Estimating Land Values

by Ted Gwartney
Arden, Delaware
July, 1999

Contents

- Ground Rent Capitalization
- Subdivision Development
- Land Value Maps
- Computer Estimated Land Values

The Source of Public Revenue

- Environmental Preservation
- Efficiency of Public Revenue
- How Much Land Rent Should the Community Collect?

THE NATURE OF LAND AND NATURAL RESOURCES

Characteristics of Land

Land, in an economic sense, is defined as the entire material universe outside of people themselves and the products of people. It includes all natural resources, materials, airwaves, as well as the ground. All air, soil, minerals and water is included in the definition of land. Everything that is freely supplied by nature, and not made by man, is categorized as land.

Land holds a unique and pivotal position in social, political, environmental and economic theory. Land supports all life and stands at the center of human culture and institutions. All people, at all times, must make use of land. Land has no cost of production. It is nature's gift to mankind, which enables life to continue and prosper.

Land's uniqueness stems from its fixed supply and immobility. Land cannot be manufactured or reproduced. Land is required directly or indirectly in the production of all goods and services. Land is our most basic resource and the source of all wealth.

Land rent is the price paid annually for the exclusive right (a monopoly) to use a certain location, piece of land or other natural resource. People receive wages for work, capital receives interest for investment, and land receives rent for the exclusive use of a location. Equity and efficiency require that the local general public, who created land value, should be paid for the exclusive use of a land site. That Payment is in the form of a land tax.

When considering world-wide economics, most people think that land rent contributes only a small insignificant portion of value. But as societies progress, land has become the predominant force in determining the progress or poverty of all people within a community. Land in major or cities is so costly that people are forced to move further away and travel great distances in order to get to work and social attractions. In the more developed countries of the world, land rent represents more than 40% of gross annual production.

Since land is fixed in supply, as more land is demanded by people the rent will increase proportionally. Demand is the sole determinant of land rent. Changes in land rent and land taxes have no impact on the supply of land, because the land supply is fixed and

cannot be significantly expanded. Labor and capital are variable in supply. A higher price for commodities causes more labor and capital to make itself available. Labor and capital are rewarded for their work. A high price is an incentive to work harder and longer, while a low price is not an incentive to work harder and longer.

The rent of land, however, serves no such incentive function, because the supply of land is fixed. The same amount is available no matter how high or low the price. Buildings are not a part of land rent. Land rent results from the desire made by everyone who lives within a community to use land. Economic rent is the only source of revenue that could be taken for community purposes without having any negative effect on the productive potential of the economy. Economists consider rent to be a surplus payment which is unnecessary to ensure that land is available. When a community captures land rent for public purposes, both efficiency and equity are realized.

The economic market rental value of land should be sufficient to finance public services and to obviate the need for raising revenue from taxes, such as income or wage taxes; sales, commodity or value-added taxes; and taxes on buildings, machinery and industry. Public revenue should not be supplied by taxes on people and enterprise until after all of the available revenue has been first collected from the natural and community created value of land. Only if land rent were insufficient would it be necessary to collect any taxes.

The collection of land rent, by the public for supplying public needs, returns the advantage an individual receives from the exclusive use of a land site to the balance of the community, who along with nature, contributed to its value and allow its exclusive use.

LAND RENT COMPARED WITH MARKET VALUE

Land Market Value is the land rental value, minus land taxes, divided by a capitalization rate. (1) Each of these terms is defined as follows:

1. Land Rental Value is the annual fee individuals are willing to pay for the exclusive right to use a land site for a period of time. This may include a speculative opportunity cost.
2. Land Taxes is the portion of the land rental value that is claimed for the community.
3. Capitalization Rate is a market determined rate of return that would attract individuals to invest in the use of land, considering all of the risks and benefits which could be realized.
4. Land Market Value is the land rental value, minus land taxes, divided by a capitalization rate.

The mathematical relationship is then:

$$\textbf{Land Market Value} = \frac{\text{Land Rental Value - Land Taxes}}{}$$

$$\textbf{Land Rental Value} = \text{Market Value} \times \text{Capitalization Rate} + \text{Land Taxes}$$

For example, assume that the land rent for a site is $1,800, the land taxes are $300 and the capitalization rate is 6%, what would the land market value be?

$$\textbf{Land Market Value} = \frac{\text{Land Rental Value - Land Taxes}}{\text{Capitalization Rate}}$$

$$\textbf{Land Market Value} = \frac{\$1,800 - \$300}{6\%} = \frac{\$1,500}{6\%} = \$25,000$$

What would result if a larger portion of the land rent were collected? Let's consider $1,650 rather than $300.

$$\textbf{Land Market Value} = \frac{\$1,800 - \$1,650}{6\%} = \frac{\$150}{6\%} = \$2500$$

If any three factors are known, the fourth can be calculated. The term land rental value can be used instead of market value, or vice versa, in the discussion of land assessment systems.

If only a small amount of land rent remained to be capitalized after land taxes were collected, land could have a lower market value. It would, however, continue to have the same rental or productive value to the community

Not only is land rent a potentially important source of public revenue, the tax on land is a means of limiting excessive speculation in land prices. This would ensure that the equal opportunity to be productive would be available to all citizens. With limited money to invest, people could invest in productive equipment and wages, rather than in high land prices which produce no additional tangible wealth.

The formula indicates how simple it would be to translate market value to rental value or vice versa, depending upon the policy of any nation. In the United States and most other countries, land values are estimated and assessed. Land taxes, however, are a portion of land rent. The balance of this paper will explain how land values are estimated.

PRINCIPLES OF LAND ASSESSMENT

An appraisal is essentially an expert opinion of the market value of a site; the assessor must present one that is supportable and comprehensible. The assessor must develop and use specific terminology suitable and pertinent to land appraisal.

Land is the entire non-reproducible, physical universe, including all natural resources. A land site includes everything within the earth, under its boundaries and over it, extending infinitely into space. In addition to a location for a house or building, a land site would include the minerals, water, trees, view, sunshine and air space. The shape of the site can

be described as an inverted cone with its apex at the center of the earth and extending upward through the surface into space.

In appraisal, a *land site* is a parcel of land that is finished and ready for use under the standards prevailing in its area. It might have the necessary public utilities in place, like gas, electricity, water, telephone and sewer, with streets, sidewalks drainage and grading completed.

The *assessment process* is essentially the valuation of rights to use or possess land sites. Other kinds of rights include subsurface mineral rights, riparian (water) rights, grazing rights, timber rights, fishing rights, hunting rights, access rights and air rights.

The assessor bases his estimate of land market value upon basic economic principles which serve as the foundation of the valuation process. There are many economic principles which people and assessors must understand and use when implementing judgment to estimate land market values. It is necessary to discuss a few of the more important principles.

The principle of *substitution* maintains that the value of a property tends to be set by the price that a person would have to pay to acquire an equally desirable substitute property, assuming that no expensive delay is encountered in making the substitution. A person would pay no more for a site than would have to be paid for an equally desirable site.

The principle of *supply and demand* holds that the value of a site will increase if the demand increases and the supply remains the same. The value of the site would decrease if the demand decreased. Land is unique, since the supply is fixed; its value varies directly with demand.

The principle of *anticipation* contends that land value can go up or down in anticipation of a future event occurring, or a future benefit or detriment.

The principle of *conformity* contends that land will achieve its maximum value when it is used in a way that conforms to the existing economic and social standards within a neighborhood.

UTILITY, SCARCITY AND DESIRABILITY

Land value can be thought of as the relationship between a desired location and a potential user. The ingredients that constitute land value are utility, scarcity and desirability. These factors must all be present for land to have value.

Land that lacks utility and scarcity also lacks value, since utility arouses desire for use and has the power to give satisfaction. The air we breathe has utility and is generally considered important, since it sustains and nourishes life. However, in the economic sense, air is not valuable because it hasn't been appropriated and there is enough for everyone. Thus there is no scarcity -- at least at the moment. This may not be true in the

future, however, as knowledge of air pollution and its effect on human health make people aware that clean and breathable air may become scarce and subsequently valuable.

By themselves, utility and scarcity confer no value on land. User desire backed up by the ability to pay value must also exist in order to constitute effective demand. The potential user must be able to participate in the market to satisfy their desire.

LIMITATIONS ON LAND OWNERSHIP AND USE

While land is the gift of nature, certain legal, political and social constraints have been imposed in most societies throughout the years. Every nation imposes certain public limitations on land ownership and use for the common good of all citizens. Four forms of governmental control include:

1. *Taxation* -- Power to tax the land to provide public revenue and to return to the community the costs incurred to pay for the various public benefits, services and environmental protection, which are provided by the government;
2. *Eminent Domain* -- Right to use, hold or take land for common public uses and benefits;
3. *Police Power* -- Right to regulate land use for the welfare of the public, in the areas of safety, health, morals, general welfare, zoning, building codes, traffic regulations and sanitary regulations;
4. *Escheat* -- Right to have land revert to the public's agent, the government, when taxes are not paid or when there are no legal heirs.

FACTORS THAT CONTRIBUTE TO LAND VALUE

The *physical attributes* of land include quality of location, fertility and climate; convenience to shopping, schools and parks; availability of water, sewers, utilities and public transportation; absence of bad smells, smoke and noise; and patterns of land use, frontage, depth, topography, streets and lot sizes.

The *legal or governmental forces* include the type and amount of taxation, zoning and building laws, planning and restrictions.

The *social factors* include population growth or decline, changes in family sizes, typical ages, attitudes toward law and order, prestige and education levels.

The *economic forces* include value and income levels, growth and new construction, vacancy and availability of land. It is the influences of these forces, expressed independently and in relationship to one another, that help the people and the assessor measure value.

HIGHEST AND BEST USE OF LAND

A land site should be made available to the users who can make the highest and best effective use of the site and maximize the site benefits for all people. The proper system of assessment and taxation of land can provide for the proper economic use of the land. A high land tax on an improperly improved site tends to cause the site holder to either better improve his site to obtain greater return with which to pay the land tax, or to look for someone else with the means to properly improve the site. A land tax can also provide the source of public revenue which the local governing body could use for the benefit of all people. Before an assessment can proceed, the highest and best use must be determined for each site.

The economics of production should provide the atmosphere for the most efficient use to be made of all land. The assessment process is based on the highest, best and most profitable use of land. The highest and best use considers only the uses that are *legally permissible* (meeting zoning, health, and public restrictions), *physically possible* (has adequate size, soil conditions, and accessibility), and is *economically feasible* (income is anticipated). The use that meets these criteria and produces the *greatest net earnings* (best returns) is the highest and best use.

PROCEDURES FOR LAND ASSESSMENT

An assessment (or an appraisal) is essentially an opinion of value made by an experienced knowledgeable person. Specialists are known as assessors who base their estimate of land market value, upon basic economic principles which serve as the foundation of the valuation process. Anyone can learn how to do this and learn to do it better.

The assessment or appraisal process is an organized procedural analysis of data. This procedure involves six specific phases, each of which contains numerous procedures.

1. Defining the Assignment

The goal is to estimate the market value of all land sites within a given district. This will include manufacturing enterprises, apartments, commercial enterprises, single family home sites, government land, farms and all other land and natural resources of various descriptions.

The assessor should be able to support his estimate of land market, both in discussion and in writing. The assessor must define and use specific terminology suitable and pertinent to land appraisal. Economic Land Rent was defined as the value paid or imputed for the exclusive right to use a land site location or natural resources for a period of time, generally one year.

2. Determining the Data Required and Its Source

A land market assessment system is based upon data related to land attributes. These data generally include maps; aerial photographs; descriptions of physical characteristics like

size, shape, view and topography; permitted uses; economic usefulness; present uses; available utilities; proximity to town centers or employment; and site improvements like streets, curbs, gutters, sidewalks and street lights. Governments have much of this data available in the different agencies.

How are values or acquisition fees currently being determined and paid by land occupiers? Are records being maintained for the values or fees that are currently being paid by land occupiers? If land market values have been estimated in the past, attempts should be made to build upon the existing systems while making constant improvements to data collection.

3. Collecting and Recording the Data

Most governments do not have all of this information available in a single data base capable of analysis. Assessors must determine; 1) what land data and valuation systems currently exist, 2) how effectively they operate, 3) how to build upon and improve these systems and 4) how to implement procedures for collecting additional data to improve the estimates of land values.

If no effective land revenue systems are in place they can be created in a manner similar to the following. Assessors should ascertain what land data presently exists and how it could be assembled for use in a land valuation system. They should collect and maintain the data needed from any existing records even though it is not currently stored in a single source. They should determine what additional data would be valuable and from what sources it can be obtained. They should develop procedures for collecting any additional data required to determine land market values and the data should be collected for the differences in characteristics for each site.

The assessor may train a small team to find and record the additional desired data. The data should be displayed in a useful manner such as on a land market value map or a computer printout. In an area with no systems or data in place, simple relationships could be drawn for permitted use (zone), distance to amenities (location), physical characteristics (size, topography, view, and so on) and other significant factors. Data could be collected and analyzed on a neighborhood and type of potential use basis.

Conversations with residents and businessmen could help to define the parameters which people in the local community use to determine favorable land location. An interview might reveal that the distance to transportation, such as a river, roadway or public transportation, weighs greatly in people's minds. Or, other factors may predominate, such as homogeneity of a neighborhood or distance to shopping and schools. Planners, government officials, real estate agents, appraisers and others involved in real estate may also provide useful data.(2)

Even if no land sales or market evidence exists, the specific factors which influence land market value are well understood by most people in any area, even in primitive cultures.

The assessor's job is one of skillfully determining the relative priorities identified by local people.

A sample of typical and varied land sites within a city could be selected to demonstrate a land valuation system. Based upon a study, land market values could be assigned by a competent assessor. The assessor could use a few people trained to collect and analyze existing data, then analyze the sample survey data and set standards for the base market values in the area. The difference in market value of the attributes that enhance or detract from a typical site could be added or subtracted to the base market value for the other sites in the study. These features should be recorded on the land market map, which would show the primary sites with markets declining as desirability decreases or increasing as desirability increases.

Several examples of land assessment systems will be discussed in this paper, from a simple example with no significant land data, to a more complex example with plentiful land data. The methods employed will depend upon the land market data that currently exists and how that data can be assembled for use in a land assessment system.

4. Verifying the Data

Since the appraisal process is an opinion of market value that is not based upon the personal experience of the assessor, the data collected should be verified with two different sources. Market data should be verified with a person directly involved in the transaction. For example, one party could be the selling agent representing the responsible for the sale. Another party could be the site user who agrees to the sale amount. Additional sources might be government land agents or officials who have first hand knowledge of the sale. Inaccuracies can also be brought to light by concerned citizens if the data is made available to the public.

5. Analyzing and Interpreting the Data

The balance of this report will be concentrated on various methods of analyzing and interpreting land market data. Several methods will be suggested to secure the goal of estimating the market value of all land sites.

6. Estimating the Market Values

Once the analysis has been concluded, it will be possible for the assessor to make a rational estimate of the market value of every land site. This estimate will serve as the basis for the value that will be paid by a site user for the exclusive use of a location (site). The assessor would assign preliminary land value estimates based upon the comparative estimated usefulness and desirability of the sites. Initially, they could accomplish this task in a general manner, with the understanding that refinements would be made to reflect new information and public opinion.

7. Public Examination and Analysis of the Land Market Values

The preliminary land value assessment, estimated for each site, could then be displayed on a land market map. Public examination and analysis of the land market values for land sites would help to clarify any errors in assessments. People who occupy land acquire skills in noticing slight differences in land characteristics. They can explain to the assessor why and how differences should be reflected in the conclusions about land values.

Once an adequate sample survey has been completed and had favorable public review, the result can be used throughout the total area. These sample data results could be used to estimate the comparative markets of each land site.

To ensure the optimal and equitable use of land sites, land assessments should reflect the attitudes of the individuals who can make the highest and best use of the site, who would be willing to pay more than individuals with inferior uses in mind. Those neither requiring nor willing to pay the land taxes for a superior site would use another site that met their needs, desire and budget, thus making it available for others who can pay for the better site.

8. Periodic Updating of Assessments

Land market values tend to increase each year at a rate usually greater than inflation. Building values tend to decline each year, because of a wearing out of the physical structure or its functional desirability. If assessments are not maintained on a regular basis (annually) land will become greatly under-assessed and buildings will be over-assessed in only a few years.

METHODS USED TO ASSESS LAND VALUE

Three Approaches to Valuing Real Estate

Valuation of the land involves first determining the highest and best use of the site, estimating the value by current appraisal theory, and reconciling to a final estimate of value.

The first step in the valuation of land is determining the highest and best use of the site. The four criteria that highest and best use must meet are: physically possible, legally permissible, financially feasible, and maximally productive. Two types of analyzes are made in determining the highest and best use. The first is the highest and best use of the site, if vacant; the second is the highest and best use of the site as improved, or if undeveloped as proposed to be improved.

There are three standard approaches to estimating market value that form the foundation for current appraisal theory: the *cost approach*, the *sales comparison approach* and the *income approach*.

The cost approach is based upon the principle that the informed purchaser would pay no more than the cost to produce a substitute property with the same utility as the subject property. It is particularly applicable when the property being appraised involves relatively new improvements which represent the highest and best use of the land or when relatively unique or specialized improvements are located on the site and for which there exists no comparable properties on the market.

The sales comparison approach utilizes prices paid in actual market transactions of similar properties to estimate the value of the site. This appraisal technique is dependent upon utilizing truly comparable market or sales data which have occurred near enough in time to reflect market conditions relative to the time period of the appraisal. This method could also be used to estimate the rental value.

The income capitalization approach is widely applied in appraising income-producing properties. Anticipated present and future net operating income, as well as any future reversions, are discounted to a present worth figure through the capitalization process. This approach also relies upon market data to establish current market values and expense levels to arrive at an expected net operating income.

The resulting indications of value from the three approaches to value are correlated into a final estimate of value for the site. It is not always possible or practicable to use all three approaches to value. The nature of the property being appraised, and the amount, quality, and type of data available dictate the use of each of the three approaches. Variations of the three approaches to value can be devised. Several will be presented in this paper.

Specific Methods Used in Appraising Land Value

In the valuation process the land value estimate is a separate step accomplished by applying either sales comparison or income capitalization techniques. The most reliable way to estimate land value is by sales comparison. When few sales are available or when the value indications produced through sales comparison require substantiation, other procedures may be used to value land. In all, seven procedures can be used to obtain land value indications.

1. *Sales comparison* -- Sales of similar, vacant parcels are analyzed, compared, and adjusted to provide a value indication for the land being appraised.
2. *Proportional Relationship* -- Relating a site to a known standard site. The difference can be expressed as a percentage. This procedure can be used when their is little value evidence in existence.
3. *Land Residual Technique* -- It is assumed that the land is improved to its highest and best use. All operating expenses and the return attributable to other agents of production are deducted, and the net income imputed to the land is capitalized to derive an estimate of land value.

4. *Allocation* -- Sales of improved properties are analyzed, and the prices paid are allocated between the land and the improvements.
5. *Extraction* -- Land value is estimated by subtracting the estimated value of the depreciated improvements from the known sale price of the property.
6. *Ground Rent Capitalization* -- This procedure is used when land rental and capitalization rates are readily available, as in well-developed areas. Net ground rent -- the net amount paid for the right to use and occupy the land -- is estimated and divided by a land capitalization rate.
7. *Subdivision Development* -- The total value of undeveloped land is estimated as if the land were subdivided, developed, and sold. Development costs, incentive costs, and carrying charges are subtracted from the estimated proceeds of sale, and the net income projection is discounted over the estimated period required for market absorption of the developed sites.

With the appraisal process and the approaches to value understood, it is appropriate to consider the methods and procedures used to analyze and interpret the land data. The choice is based upon what data is available, its reliability and usefulness in making a value estimate.

SALES COMPARISON

This is the best method to use when appropriate data is available. This example is based upon estimating land market data for a large district based upon a limited occurrence of market sales but with data available on various site characteristics for all properties. This is based upon the actual site data and sales evidence within the assessed district.

For 12 years, the author was the Assessment Commissioner for the Province of British Columbia, Canada. During this time, significant data was collected for each parcel of land. This enabled a more detailed analysis of land value and the development and use of land valuation systems. Computer programs were written that allowed the annual update of land values.

The assessment profession has benefitted from the existence of land valuation rules based upon previous analysis. The basic intent is to provide a means of measuring and applying a rule of valuation by sales comparability for assessment purposes.

The land market is not a perfect market, but is made up of the expressions of all different types of persons in terms of money in relation to potential land use. The assessor uses market sales and site data to estimate what value would be paid for a site, assuming a competitive market, involving knowledgeable people who are typically motivated and acting in their own best interest.

Standard Units of Measure

Land markets can be estimated on the basis of a certain value per unit and the unit is often one of the following:

1. Per Dwelling Unit site
2. Per square-foot
3. Per acre
4. Per front-foot

The selection of the most appropriate unit, or combination of units, is important. It is a decision which can only be made after a careful analysis of the market and the available data.

Land is not always sold on the same basis, but rather on the value in the eyes of the user. No amount of mathematics can override the main objective of achieving fair economic value, as reflected by market behavior. This relegates the unit of measure to the role of a means to an end. The measure can be used to assist in the interpretation of market evidence for a few sites (the sample), so that all of the sites can be properly estimated (the population).

The choice of a particular Unit of Measure will be dictated by expediency. For example, the user of a condominium Dwelling Unit will share the use of a large site, but a certain air space will belong to them and command a different market value due to height, access, view and preference. In urban land valuation, many of the sites to be valued will be of similar sizes and arranged in more-or-less orderly rows on streets, avenues, boulevards and cul-de-sacs. Many will be of identical size with minor departures arising from topography and shape. The assessor will probably wish to adopt a standard site value, which includes the majority of sites, for the particular area under review -- standard both as to probable market value and to characteristics.

The standard residential site may respond well to a value *Per Dwelling Unit Site*. A commercial use may be better estimated by using a value *Per Square-Foot* or *Per Front-Foot*. A farm or rural site may be better estimated by using a value *Per Acre*. Once the market value per unit of measure has been established for the standard site representative of the area, the value will become a base to which all other sites can be compared.

Adjustments will have to be made for differences between the standard site and every other site. The assessor will want to study the typical differences and make individual refinements. There may be reasons for an increase in value for characteristics which are better than the standard site. They would make a positive adjustment for desirable characteristics, such as superior location, view, topography, services or access.

There can also be reasons for loss of value for characteristics which are inferior to the standard site. They would make a negative adjustment for undesirable characteristics, such as poor location, longer distance to transportation, longer distance to the civic center, wet ground in the winter, over-abundance of rock or poor access

Site valuation may be summed up in the manner of a Unity Rating which will be X% greater or lesser than unity (1.0) when compared with the base standard site characteristics adopted for tile area.

Standardized Adjustments

A standardized method is the application of the comparative method to land markets under review. Adjustments are made for divergences from the standard site by the use of a specific set of rules. The most common examples are those used for distance and size. The methods were born out of the necessity to produce sound and impartial market estimates in a limited amount of time recognizing the accepted principles of valuation.

It is essential to use discretion and judgment and only treat standardized methods as guides. The use of formulas should be the result of local market analysis and testing. Sales are sought that are similar except for the one difference that is being analyzed. A value for this difference will result. The main virtue of the method is its administrative adaptability, permitting land markets to be estimated on the basis of strict comparability. Mistakes become more easily detectable, particularly in cases of errors of judgment and mathematics.

Following is an example of an adjustment grid and tile procedures which are commonly used to estimate site value after considering all differences. This shows how market values increase or decrease due to distance, size, frontage and other important characteristic differences.

Per Dwelling Unit Site -- Sale evidence will frequently indicate that minor variations in sites, whether frontage or size, have little effect on markets. The assessor could select the standard Dwelling Unit site, both as to location and market. They would proceed to make judgment decisions in relating the other sites to the site that was selected as the standard site--rating them as standard, superior or inferior. An individual site could have some characteristics that are superior and others that are inferior. The per Dwelling Unit site method is useful in the valuation of apartments and homes. It may also be combined with the use of another method such as the per square-foot method.

Adjustments for Unique Features

After the base value has been estimated, the individual sites must be considered. Some sites have unique advantages or disadvantages compared to other sites. Actual real estate market values vary for each site and are dependent upon numerous individual features, qualities, characteristics and restrictions such as:

location	**zoning**	**site**	**access**
utilities	**use density**	**view**	**frontage**
topography	**river**	**transportation**	**parks**
traffic	**regulations**	**noise**	**utilities**

People would tend to be willing to pay additional value for a land site with special advantages and would pay less value for a land site with disadvantages. The market value for the unique differences would be determined by how much more or less site users in general were willing to pay for those features. This market difference must be determined for each significant variable feature.

The difference can then be converted to an adjustment of value. For example, if a site were better than the standard in a district because of distance to downtown of 5% ($4.000), site size of 5% ($4,000), location of transportation 10% ($8,000) and convenience of recreation of 5% ($4,000), the site being appraised would be 25% ($20,000) superior to the standard site. In reality most sites have many small differences both positive and negative from a standard site.

SALES ADJUSTMENT GRID

Per dwelling unit site

VARIABLE	=	STANDARD	>	SUPERIOR	<	INFERIOR
Base Value - $		$80,000		$80,000		$80,000
Downtown - miles	5	0	3	+ 4,000	7	- 4,000
Size - square feet	10,000	0	12,000	+ 4,000	8,000	- 4,000
Transport - blocks	3	0	1	+ 8,000	6	- 6,000
Recreation - blocks	6	0	3	+ 4,000	10	- 3,000
Adjusted value - $		$80,000		$100,000		$63,000

Per Square-Foot -- The value per square-foot unit of measure has application in estimating value for commercial and industrial lands where the applied rate will be more constant over the entire site. The size of the site limits or enhances the use and market value of a site. The application of a market value per square-foot to residential lands is not common.

Per Acre -- Beyond the limits of the urban area, there will be those parcels that are so much larger that they will not respond well or at all to dwelling unit site value, a square-foot or front-foot unit measure. Where these larger parcels are the norm, the unit of measure can best be expressed as a value per acre. The adjustment factors would be completely different however. They might relate to agricultural benefits, such as soil fertility, distance to markets or water supply.

Per Front-Foot -- This method has been useful in the downtown portion of intensely developed cities where people pay a premium for exposure to customers. For those sites that are not identical to the standard site, it will be necessary to make appropriate adjustments for variations in width, depth and other attributes that differ from the standard site. The total departures from standard front-foot market can be expressed as an

adjusted frontage. It is against this adjusted frontage that the adopted front-foot value will be applied.

There is a principle of commerce that commodities are cheaper by the dozen. By the same token it could be that frontage feet are cheaper per unit when the total exceeds the average, or standard width. A width table is a series of percentage adjustments greater or less than 1.0 needed to adjust the actual Market per Front-Foot of any site and equate it to the Front-Foot value of the adopted Standard Site.

PROPORTIONAL RELATIONSHIP

One method to secure a land assessment system, when sales or rental data is unavailable, is to make an estimate of value based upon the experience in other locations where land data already exists. This is a variation on the Sales Comparison method. It could be used to measure land market value or the rental value of land.

Adjustments for Use and Location

If a jurisdiction has very limited land data, such as permitted use (zoning) and density of population, but no assessment system, it might be possible to build a simple model. An assessor might draw a grid, showing the potential use on the Y axis and the resulting land market value on the X axis.

In this instance, a typical home unit site in a major city could be assigned a base market value of 1.00 to which all other sites would be compared. Moving toward a superior location and potential use would influence the land market value in a positive manner. Moving away from the base location and use to one which was inferior would influence the land market value in a negative manner.

Adjustments for additional attributes and deficiencies could be made for each individual site, after the base market value had been estimated by the comparative method. The experience from a comparative city could be borrowed and tested in the local area to verify the results.

A chart that illustrates the relationship of one type of land use and location, to another site of differing potential land use, can be created. The relationships in the chart that follows have been found to be common in many areas of the world. However, every area is different and a new-suitable model should be designed by local experts.

This model could be a basis for considering the distinctions that are part of the local society of a city. It should be modified to conform with the local experience. This can be accomplished by performing a local investigation which draws upon the expertise of individuals who understand the advantage that one location has compared to another. A base factor which was equal to the comparative difference could be determined for each use and location. Individual sites could then be adjusted for superior or inferior

conditions as compared to the base. A determined value could then apply to all sites resulting on equitable treatment for varying qualities.

PROPORTIONAL LAND MARKET VALUES

USE - LOCATION	MAJOR CITY	SUBURBAN	DEVELOPING	RURAL
COMMERCIAL				
Central business	20.00+			
Downtown area	10.00	5.00	2.50	
Standard	**3.00**	**2.00**	**1.00**	**.75**
Secondary	1.50-	1.00	.60	.50
INDUSTRIAL				
Prime	2.50+	1.75	1.50	.95
Standard	**1.50**	**1.00**	**.75**	**.65**
Inferior	.75-	.50	.40	.25
HOME				
Prime	1.50+	1.00	.75	.50
Standard	**1.00**	**.75**	**.60**	**.40**
Inferior	.65-	.45	.40	.25
RURAL AND FARMING				
Acreage close-in	**.20+**	**.15**	**.10**	**.05**
Acreage distant		.10	.05	.02
Intense farming			.03	.02
General farming			**.02**	**.01-**

Basis for comparison: An home site of standard quality in a major city = 1.00

DEVELOPMENTAL ANALYSIS

Hypothetical Building

A theoretical method to achieve a land assessment system, when market or sales data is unavailable, is to make an estimate of the market value of land, based upon the net land residual income (total income, less all costs except land value). This would result from the development of a hypothetical building of the highest and best use for a given site.

The developmental analysis technique would be used, when the following data can all be reasonably estimated: the best use of the land site, the hypothetical building value, the hypothetical net income to the development and the appropriate capitalization rate.

First, an assessor would determine what hypothetical improvements would represent the highest and best use (greatest net land value) for the site.

Second, to determine the net land income, the assessor would have to estimate the gross possible income which could be earned from the use of the improvements and site combined. An allowance for the average vacancy (non-use) over the life of the investment would be subtracted. Then the probable operating expenses (but excluding income attributable to the land) would be evaluated and deducted.

Third, the assessor would have to estimate the cost of the proposed building. A portion of the net income would be required to recapture the investment in the hypothetical building and furnishings. The remaining income would be income residual to the land.

The residual land income would be available as the revenue source (tax base) to fund public improvements and services. The entire amount may be accumulated and utilized for the benefit of all citizens. If a portion of the net land value were not collected, it would be converted into a selling price and privately appropriated.

The selling price would be determined by capitalizing the remaining net income which was not collected for land taxes. The net markets were capitalized at a rate of, say, 6% to estimate the market value of the land. This rate would vary for different types and ages of property. Using a financial calculator, an amount of $12.05 would have to be paid for a period of 50 years if interest were at, say, 6% per year. The land price is what a potential future user would have to pay a land owner in order to use the site, unless all of the net rent is used for general community purposes.

An example on a *per square foot basis*	**Land Income**	**Land Value**
Gross possible income	$24	
Vacancy allowance	-1	
Operating expenses	-5	
Net income before land taxes	$18	
Recapture of building cost	-12	$190
Land Residual	$6	-$100
Land Tax	-5	-$83
Net Land Income	**$1**	**$17**

ALLOCATION

When it is difficult to find vacant land sites that have sold or are offered for sale, the assessor can use an allocation approach. There tends to be a typical ratio of land value to property (land + buildings) value for specific categories of real estate, with similar characteristics, in specific locations.

The individual values for the total property (both the land and building) may be known and available on public records, but there is no allocation made between the land and buildings. Time might best be spent in analyzing a sample of homes to estimate the typical proportion of value which represents land as compared to buildings. This percentage factor could then be applied to all of the total market values for the similar type of homes in a given district, to estimate the individual site land values.

If the existing practice for assigning total values has been arbitrary or not based upon valid market conditions, this method will not be useable. Fairness and justice would require that all markets be based upon a competitive system where all individuals were given an equal opportunity to use a given site. As an interim step, an estimate of competitive total value could be made for different types of property and locations, then an allocation could follow.

The analysis of many units, which represent a random sample, would be conducted, perhaps by using some of the other techniques that are discussed. From this analysis a typical land factor (relationship), for each type of property and location, would be determined. The land portion would be allocated from the total value. In the sample below, an assessor might conclude that the typical land factor was .40 (40% land and 60% buildings).

Sample Analysis

Unit number	Total value	- Building portion	= Land portion	Land factor Land/Total %
212	$190,000	$114,000	$76,000	40%
321	$181,000	$105,000	$76,000	42%
222	$192,000	$117,000	$75,000	39%
311	$192,000	$119,000	$73,000	38%
Conclusion: Indicated Land Portion:				40%

Once the portion was determined and tested for accuracy, it could be applied to the entire population of market data for a particular category of real estate in a specific location. The calculation might be made as follows:

Population application

Unit number	Total value x	Land factor =	Land value
215	$193,000	.40	$77,200
305	$185,000	.40	$74,000
301	$189,000	.40	$75,600

EXTRACTION

The extraction method is a variant of the allocation and developmental methods where the market rent contribution of a building is estimated, then subtracted from the total rent with the balance being assigned as land rent. This was reviewed earlier, and accomplishes a land value analysis in a simplified manner. This could best be used where the improvements or buildings made a small contribution to the rent, and the majority of the value was land value.

	Land Rental Income	**Land Market Value**
Gross possible income	$24	
Vacancy allowance	-1	
Operating expenses	-5	
Net income before land taxes	$18	$300
Recapture of building cost	-1	-$17
Land Value Residual	$17	$283
Land Tax	-12	-$200
Net Land Income	**$5**	**$83**

In this example, $5 per square foot is the net land market allotted to the land. The land tax is $12 per square foot and the land value is $83 per square foot.

GROUND RENT CAPITALIZATION

In many parts of the world, including areas within the United States, land is owned by an individual or government agency and leased to tenants who construct buildings and pay an annual rental fee. These rental fees can be analyzed just like sales and a market rental fee estimated. This lease fee can be capitalized by an appropriate rate to estimate market value.

This procedure is used when land rental and capitalization rates are readily available, as in well-developed areas. Net ground rent -- the net amount paid for the right to use and occupy the land -- is estimated and divided by a land capitalization rate.

Comparable ground rents	**Per SF**	**Location**	**Traffic**	**Parking**	**Adj. SF**
Comparable ground rent 1	$10.00	-$0.50	-$0.50	+$0.75	+$9.75
Comparable ground rent 2	$9.50	-$0.25	+$0.50	-$0.25	+$9.50
Comparable ground rent 3	$10.00	-$0.00	-$0.50	+$0.00	+$9.50
Subject market ground rent	$9.50 rent per square foot /				

	10% = $95.00 value per square foot

Rent 3 was the best comparable located in the same area and required only one adjustment for traffic, Rent 2 required three small adjustments and Rent 1 required larger adjustments. I conclude that the subject land has a value of $9.50 rent per square foot 10% = $95.00 value per square foot.

SUBDIVISION DEVELOPMENT

The total value of undeveloped land is estimated as if the land were subdivided, developed and sold. Development costs, incentive costs and carrying charges are subtracted from the estimated proceeds of sale, and the net income projection is discounted over the estimated period required for market absorption of the developed sites. This is the method used by developers to estimate the price they can pay for raw land.

Total sales proceeds, 50 sites at $50,000	$2,500,000
Discounted at %15 over 50 months	$1,850,000
Subdivision cost, $1,000 per site	$50,000
Development cost, $15,000 per site	$750,000
Sale cost, 10% of gross sale price	$250,000
Taxes, interest, carrying cost, 10% of net value	$50,000
Incentive cost and profit, 10% of gross sale price	$250,000
Net value of undeveloped land	$500,000
Net value per acre, 12.5 acres	$40,000
Net value per site, 50 sites	$10,000

LAND VALUE MAPS

The market values which have been calculated should be displayed on a land market map. This will allow the assessor to review his market data and market value conclusions. They can then judge whether equity has been achieved. A field review will allow him to make further necessary adjustments -- for other variables observed in the review -- and finish his project. The assessor will find that when the results of his analysis are presented, and the major adjustment criteria utilized, the public can understand the logic of the assessments.

COMPUTER ESTIMATED LAND VALUES

There are many jurisdictions that have both prior market value estimates and some site data available on a computer. They may be capable of using this data as a basis for updating market estimates.

Many government agencies have already collected limited data about land on a computer system. (3) By analyzing market trends, new land market estimates could be made with a single updating factor for each permitted land use within a neighborhood.

An entire country would be capable of annual reassessments, updated by computer data entries. A simple model used for computer calculation of land value or market values for 1,000,000 land sites could be based upon a careful analysis of the market value of a sample of 12,000 sites. (4) A local valuation committee of land experts could define the land use classes, neighborhood areas and market values for each standard site in the area. A Geographic Information System can be use to display land values, characteristics and statistical data.

The advantages to using a computer assisted market update include the abilities to:

1. Facilitate frequent update of markets ensuring equitable treatment of all renters.
2. Eliminate arithmetic errors in land value calculations.
3. Improve the assessor's productivity in land value assessment.
4. Employ standardized assessment techniques that have proven to be effective.

THE SOURCE OF PUBLIC REVENUE

What are the factors that cause land to have market value and to whom does this market revenue advantage properly belong? Land has market value for three reasons: the limited supply and "natural" productivity of the soil and natural resources, the publicly provided services, including planning, improvements that increase the market value of land and the growth of communities and peoples' competitive demand for the exclusive use of prime locations.

Land rent is the price that people and businesses are willing to pay for the exclusive right to possess and use a good land site for a period of time. For example, people prefer to use sites of good location because it gives them an advantage of spending less time in travel by being near what they choose to do and where they work. A businessman can sell more goods at a site where many people pass each day, compared to a site where only a few people would pass.

The collection of land rent should be used as revenue, by the community for supplying public needs. This returns the advantage an individual land possessor receives from the exclusive use of a land site, to the balance of the people who live within the community and have allowed the land possessor the exclusive use of the land site for the period of time.

ENVIRONMENTAL PRESERVATION

It is the responsibility of the local communities to insure that the market rent of land is collected for public purposes. When a major part of land rent is not collected, which is the case in most of the world today, land title holders obtain rights to sell the value of the public improvements which were made by the whole community. The community added to the market value to land by making improvements which increases demand and rent for the land. The longer the possessors hold the land out of use the greater will be the bonus they obtain.

By prohibiting people from using good land, the possessors force the premature use of other less desirable land, which is more distant from the city. This raises the cost of community improvements and the rental value of the unused, but better located, land. This precipitates the degradation of the rural environment by using city land inefficiently -- and creates huge unnecessary pressures on the natural environment.

A problem that we face is that cities throughout the world are spreading out and using land prematurely which is not needed and should not be used. That is because failure to collect land rent subsidizes the waste of natural resources and clutters the environment. Cities that collect the full rental value of land are more compact and provide greater and less costly amenities for their citizens.

Any moves to enact good government principles without collecting the full market rent of the land may result in a failure. People are guided by the profit motive. When people can make a larger profit by doing nothing, but keeping the land they possess out of use for a long period of time, they will do so. When the community collects the full market rent of land, they eliminate the motive for keeping land out of efficient use, because the unearned profit has been collected as public revenue.

Efficient land use appeals to all people because it surpasses the political constraints of most people. Everybody understands that the earth belongs equally to all people. They want a clean environment on earth and to leave a healthy inheritance to the future generations, regardless of their political viewpoints.

The major function of a competent city government is to provide good community services by collecting the land rent created within the community to ensure the efficient use of land and equal opportunities for all of its citizens. Transportation is an important function of government which would facilitate the creation of a compact city, where people can easily find the facilities they desire for education, commerce, religion and recreation. Good land use, with the freedom of individuals to achieve the highest and best use of land, would ensure a desirable community. A compact city would reduce the need to invade the wilderness and devastate the environment.

EFFICIENCY OF PUBLIC REVENUE

Adam Smith, in *The Wealth of Nations*, suggested that any "tax" should be a charge for services which benefit all people and are more efficiently preformed by a single cooperative effort. He postulated four principles of taxation which any source of revenue should meet:

1. Light on the production of wealth, and does not impede or reduce production;
2. Cheap to collect, requiring few collectors, and easy to understand;
3. Certain; can't be avoided, little opportunity for corruption, and provides adequate revenue;
4. Equitable and fair, payment for benefits received, impartial, and just.

Collecting public revenue from land rent is the only revenue source, or "tax", that meets these criteria.

While the major argument for raising public revenue from land rent and natural resources is because it is equitable and fair, it is also the most efficient method of raising the revenue which is needed for public facilities and services. Land is visible, can't be hidden and its valuation is less intrusive than valuations of income and sales. Taxes on labor and capital cause people to consider alternative options, including working with less effort, which produces less real goods. For example, a tax on wages will reduce after-tax net wages and weaken the incentive to work. A person might be willing to work hard for a wage of $20 per hour, but decide to drop out if the taxes take $8 and the net wage is only $12 per hour. Economists claim that present taxes account for a 25% loss in production in the United States. Production and consumption would be greatly improved if public revenue came primarily from land rather than a wage tax. The same would occur when buildings and machinery are taxed. The tax on building reduces the quantity and quality of buildings produced. A tax on sales, commerce or value added reduces consumption, production and net wealth. Sales tax evasion in the United States has exceeded 30% in recent years.

As new inventions and more efficient ways of producing goods are discovered, people's economic well-being is not improved, because they have lost access to land and must pay both rent and taxes. (5) Instead of rent being used to provide community services, capital and wages must be depleted, which obstructs private enterprise.

When the rent of land is taken for public purposes production and distribution are not held back. This is because the same amount of rent would otherwise have been taken by some private individual. The rent would be the same, the difference is how it is utilized. There is evidence that communities who raise their revenue from land, rather than from labor and capital, are more prosperous, many increasing productivity by more than 25% (6)

HOW MUCH LAND RENT SHOULD THE COMMUNITY COLLECT?

In order to preserve the environment, it is necessary and possible to better utilize our communities. If the producers of the land market value (nature, government and people) don't utilize land rent, someone else will. This is why efficient land use fails under contemporary land systems in most countries. All countries collect some of the land rent, perhaps 10%, 20% or 30%, but none yet, collect all of the market rent of land.

Studies have been produced that demonstrate that communities prosper and succeed in proportion to the percentage of the land rent that they collect. The first communities that decide to collect all of the ground rent will have an enormous competitive advantage over all other communities. They will be able to reduce or eliminate regressive taxes on labor and capital. They will attract new business and industry and become prosperous.

To determine how much land rent the community should collect let's consider the alternatives. Whatever is not collected will be capitalized into market value by land owners. Buying land at inflated market prices is a block to new industry. Land owners sell the capitalized land rent (known as land value) which is uncollected by the community even though it is unearned income. This causes a disparity between landowners and non-landowners. In the United States 5% of the population, which does not include many homeowners or farmers, own 70% of the total national land and natural resource values.

People will come to a well run community because they will be better off than living by themselves or in an impoverished locale. A city must secure revenue in order to provide good quality services.

This revenue can best be procured when the community recaptures the value of the benefits and services that it provides. This is done by collecting the rental revenue from land that reflects the value of the services and facilities provided in that community. The land rent belongs equally to all people that live in the locale who helped to produce that value. In a well run community. there is sufficient land rent to provide adequate funding for the social purposes requested of, and provided by, the local city government

Cities which choose to collect land rent as their primary source of revenue have the advantage of not requiring burdensome taxes to be paid by workers, businesspeople, entrepreneurs or citizens. Individuals who work to create wealth should be allowed to keep what they produce. When labor is not taxed, greater production and consumption occurs. Investment capital is formed which is used to produce more wealth. New jobs are created and economic diversity results.

Each person has a right to keep what he or she produces, but no one has the right to waste what belongs to all people, the land which includes the natural environment. Each person should have an opportunity to use the best land for his business or personal needs, as long as they are willing to pay the land rent that other land users are willing to pay.

If the value of land rent exceeds the community's needs for public services a method of dispensing of the surplus revenue can easily be found. To maintain an equitable society,

where nobody has special benefits that they do not pay for, it is important to collect all of the land rent. The community should use what is needed for public services and improvements such as schools, hospitals, parks, police, roadways, utilities and defense -- and reserve a fund for emergencies.

An ethical proposal might be to then divide the excess revenue that is not needed for public facilities and services at the end of each year and send each citizen in that community an equal portion of the remaining revenue. This is similar to the method used in Alaska and Alberta. Equality of opportunity to be productive can only be accomplished by recapturing all of the market rent of land and ensuring that all people benefit from its value.

Not only is land rent potentially an important source of public revenue, collecting all of it would ensure that the equal opportunity to be productive would be available to all citizens. People could fund useful buildings, equipment and wages, rather than having to buy land at inflated prices. Many countries, including the United States, were started on the premise of using land rent to fund public services. Many countries suffer economic loss because they no longer collect the market rent of land.

The value of land can be estimated with an acceptable accuracy, at a cost which is very small compared to the revenue to be obtained. A proper system of assessment and taxation of land can provide for the proper economic use of the land. A land site should be available to the user who can make the highest and best use of the site and maximize the site benefits for all people. A land tax can provide a major source of public revenue which the local governing body could use for the benefit of all people. A land tax can prevent the dispossession of our children, the future producers in the society. Justice requires that land values, which are created by society and nature, be made available for public improvements. This is the responsibility of good government.

NOTES

1. Some economists consider there also to be a speculative premium that must be removed. Buildings are not considered to be land and are excluded from any discussion of land taxes. [go back]

2. Additional land characteristics and sources of information can be found in the manuals *property Appraisal and Assessment Administration* and *Land Valuation* by the International Association of Assessing officers, 1313 East 60th St., Chicago, IL 60637. *Training Course in Land Valuation Techniques* written and taught to Land Assessors of Jamaica in October, 1990, By Ted Gwartney, Tgwartney@aol.com [go back]

3. When the author was City Assessor in Southfield, Michigan, the only land data available on the computer system were the original land value estimates, an identifier for

the permitted use and a neighborhood (location) classification, made years earlier. [go back]

4. When the author managed the British Columbia Assessment Authority, we were able to value 1,350,000 land parcels annually, using a land valuation computer system, which considered all land attributes, zoning, physical features and market demand factors. A multiple regression analysis system was used for the analysis of sales and testing of results. [go back]

5. Many books have detailed this dilemma. Perhaps the best known is *Progress and Poverty* by Henry George, published by the Robert Schalkenbach Foundation, 149 Madison Ave., #601, New York, NY 10016. [go back]

6. *The Losses of Nations*, Fred Harrison, Ed., Othila Press, London, 1998.