



## Supplementary

## A GIS-driven suitability analysis of crop resilience to climate change in Son La province, Vietnam

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### Supplementary

**Table S1** Fruit tree growing conditions used in mapping procedure

Crop type	Growing conditions	Highly suitable	Moderately suitable	Marginally suitable	Unsuitable
Mango	Annual average temperature (°C)	24–30	16–23; 31–37	10–15; 38–45	≤10; 46
	Accumulated average rainfall (mm)	890–1,015	1000–1200	500–750; 1,200–1,400	≤500; >1,500
	Average annual air humidity (%)	50–70	55–75	<55; >75	≤50; >80
	Soil type	Pbe; Pe; Hj,D	Fv, Fn, Fk, Fu, Fe, Fj	Fs, d, Fa, Fq, Fp, X	Other
	Slope (°)	2	4	6	>6
	Soil depth	>100	50–100	30–50	≤30
Longan	Annual average temperature (°C)	> 25	> 22–25	>20–22	<20; >40
	Accumulated average rainfall	>2,100–2,500	> 2,100–2,500	>1,700–2,100	<1,700; >2,500
	Soil type	Pbe, Pbc, Pe, Pc, Fk, Fu	Fp, X, Fs	Fp, Fq, B	Other
	Slope (°)	0–8	15–8	15–20	> 20
	Soil depth	<100	<70–100	>50–70	<50
Custard apple	Annual average temperature (°C)	22–24	25–28	29–34; <22–18	>34; <18
	Accumulated average rainfall (mm)	1,200–1,400	>1,400–1,800; <1,200–1,000	<1,000–800; >1,800–2,000	>34, <18
	Average annual air humidity (%)	75	<75–60; >80–85	20–60; >85–90	<20
	Soil type	Fv, Fn, Fj, Fq, Fs, Pbe, Pbc	Pe, Pc, Fk, Fu, Fp, X, Fs, Hk, Hu	Hv, Fa, Fq, B	Other
	Slope (°)	1–8	9–19	20–30	>30
	Soil depth (cm)	>80	<80–50	30–50	<30

B= Degraded grey soil on old alluvium, D= Valley soil formed by colluvial deposits, Fa= Red-yellow soil on acidic igneous rock, Fd= Red-yellow soil on basic and neutral igneous rock, Fk= Red-brown soil on basic and neutral igneous rock, Fu= Yellow-brown soil on basic and neutral igneous rock, Fe= Purple-brown soil on purple shale, Fn= Yellow- brown soil on limestone, Fv= Red-brown soil on limestone, Fj= Yellow-red soil on metamorphic rock, Fs= Red-yellow soil on clay rock, Fq= Light-yellow soil on sandstone, Fp= Yellow-brown soil on old alluvium, Hk= Dark red-brown humus soil on basic and neutral igneous rock, Hu= Dark yellow-brown humus soil on basic and neutral igneous rock, Hv= Dark red-brown humus soil on limestone, Hj= Red-yellow humus soil on metamorphic rocks, Pbe= Regularly replenished neutral to slightly acidic, Pbc= Regularly replenished acidic alluvial soil, Pe= Infrequently replenished neutral to slightly acidic alluvial soil, Pc= Infrequently replenished acidic alluvial soil, X= Grey soil on old alluvium

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**Table S2** Staple crop growing conditions used in mapping procedure

Crop Type	Growing conditions	Highly suitable	Moderately suitable	Marginally Suitable	Unsuitable
Maize	Annual average temperature (°C)	25–30	>30; >20–25	15–20	<15
	Accumulated average rainfall	> 800	700–800	600–700	< 600
	Soil type	Fv, Fn, Fj, Fq, Fs, Pbe, Pbc	Pe, Pc, Fk, Fu, Fp, X, Fs, Hk, Hu	Hv, Fa, Fq, B	Other
	Slope (°)	0–2	4–8	8–16	>16
	Soil depth	> 120	75–120	30–75	<30
Paddy rice	Annual average temperature (°C)	> 25–30	> 20–25	> 30, >15–20	<15
	Accumulated average rainfall (mm)	>2,000–2,500	>1500–2,000; >2,500	>1,300–1,500	<1,300
	Average annual air humidity (%)	50–70	55–75	< 55; >75	≤ 50; >80
	Soil type	Pb, Pf, Pg, Pe	B, Fl, Fp, Mi, D, Py	Fj, Fq, Fs, Fu, M, Mn, C, X	Other
	Slope (°)	0–3	3–8	8–15	>15
	Soil depth (cm)	> 100	> 70–100	>30–70	<30

B= Degraded grey soil on old alluvium, C = Coastal sandy soil, D= Valley soil formed by colluvial deposits, Fa= Red-yellow soil on acidic igneous rock, Fd= Red-yellow soil on basic and neutral igneous rock, Fk= Red-brown soil on basic and neutral igneous rock, Fu= Yellow-brown soil on basic and neutral igneous rock, Fe= Purple-brown soil on purple shale, Fn= Yellow- brown soil on limestone, Fv= Red-brown soil on limestone, Fj= Yellow-red soil on metamorphic rock, Fs= Red-yellow soil on clay rock, Fq= Light-yellow soil on sandstone, Fp= Yellow-brown soil on old alluvium, Fl= Altered red-yellow soil due to paddy rice cultivation, Hk= Dark red-brown humus soil on basic and neutral igneous rock, Hu= Dark yellow-brown humus soil on basic and neutral igneous rock, Hv= Dark red-brown humus soil on limestone, Hj= Red-yellow humus soil on metamorphic rocks, M= Moderately saline soil, Mi= Slightly saline soil, Mn= Highly saline soil, Pbe= Regularly replenished neutral to slightly acidic, Pbc= Regularly replenished acidic alluvial soil, Pe= Infrequently replenished neutral to slightly acidic alluvial soil, Pc= Infrequently replenished acidic alluvial soil, Pg= Gleyed alluvial soil, Pf= Alluvial soil with mottled yellow-red layers, X= Grey soil on old alluvium

**Table S3** Area changes (in square kilometers) under current and future climate change scenarios for mango, longan, custard apple, maize and paddy rice

		Area (km <sup>2</sup> )		% Change	
		Current (1970–2000)	SSP1-2.6 (2081–2100)	SSP3-7.0 (2081–2100)	SSP1-2.6 (2081–2100)
Mango	Unsuitable	2,280	1,470	878	+35.52
	Marginally suitable	12,188	12,924	13,261	+6.03%
	Moderately suitable	0	14	185	(Increase)
	Highly suitable	0	0	0	0
Longan	Unsuitable	5,970	4,332	2,403	-27.43%
	Marginally suitable	8,553	10,075	12,031	+17.79%
	Moderately suitable	0	0	0	0
	Highly suitable	0	0	0	0
Custard Apple	Unsuitable	653	612	669	-6.27%
	Marginally suitable	13,555	13,728	4,208	+1.27%
	Moderately suitable	291	103	9,529	-64.60%
	Highly suitable	0	0	0	0
Maize	Unsuitable	611	660.5	671	0%
	Marginally suitable	13,915	14,638.2	10,050	-1.3%
	Moderately suitable	0	0	3,691	0
	Highly suitable	0	0	0	(Increase)
Paddy Rice	Unsuitable	2,257	1,418	1,175	-37.17%
	Marginally suitable	12,207	13,037	13,189	+6.79%
	Moderately suitable	0	0	76	0
	Highly suitable	0	0	0	(Increase)