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Influence of green imbalance for carbon emission based on case analysis

Zhenjun Xu[a,b,*]

[a]*School of architectural engineer, Qingdao agricultural university, Qingdao 266109, China*
[b]*College of engineer, Peiking university, Beijing,100871, China*

Abstract

Low carbon planning of a national sustainable development of experimentation area, chengyang area qingdao city, was researched around the technology for controlling carbon emission resource, expanding carbon sink and town low carbon construction planning. The contribution of architectural layout to low carbon emission and the contribution of afforest to carbon sequestration capacity were studied. In addition, influence of afforest imbalance ratio for town carbon emission was researched in the paper. Results show that the quantity of carbon fixation and oxygen release was 623700 tons and 459200 tons per year in chengyang area. The reasonable architectural layout contribute to reduce 13200 tons of CO_2 emissions. The average fixed carbon quantity is about 0.46kg per square meter in urban area, about 4kg per square meter in outer suburb and mountainous area, accounted for about 70% of the total amount of carbon. There is serious imbalance phenomenon in the town greening. It is one of the conclusion that key point for greening should be changed from the high rate of greening to high-quality green rates, that is to increase the urban greening ratio and optimize its distribution.

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Keywords: imbalance load, thermal accumulation, zoning operation, load ratio

1. Introduction

More people lived in the centre of city than urban. Because high density buildings and population are in the centre, it is concentrations of carbon emission. At present, biomass method [1] is mainly carbon fixed accounting methods, Biomass is currently the most widely used method, its advantages are direct, clear, simple technology. While the volume method is a method to estimate the forest volume data based carbon. Biomass list method, is the ecological investigation and forest census data together. Forest biomass estimation using the conversion factor function [1], to calculate the bio carbon sequestration in the data under the condition of less. In order to study regular pattern of carbon emission, building layout, green planning are considered to calculate carbon reduction and carbon fixed.

2. Calculation Methods

The role of the forest ecological system in carbon cycle depends on biomass, forest products, plant litter and root debris, forest soil. Measurement method of forest carbon sequestration is the basic work to evaluation ecological benefits of forest carbon sink. Base on the measurement method, we can carry out forest carbon sequestration management and economic evaluation with the purpose of carbon sink. There are many measurement methods presented for calculating forest carbon sink by experts at home and abroad. Biomass method is the most widely used method, it's direct, clear and simple. The accumulation

* Corresponding author. Tel.:86-532-88030411
E-mail address:xuzhenjun@qau.edu.cn

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method is based on the data of forest reserves. Biomass accumulation is the method combines the ecological survey data and forest survey data. Forest biomass estimation adopts conversion factor continuous function method [11], it's able to calculate the amount of carbon sequestration with less data.

The regression equation for forest biomass estimation is:

$$B = aV + b \quad (1)$$

Where, B is the biomass per unit area(t/hm^2); V is the reserves per unit area(m^3/hm^2); a,b is the parameter.

Table 1 Model parameters for conversion of forest volume and biomass

species/tree species group	*a*	*b*
Pinups densflora	0.510	1.045
Pinus thunbergii、Japanese red pine、metasequoia	0.517	33.238
Cypress	0.613	46.145
China fir	0.400	22.541
Cryptomeria fortunei	0.416	41.332
Coniferous mixed	0.589	24.515
Quercus	1.145	8.547
Camphor, willow, Acacia	0.798	0.420
Hardwood	0.756	8.310
Softwood	0.475	30.603
Broad leaved mixed	0.839	9.416
Quotmixed coniferquot	0.714	16.915

Table 1 lists 12 groups forest stock and biomass conversion model parameters. Corresponding to 1 or more tree species/tree species groups. Tree species groups including the mixed conifer forest, mixed coniferous and broad-leaved mixed forest adopt the parameters of Zeng Weisheng [12]. Economic forest and shrub forest adopt the estimation method of Fang Deng. Economic forest : estimated by average biomass per unit area and total area, the average biomass per unit area adopts 23.70 t/hm^2. Bush: estimated by biomass per unit area multiply by the total area , the average biomass per unit area adopts 19.76t/hm^2. Adopting the average biomass per plant and total number to estimate bamboo grove, the average biomass per plant is 10.44kg.

Utilizing carbon fixation and oxygen release of tree species/tree species groups to calculate the C02 amount absorbed by forest ecological system. The plants produce carbohydrates such as glucose and releases O2 by photosynthesis. Photosynthesis equation:

$$CO_2(264g) + H_2O(108g) \rightarrow \text{Glucose}(180g) + O_2(192g) \rightarrow \text{Polysaccharide}(162g) \quad (2)$$

Forest absorb (fixed) 1.63t CO_2 to produce 1.00t dry matter, releasing 1.20t O_2 meanwhile. In dry state, the composition ratio between carbon, hydrogen and oxygen is about 15 from atomic level. The atomic weight of carbon is 12, the atomic weight of hydrogen is 1,the atomic weight of oxygen is 8 -- carbon occupies 50% of the total mass. Considering the relationship between total dry biomass and air dry biomass, we calculate carbon storage with the method of Liu Sheng [13]:

$$P = 0.5[(a - 0.04)M + b] \quad (3)$$

The quantity of economic forest, shrub forest and bamboo forest should reduce to 45% [14]in dry matter. Carbon fixation is 1.63 times to carbon storage ,while oxygen released is 1.20 times to carbon storage. There are some important indexes in forest dynamic analysis-- forest area, dynamic forest area of volume , and the amount of volume.

Table 2 Vegetation statistics of Chengyang District

tree species group	*forest coverage (hm^2)*	*Forest volume (10,000m^3)*	*Biomass (10,000t)*
Pinups densflora	1245.084	15.293	7.930