

Supporting Information

Table S1. The simulated data set, based on two assumptions with even ρ ($0.59, \text{ t m}^{-3}$) and randomly distributed ρ for constructing a pseudo stand population in a large region (10,000 stands, assuming *Eucalyptus*).

Stand no.	Area (ha)	V (m^3ha^{-1})	Homogeneous stands ($\rho = 0.59 \text{ t m}^{-3}$)				Heterogeneous stands ($\rho = 0.38 \sim 0.82 \text{ t m}^{-3}$)			
			ρ	Bs	Bt	Stand Bt	ρ	Bs	Bt	Stand Bt
			(t m^{-3})	(t ha^{-1})	(t ha^{-1})	(t)	(t m^{-3})	(t ha^{-1})	(t ha^{-1})	(t)
1	4.9	43.5	0.59	25.4	47.5	233.5	0.49	21.4	42.5	208.9
2	2.9	42.2	0.59	24.7	50.1	147.1	0.48	20.3	38.8	114.0
3	3.3	580.7	0.59	339.7	391.9	1280.2	0.57	331.4	447.7	1462.6
4	3.8	324.2	0.59	189.6	279.1	1053.8	0.52	168.9	272.7	1029.3
5	3.2	64.9	0.59	38.0	72.4	233.3	0.57	37.0	67.7	218.3
6	1.6	96.8	0.59	56.6	98.1	159.4	0.61	59.4	103.9	168.8
7	3.0	48.2	0.59	28.2	46.4	140.2	0.68	32.7	55.4	167.4
8	2.5	49.2	0.59	28.8	51.1	130.0	0.66	32.6	66.7	169.7
9	4.5	278.9	0.59	163.1	248.7	1116.9	0.63	175.1	256.3	1150.9
10	4.1	180.1	0.59	105.4	155.9	637.0	0.50	90.3	147.2	601.5
...
9999	4.2	168.9	0.59	98.8	158.3	661.6	0.57	95.8	143.6	600.1
10000	5.0	401.0	0.59	234.6	328.0	1638.3	0.53	213.4	320.1	1599.1
Total or average	30,127	197.8	0.59			5.19 (M t)	0.59			5.18 (M t)

The conditions for generating pseudodata are summarized as follows.

- a) Stand area: Generated under uniform distribution, ranging from 1 to 5 ha.
- b) V: Generated under negative exponential distribution, ranging from 10 to 600 $\text{m}^3 \text{ha}^{-1}$, $\lambda=3.0$.
- c) ρ : (1) Constant, 0.59 t m^{-3} . (2) Generated under normal distribution, expectation= 0.59 , standard deviation is 0.059 .
- d) Bs: Calculated using $Bs = \rho * V$
- e) Bt: Generated under normal distribution, expectation= $2.85 * Bs^{0.87}$, standard deviation is 5% of expectation.

The amounts of 5.19 and 5.18 million tons are two true values (Bt). These true values are used for comparing the estimates using different parameters of the volume-biomass equation. This pseudo dataset is employed as a forest population for sampling simulations, which include two designs of 20-plot-sampling and 100-plot-sampling.

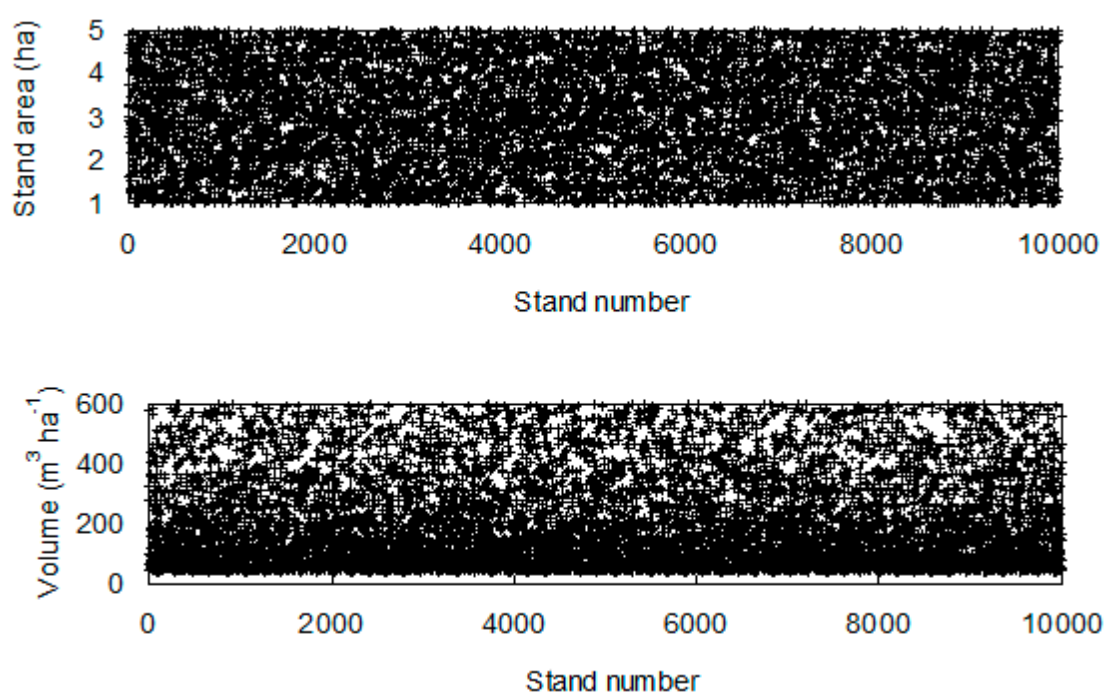


Figure S1. Simulated stands as a forest population for the model testing experiment. The stand number corresponds to the number in Table S1.

Table S2. Measurements of volume and biomass in China. The data include both measured volume and biomasses of each tree organs for 261 species at 1,607 field plots over the country. We screened all available 1056 measurements for calculating wood densities, and 803 measurements for building allometric equations of stem and total tree biomass. All data were collected from two published datasets (1) (2). The "No." in dataset (1) corresponds to "ID" in dataset (2) by row for convenient use.

Note: All data are available on request.

Item #	Item name
1	Data No. (total 1056)
2	Species 1
3	Species 2
4	Species 3
5	Species 4
6	Lat
7	Long
8	Mean annual temperature (d.c)
9	Mean annual precipitation (mm)
10	Mean DBH (cm)
11	Mean tree height (m)
12	Tree density (trees/ha)
13	Stand volume (m ³ /ha)
14	Stem biomass (t/ha)
15	Total biomass (t/ha, above- and below-ground)

Reference

Luo, Y., Wang, X., Zhang, X., & Lu, F. *Biomass and its allocation of forest ecosystems in China*, Chinese forestry publishing house, Beijing, 2013.