SUPPORTING INFORMATION:

Assessment of miscanthus yield potential from strip-mined lands (SML) and its impacts on stream water quality.

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The table S1 and table S2 show the inventory of surface mined lands under permit for mining activities and various stages of post-mining activities in the U.S. and the state of Ohio respectively from 1977 to 2012. The compiled data presented in these two tables were acquired from annual reports published by Office of Surface Mining Reclamation and Enforcement (OSMRE) until 2012 (https://www.osmre.gov/resources/annualReports.shtm). For the state of Ohio, the SML inventory data from 2013 to 2015 were acquired from Ohio Department of Natural Resources (ODNR) (http://minerals.ohiodnr.gov/portals/minerals/pdf/coal/).

Table A.1: Strip-mined lands stocks in the US from 1977 to 2012

Year	Annual stock of new permits issued (ha)	Annual stock of permit (ha)	Land area under phase I (ha)	Land area under phase II (ha)	Land area under Phase III (ha)/released strip-mined lands (ha)
2012	72,642	1,892,077	17,188	12,021	18,213
2011	64,011	1,875,923	18,363	13,149	14,305
2010	70,794	1,831,324	24,654	20,340	20,336
2009	86,185	1,784,955	20,961	17,045	15,511
2008	61,827	1,803,085	22,019	14,300	19,768
2007	85,674	1,870,753	24,811	19,803	20,690
2006	77,586	1,785,923	20,209	16,981	20,031
2005	32,619	1,747,944	22,422	12,717	21,247
2004	47,289	1,733,788	21,228	15,225	20,277
2003	46,038	3,188,726	22,765	20,230	24,551
2002	46,934	2,358,606	22,005	20,965	29,719
2001	44,014	1,778,098	30,434	33,243	33,139
2000	30,750	NA	22,653	18,561	25,535
1999	22,559	1,911,904	20,448	21,188	29,453
1998	35,058	1,800,923	30,232	28,885	34,977
1997	46,136	1,679,964	4,769	NA	32,910
1996	54,008	2,016,641	19,745	NA	19,745
1995	59,102	2,081,811	26,244	NA	26,244
1994	55,138	2,705,962	26,123	NA	26,123
1993	25,136	NA	406,848	NA	406,848
1977-1992	NA	NA	NA	NA	37,113
Total released strip-mined lands (Post-SMCRA law, 1977 till 2012)					896,736.44

Table A.2: Strip-mined lands stocks in the state of Ohio from 1977 to 2012

Year	Annual stock of new permit issued (ha)	Surface mining permit in a year (ha)	Total area disturbed (ha)	Area under phase I (ha)	Area under phase II (ha)	Area under Phase III/released strip-mined lands (ha)
2015	825	29,387	23,264	906	1,609	1,414
2014	1,939	30,720	23,930	1,262	2,288	1,521
2013	1,593	29,568	24,616	2,860	1,490	1,738
2012	1,427	32,428	24,653	927	715	1,036
2011	913	33,883	20,758	803	1,215	1,183
2010	1,246	34,591	20,758	1,054	879	1,432
2009	1,038	36,923	20,916	861	747	1,130
2008	2,432	38,984	20,909	1,447	1,077	1,085
2007	2,899	38,587	20,952	1,078	1,244	1,402
2006	2,038	37,401	20,462	1,136	1,785	1,490
2005	1,047	36,785	19,677	1,512	1,047	1,134
2004	2,115	37,247	NA	922	1,020	2,073
2003	885	37,162	NA	1,486	896	1,730
2002	1,684	35,142	NA	1,440	1,495	2,384
2001	3,259	40,445	NA	2,793	3,121	3,302
2000	3,134	43,603	31,666	1,111	1,262	3,062
1999	13,372	50,040	32,345	1,781	2,694	2,093
1998	6,181	50,810	32,018	2,650	3,672	2,339
1997	3,749	54,939	37,827	2,111	3,192	4,261
1996	3,050	54,992	37,004	1,176	789	946
1995	5,885	67,652	NA	NA	NA	3,304
1994	5,130	61,538	NA	NA	NA	3,289
1993	2,575	NA	NA	2,645	4,677	2,632
1977-1992	NA	NA	NA	NA	NA	2,718
Annual Average	2,975	41,492	25,735	1,522	1,758	2,029
Total released strip-mined lands (Post-SMCRA law, 1977)						48,700

Table S3: SWAT management inputs for annual and perennial crops

Crop rotations	Year No	Date	Operations	Inputs	Crop type
Corn-soybean crop rotation (annual)	1	April 15	Primary tillage (chisel plow)		Corn
	1	April 22	Fertilizer aplication	212 kg ha^{-1}, anhydrous ammonia	Corn
	1	April 24	Fertilizer aplication	67 kg ha^{-1}, P_2O_5	Corn
	1	May 2	Pesticide aplication	2.2 kg ha^{-1}, Atrazine	Corn
	1	May 5	Secondary tillage (offset disk plow)		Corn
	1	May 5	Planting		Corn
	1	October 14	Harvest		Corn
	2	May 10	Fertilizer application	56 kg ha^{-1}, P_2O_5	Soybean
	2	October 7	Harvest		Soybean
	2	November 1	Primary tillage (chisel plow)		Soybean
Miscanthus (perennial)	1	March 21	Herbicide application	3.5 kg ha^{-1}, Glyphosate	Miscanthus
	1	March 28	Primary tillage (Mould board plow)		Miscanthus
	1	March 30	Fertilizer application	115 kg ha^{-1}, urea	Miscanthus
	1	October 31	Harvest		Miscanthus
	2 to 20	April 15	Fertilizer application	*0/100/200 kg ha^{-1}, urea and 75 kg ha^{-1}, P_2O_5	Miscanthus
	2 to 20	October 31	Harvest		Miscanthus

*Miscanthus yield was simulated with 3 levels of nitrogen applications: No nitrogen, 100 kg ha^{-1} and 200 kg ha^{-1}

Table S4. Stream-flow, nitrogen and sediment parameters and minimum, and maximum values used for calibration period using the SWAT-CUP.

Parameter	Method†	Min. value	Max. value
Flow parameters			
CN2.mgt	r	-0.2	0.2
SFTMP.bsn	v	-20	20
SURLAG.bsn	v	0.05	24
SMTMP.bsn	v	-20	20
TIMP.bsn	v	0.01	1
ESCO.bsn	v	0	1
EPCO.bsn	v	0	1
SMFMX.bsn	v	0	20
SMFMN.bsn	v	0	20
CH_N2.rte	v	0	0.3
CH_N1.sub	v	0	0.5
CH_K2.rte	v	0	130
CH_K1.sub	v	0	300
ALPHA_BF.gw	v	0	1
GW_DELAY.gw	v	0	500
GWQMN.gw	v	0	2000
GW_REVAP.gw	v	0	0.2
GW_SPYLD.gw	v	0	0.4
RCHRG_DP.gw	v	0	0.2
REVAPMN.gw	v	0	500
ALPHA_BNK.rte	v	0	1
ALPHA_BF.gw	r	-0.1	0.1
SOL_AWC().sol	r	-0.2	0.4
SOL_K().sol	r	-0.8	0.8
SOL_BD(1).sol	r	-0.5	0.6
SNOCOVMX.bsn	v	0	500

†r means the existing parameter value is multiplied by (1 + a given value) and v means the existing parameter value is replaced by a given value.

Parameter	Method†	Min. value	Max. value
Nitrate (NO3 –N) parameters			
RCN.bsn	v	0	15
NPERCO.bsn	v	0	1
CDN.bsn	v	0	3
SDNCO.bsn	v	0	1
SHALLST_N.gw	v	0	1000
N_UPDIS.bsn	v	0	100
BC2_BSN.bsn	v	0.2	2
BC3_BSN.bsn	v	0.02	0.4
TRNSRCH.bsn	v	0	1
RS3.swq	v	0	1
HLIFE_NGW.gw	v	0	200
HLIFE_NGW_BSN.bsn	v	0	500
CMN.bsn	v	0.001	0.003
BC1.swq	v	0.1	1
BC2.swq	v	0.2	2
BC3.swq	v	0.02	0.4

Parameter	Method†	Min. value	Max. value
Sediment and Phosphorous parameters			
USLE_P.mgt	v	0	1
SPEXP.bsn	v	1	1.5
SPCON.bsn	v	0.0001	0.01
CH_COV1.rte	v	-0.05	0.6
CH_COV2.rte	v	-0.001	1
LAT_SED.hru	v	0	5000
SLSOIL.hru	v	0	150
USLE_P.mgt	r	-0.6	-0.1
USLE_K().sol	v	0	0.65
PRF_BSN.bsn	v	0	2
PSP.bsn	v	0.01	0.7
PHOSKD.bsn	v	100	200
PPERCO.bsn	v	10	17.5
ERORGP.hru	v	0	5

Table S5. SWAT input parameters included in the calibration process and their calibrated values and sensitivity statistics.

Variables	Parameters	Range	Calibrated values	t-stat	p-value
Flow	r__CN2.mgt	-0.2 - 0.2	-0.19	-19.91	0
	r__SOL_AWC().sol	-0.2 - 0.4	0.28	-13.54	0
	v__ALPHA_BNK.rte	0 - 1	0.57	-9.17	0
	v__CH_K2.rte	0 - 130	55.34	32.68	0
	v__CH_N1.sub	0 - 0.5	0.11	25.53	0
	v__CH_N2.rte	0 - 0.3	0.10	39.37	0
	v__GW_REVAP.gw	0 - 0.2	0.19	-3.98	0
	v__RCHRG_DP.gw	0 - 0.2	0.01	-8.95	0
	v__SFTMP.bsn	-20 - 20	-11.40	-18.17	0
Nitrate	v__ESCO.bsn	0 - 1	0.84	-2.76	0.005
	v__NPERCO.bsn	0 - 1	0.87	-1.81	0.07
	v__RS3.swq	0 - 1	0.58	-1.40	0.161
	v__NPERCO.bsn	0 - 1	0.86	-1.81	0.07
	v__CDN.bsn	0 - 3	1.02	0.94	0.34
	v__SMFMN.bsn	0 - 20	12.75	-1.23	0.21
	v__SDNCO.bsn	0 - 1	0.87	1.11	0.26
	v__TRNSRCH.bsn	0 - 1	0.54	-6.38	0
Sediment	v__GW_REVAP.gw	0 - 0.2	0.19	2.95	0.003
	v__LAT_SED.hru	0 - 5000	9.49	-66.6	0
	v__SNOCOVMX.bsn	0 - 500	255.63	2.42	0.015
	v__USLE_K().sol	0 - 0.65	0.05	-7.58	0