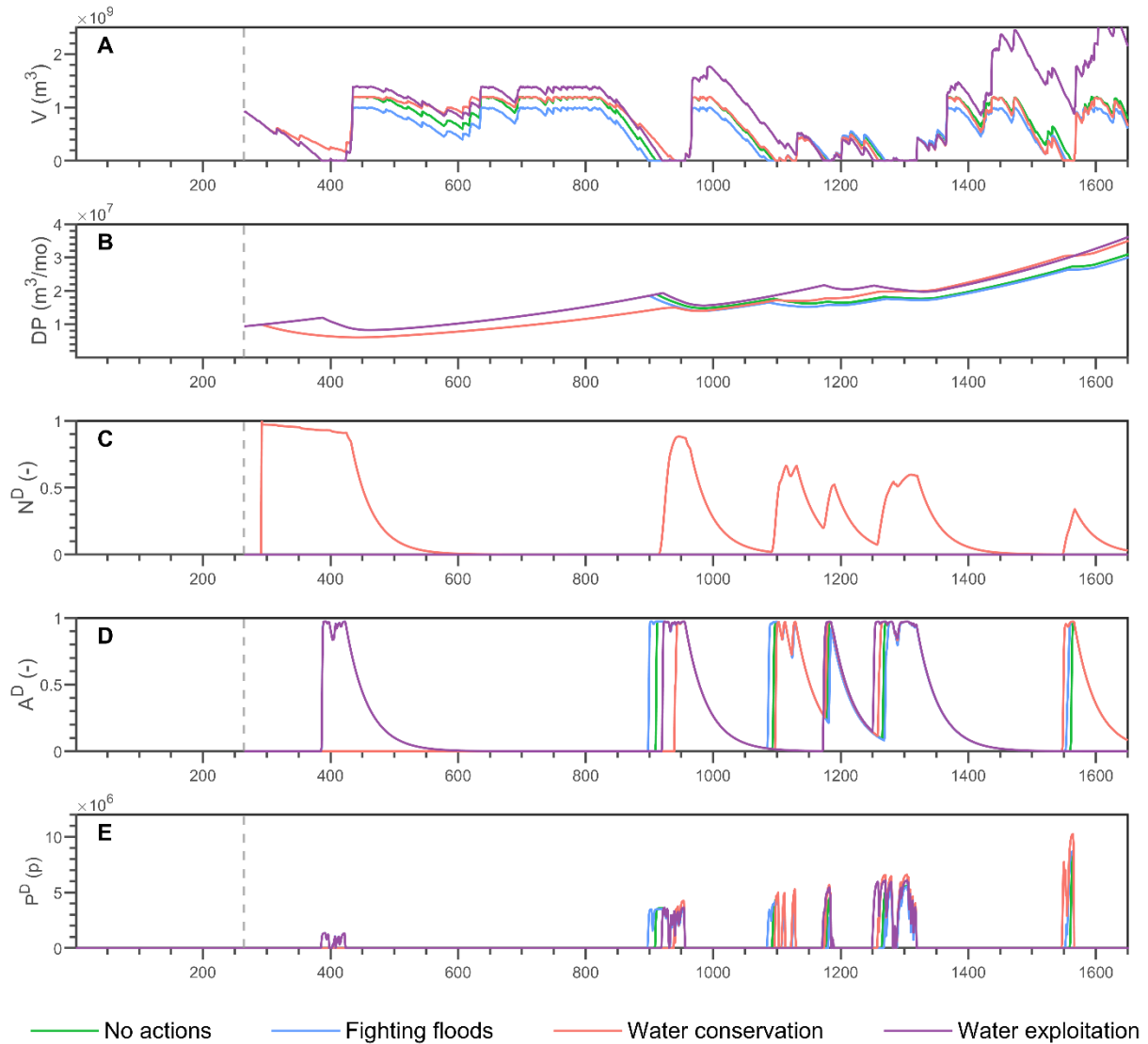


Figure A17. Water shortage-based variables of the synthetic experiments additional scenario #5 considering dam construction and human-flood interactions with the four water management strategies introduced in this study. (A) reservoir volume (V), (B) total water demand (DP), (C) willingness to the new per-capita demand (ND), (D) drought awareness (AD), and (E) population affected by droughts (PD). The grey dashed line indicates the construction of the Wivenhoe Dam.

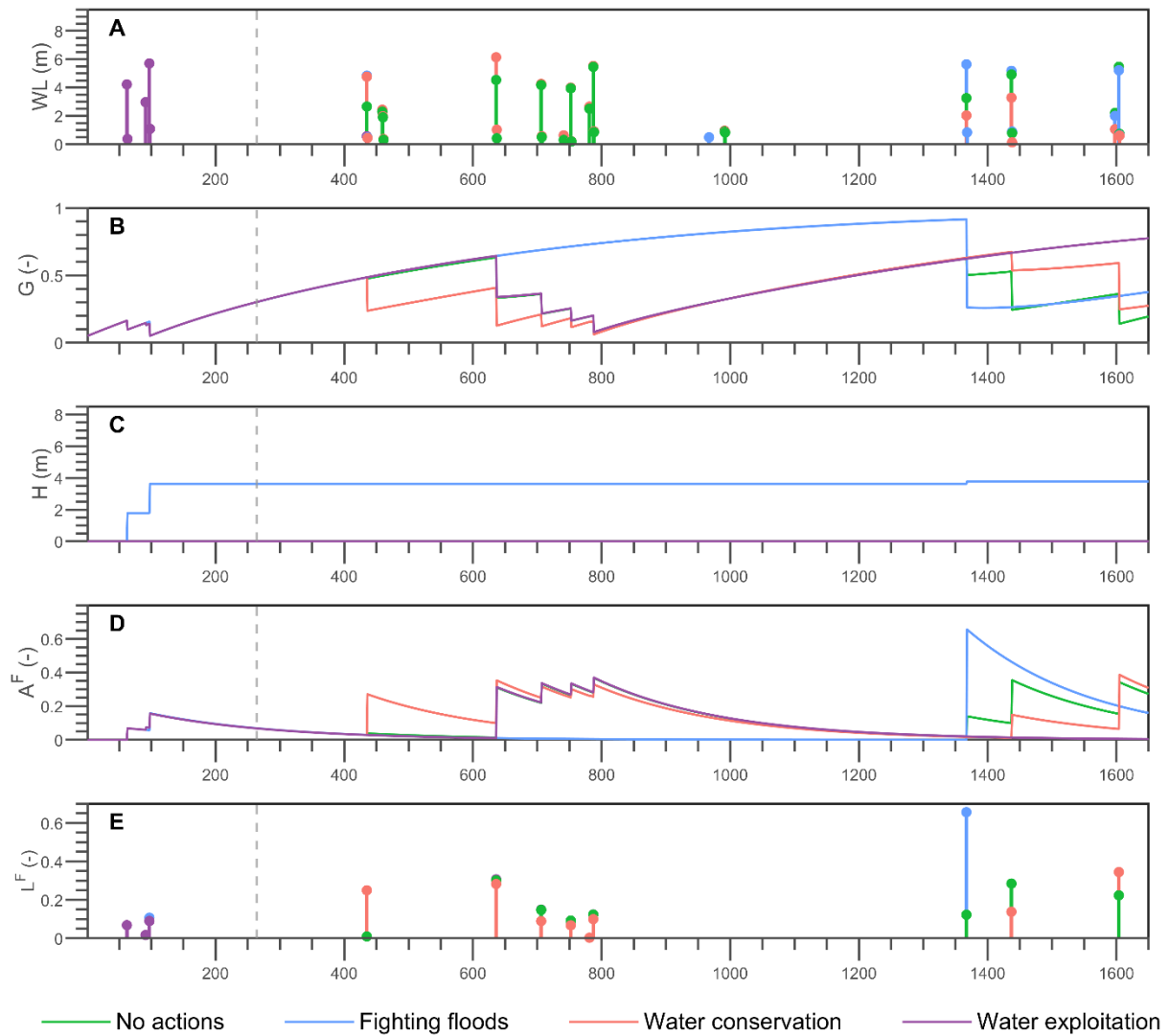


Figure A18. Flooding-based variables of the synthetic experiments additional scenario #5 considering dam construction and human-flood interactions with the four water management strategies introduced in this study. (A) Water level (WL), (B) proportion of population in floodplain (G), (C) levee height (H), (D) flood awareness (AF), and (E) flood losses (LF). The grey dashed line indicates the construction of the Wivenhoe Dam.

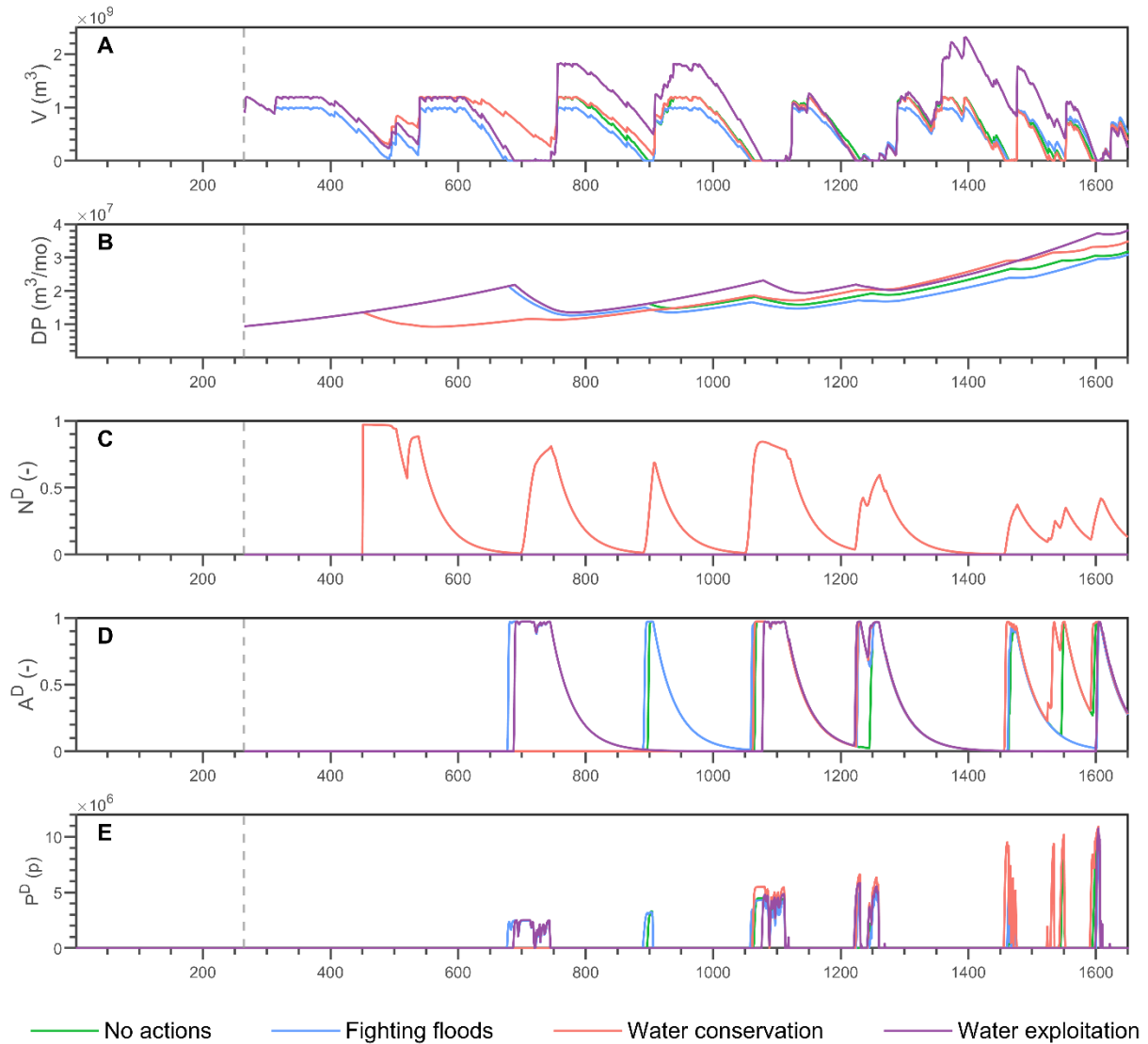


Figure A19. Water shortage-based variables of the synthetic experiments additional scenario #6 considering dam construction and human-flood interactions with the four water management strategies introduced in this study. (A) reservoir volume (V), (B) total water demand (DP), (C) willingness to the new per-capita demand (ND), (D) drought awareness (AD), and (E) population affected by droughts (PD). The grey dashed line indicates the construction of the Wivenhoe Dam.

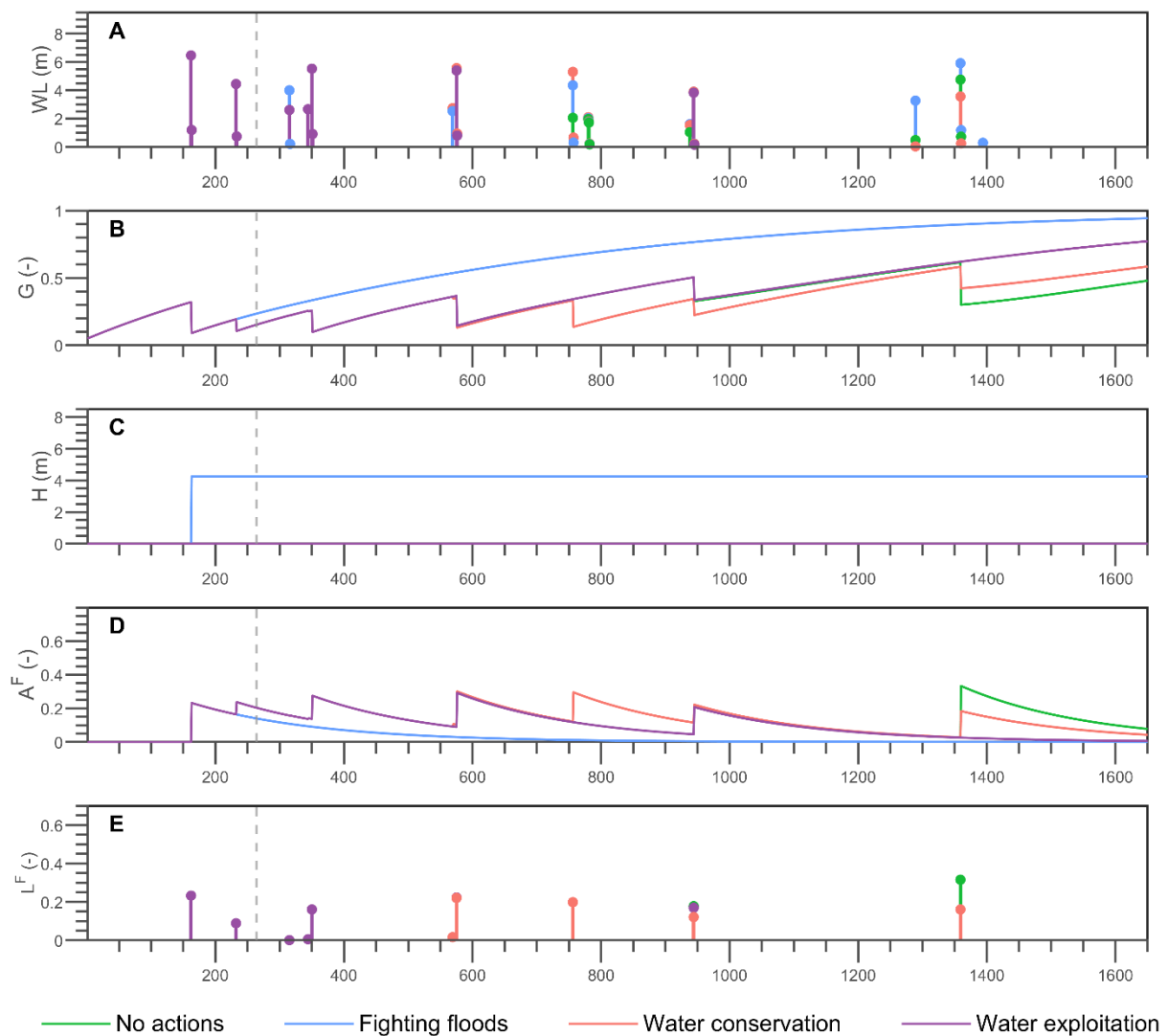


Figure A20. Flooding-based variables of the synthetic experiments additional scenario #6 considering dam construction and human-flood interactions with the four water management strategies introduced in this study. (A) Water level (WL), (B) proportion of population in floodplain (G), (C) levee height (H), (D) flood awareness (AF), and (E) flood losses (LF). The grey dashed line indicates the construction of the Wivenhoe Dam.

Mean values of model outcomes with the additional six river flow scenarios*Table A2. Average values of different model variables obtained for the synthetic experiment additional scenario #1 with dam construction and four water management strategies (NA: No Actions; FF: Fighting Floods; WC: Water Conservation; WE: Water Exploitation)*

Model variable	NA	FF	WC	WE
WL	2.27	2.36	2.59	2.44
V	$6.3 \cdot 10^8$	$5.1 \cdot 10^8$	$7.5 \cdot 10^8$	$7.2 \cdot 10^8$
D	202.90	198.49	151.63	203.52
G	0.31	0.65	0.29	0.33
H	0.00	3.97	0.00	0.00
A^F	0.13	0.02	0.14	0.12
A^D	0.27	0.28	0.23	0.24
L^F	0.16	0.18	0.10	0.16
L^D	0.81	0.83	0.83	0.80
P^F	$2.2 \cdot 10^5$	$3.2 \cdot 10^4$	$6.6 \cdot 10^4$	$1.3 \cdot 10^5$

Table A3. Average values of different model variables obtained for the synthetic experiment additional scenario #2 with dam construction and four water management strategies (NA: No Actions; FF: Fighting Floods; WC: Water Conservation; WE: Water Exploitation)

Model variable	NA	FF	WC	WE
WL	2.72	2.83	2.66	2.60
V	$6.9 \cdot 10^8$	$5.7 \cdot 10^8$	$7.8 \cdot 10^8$	$1.3 \cdot 10^9$
D	188.46	181.29	141.86	189.55
G	0.28	0.44	0.24	0.33
H	0.00	5.46	0.00	0.00
A^F	0.16	0.12	0.17	0.12
A^D	0.27	0.28	0.20	0.21
L^F	0.14	0.33	0.14	0.14
L^D	0.83	0.81	0.82	0.83
P^F	$2.3 \cdot 10^5$	$1.2 \cdot 10^6$	$2.4 \cdot 10^5$	$1.3 \cdot 10^5$

Table A4. Average values of different model variables obtained for the synthetic experiment additional scenario #3 with dam construction and four water management strategies (NA: No Actions; FF: Fighting Floods; WC: Water Conservation; WE: Water Exploitation)

Model variable	NA	FF	WC	WE
WL	2.54	2.62	2.43	2.47
V	$7.1 \cdot 10^8$	$6.0 \cdot 10^8$	$7.5 \cdot 10^8$	$1.1 \cdot 10^9$
D	172.09	166.36	149.75	176.23
G	0.30	0.56	0.31	0.39
H	0.00	4.39	0.00	0.00
A^F	0.15	0.09	0.15	0.11
A^D	0.25	0.27	0.20	0.20
L^F	0.13	0.51	0.16	0.14
L^D	0.81	0.80	0.80	0.76
P^F	$2.5 \cdot 10^5$	$2.9 \cdot 10^6$	$3.4 \cdot 10^5$	$2.1 \cdot 10^5$

Table A5. Average values of different model variables obtained for the synthetic experiment additional scenario #4 with dam construction and four water management strategies (NA: No Actions; FF: Fighting Floods; WC: Water Conservation; WE: Water Exploitation)

Model variable	NA	FF	WC	WE
WL	2.51	2.38	2.58	2.38
V	$6.4 \cdot 10^8$	$5.4 \cdot 10^8$	$7.7 \cdot 10^8$	$9.5 \cdot 10^8$
D	204.31	191.58	148.86	205.28
G	0.33	0.59	0.28	0.42
H	0.00	4.12	0.00	0.00
A^F	0.14	0.07	0.15	0.09
A^D	0.27	0.30	0.22	0.21
L^F	0.17	0.49	0.14	0.13
L^D	0.82	0.81	0.83	0.79
P^F	$3.3 \cdot 10^5$	$2.9 \cdot 10^6$	$2.6 \cdot 10^5$	$7.2 \cdot 10^4$

Table A6. Average values of different model variables obtained for the synthetic experiment additional scenario #5 with dam construction and four water management strategies (NA: No Actions; FF: Fighting Floods; WC: Water Conservation; WE: Water Exploitation)

Model variable	NA	FF	WC	WE
WL	2.35	2.33	2.30	2.23
V	$6.6 \cdot 10^8$	$5.5 \cdot 10^8$	$7.0 \cdot 10^8$	$9.7 \cdot 10^8$
D	158.13	156.91	122.83	161.08
G	0.35	0.55	0.35	0.42
H	0.00	3.48	0.00	0.00
A^F	0.13	0.08	0.12	0.09
A^D	0.25	0.26	0.19	0.19
L^F	0.13	0.28	0.13	0.12
L^D	0.67	0.68	0.67	0.69
P^F	$2.7 \cdot 10^5$	$1.2 \cdot 10^6$	$3.2 \cdot 10^5$	$9.6 \cdot 10^4$

Table A7. Average values of different model variables obtained for the synthetic experiment additional scenario #6 with dam construction and four water management strategies (NA: No Actions; FF: Fighting Floods; WC: Water Conservation; WE: Water Exploitation)

Model variable	NA	FF	WC	WE
WL	2.40	2.50	2.43	2.57
V	$6.7 \cdot 10^8$	$5.6 \cdot 10^8$	$7.1 \cdot 10^8$	$9.2 \cdot 10^8$
D	180.87	177.21	146.35	186.52
G	0.34	0.63	0.32	0.39
H	0.00	3.84	0.00	0.00
A^F	0.13	0.03	0.13	0.10
A^D	0.25	0.26	0.19	0.18
L^F	0.15	0.23	0.12	0.13
L^D	0.72	0.73	0.68	0.72
P^F	$2.4 \cdot 10^5$	$6.3 \cdot 10^4$	$1.4 \cdot 10^5$	$8.7 \cdot 10^4$