

The Possibilities and Problems
of
Forest Farming in the Willamette Valley
with Particular Reference to
the Determination of Economic Size

by
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FORWARD

This thesis is an attempt to isolate and explain problems much more than it is to answer them. It is hoped therefore, that the reader will, upon reaching the last page, have many more questions to ask than he did upon reading the introduction. It is also hoped, however, that this work will contribute to the readers knowledge through the discussion of the various aspects of the problems. The practical solution of these problems must be based on detailed field investigations. Case studies of actual operation and individual tracts should prove especially enlightening. At best the solutions described can only be considered as indications of possible procedures for investigating actual tracts. Figures given are only averages and in some cases merely approximations.

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INTRODUCTION

General:

Much has been written on the farm forest or woodlot, and the advantages of having a small acreage of forest attached to most farms have been proven and quite generally accepted. Even where other conditions make it impossible, the farm woodlot is often missed. In spite of this it must be recognized that the farmer's chief concern is for crops other than those of the forest. Because of this and because the farm forest is seldom, from its very nature, large enough to permit the employment of technical supervision other than that supplied by the advice of the public agencies, the practice of forestry in farm forests is frequently very inefficient.

One aspect of this inefficiency may be the improper size of the forest holding.(12) There is a very definite limit to the size of forest which the average farmer can manage efficiently without hiring permanent employees to do the woods work. Above this limit the woodlot should become a full time enterprise in itself. Research upon this problem could be conducted, preferably by the case study method, so as to produce information on the size of forest a farmer can handle under specific local conditions.(12)

The smaller acreages of farm woodlots are rendered economically profitable by the interrelation of farm and forest labor, equipment, and administration. However, when a forest enterprise increases in size and becomes a full

time enterprise, it can no longer lean on the farm to make it profitable. It must be able to utilize efficiently, and pay for, its own equipment and labor requirements and all other expenses of a normal business. New factors are thus present which must be integrated efficiently before the operation can be successful.

The question now presents itself as to whether this apparently simple step-up in size can be accomplished or whether the new factors effectively prevent such a step.

Generalizing, we could say that "the efficient operation of a forestry enterprise is facilitated by a reasonably compact body of land, accessible to existing or prospective means of transportation, with an adequate volume of timber and a suitable distribution of age classes, and susceptible of coordinated management".(12)

These principles seem made to order for the enlarged woodlot, except perhaps for the factors of "an adequate volume of timber and a suitable distribution of age classes". Speaking of the second first, there seems no difficulty there, provided good management is used. Even a single acre could have all the age classes necessary.

We must now ask ourselves the question: "Is there an adequate volume of timber in an oversized woodlot to enable an individual to conduct an efficient and successful forestry enterprise? This is the crux of our whole problem: Is there enough timber so that the minimum efficient organization of equipment and labor can be employed efficiently?"

We can at once make the general statement that "Efficiency of management may not always call for the building up of extensive holdings. Smaller units may often be more efficiently managed than large, except where holdings of greater size permit the employment of trained technicians and managers. Oversized tracts may become not only unwieldy, but also uneconomical."(12)

It can be said still further that, from the administrative standpoint, it is really very advantageous if the forest property remain of small size and so subject to the detailed scrutiny of the owner or operator.(4)

In relation to this it has been stated that the best opportunity existing at present for logging engineers is to become a small gypo operator. Might it not be legitimate to extend this further and say that, at least in the near future, if not now, it would be a good opportunity for this operator to own his own timber and operate on a sustained yield basis? This concept would correspond quite closely to that of the forest farm.

The "forest farm" is a fairly new term used to describe a farmlike unit on which forest products are the primary source of cash income.(5) This implies that at least a small area of each unit is used for agricultural purposes. Expressed in the terminology of the agricultural economist, the major crop is forest. The minor crops may be any that fit in with the major crop so as to contribute to the essential requirements of largest total net

income. As ordinarily used, the term would typically indicate a family sized unit.

These units are beginning to be developed in various regions of the U. S., especially in the South where turpentine allows a convenient annual income.(5)

The ideal management unit is ordinarily thought of as comprising at least 20,000 acres(4), but when you come to think of it, why should forest units be large scale any more than farms? The "corporation farm" is supposed to be technically more efficient than family size farms, but other factors, both economic and sociological, seem to counterbalance this so that the smaller farm usually comes out, in the final analysis, as superior. A farm situation similar to the present "ideal" forestry unit would be a cannery owning all the land and producing all the products processed in the plant.

The development of small, highly mobile logging machinery has made possible the small operator and is placing logging equipment in much the same class of performance as the equipment available for the typical diversified farm.

When we enter the realm of theoretical sociology we find very little question of the desirability of the forest farm.

It has always been a foremost principle of American life that the small, middle-class owners of small businesses form the solid base upon which our democracy has been

built. The farmer is at once both the foremost exponent of this philosophy and the classic example of it. If the forest equivalent of the modern American farm could be generally established, and the moral caliber of its proprietor duplicated, a signal contribution to the stability both of the nation and of the forest economy would have been achieved.

From the practical standpoint, however, "it is evident that two points of view must be considered: first, how profitable is the type of ownership to the owner, and second, how good is it for the forest? On the one hand the benefit to the private owner is paramount; on the other, the ultimate public welfare."(12)

In this study we shall at least attempt to discuss methods of investigating practical field situations so that the evaluation of the forest farm in relation to their principles can be made.

The Willamette Valley:

The Willamette Valley, as considered in this study, consists of the Oregon counties of Washington, Multnomah, Yamhill, Clackamas, Polk, Marion, Benton, Linn, and eastern Lane. The lower portions of the valley are largely agricultural lands of high value, all in all an excellent farm area. The outskirts fade into lands adapted to extensive farming and finally into strictly forest land.

There are still considerable forested areas even on the valley floor. In the areas adapted to extensive farming, there is at present largely a mixed farm and forest type often with large tracts of forest on the ridges and farms in the valleys between. As one progresses farther into the foothills the proportion of forest to farm increases until one finds rather small patches of farm land surrounded by forest land. This is the home of the stump farm, delinquent taxes, and poor land use.

This region, from the beginning of the mixed type to the last patches of good and assessable farm land is the problem area to which this thesis directly applies. If the methods and conceptions developed here have any validity, they could probably be adapted to many other areas.

The major land uses in the valley today are approximately 58.8% in growing timber, 16.7% in woodland pasture, 15.9% under plow, and 8.6% for all other uses. About 40% of all the farm area is in woods at present. It is estimated that there are 1600 farms on the outskirts of the

valley operated by stranded industrial groups, largely from liquidated timber.(10)

Importance:

It could be asked: "Of what interest to us of the Willamette Valley is this concept of the forest farm?" After all, this is a region of big companies with large supplies of overmature Douglas-fir. Forest farms could not be adapted to old-growth stands, and a hundred years taken to make the first cut. The taxes and carrying charges would be tremendous; the initial capital needed, out of the question for a small operator.

That is true, but from the indications of extensive cutting of second growth stands at present, there is a definite need for the organization of management on these smaller tracts. If it is now economically possible to cut these stands, it should be possible to organize cutting units of a size that would enable sustained yield to be practiced, providing, of course, that sustained yield is possible under some type of organization. An increasing number of authorities believe this is now becoming fact in the Willamette Valley.(3)

The present destructive and unplanned cutting of these not completely mature stands is to be deplored from all angles. To ^{personal element undesirable} me it seems more important that they be developed into management units than that the large cutting operations be so developed. The present second growth stands are in a position to carry the lumber industry over from the exploitation era to that of sustained management. If they are destroyed now, extreme dislocation of the lumber

industry upon the termination of old-growth cutting seems inevitable. If they can be maintained and improved, a relatively mild adjustment might be possible.

It would be very costly and almost impossible at present to set up complete growing and manufacturing units of even 20,000 acres on these lands. They are for the most part broken up by other land uses and by totally non-restocking areas. Smaller units could be fitted into the existing pattern without too great difficulty where larger units could not.

If a few forest farm units could be organized and proven practical, soon an appreciable percent of the total area susceptible to this undesirable cutting might be under good management.

It is generally recognized that reasonable continuity of policy is essential for the practice of forestry. During this present transition period from liquidation to production, practically the only way stability of policy can be achieved is through stability of ownership(12), and there will be no stability of ownership until it is demonstrated that efficient, profitable sustained yield management of forest units is possible.

Alternatives:

Perhaps in order to get a better picture, we should investigate briefly what alternatives might present themselves. We have mentioned some already. We have implied that forest farm areas are those where volume of timberland makes it inefficient to incorporate all the forest lands in farm woodlots. This alternative would seem therefore, to be ruled out. Another alternative we have mentioned is that of large private ownership patterns and we have discussed briefly some of the factors involved here.

The remaining possibilities are mostly in the various forms of public ownership or control. The development of State and/or county forests is one of these. There is at present a strong drive to incorporate considerable quantities of hitherto private land into forests of this nature. It is a distinct probability that, unless the tax delinquency and related problems can be solved, large areas of forest land will eventually be incorporated thus. It is my thesis, however, that every attempt should be made to solve the problems of private ownership and so enable it to survive. Public ownership should be resorted to only where private ownership has proven unequal to the task.

The extension of the National forests to include practically all forest lands outside of farm districts has been also advocated at various times. It would seem that the same principles apply here as with the state ownership.

The Forest Restoration Bill provides another alternative.

This would allow the leasing by the government of depleted forest lands from private owners and others at a rental of not over the average of the taxes for the last five years (13). Thus the government would take over all expenses (the rental would enable the owner to pay taxes) and would manage the land until it had been reimbursed from timber sales, etc., for all, or a fixed percentage of, such expenses. It should be noted that the owner would lose all direct interest in his land for long periods. Would he not then be in the class of the coupon clipper?

MANAGEMENT

As an indication of the probable details of management of a forest farm in the Willamette Valley and in order to have something concrete on which to base further discussion, I have assumed figures and outlined what would seem to be the logical organization for such a unit.

The forest farm would ordinarily be a family sized unit so it would seem that only one man, the proprietor, would need to be on the farm throughout the year. At least one more man would be needed most of the year. In fact, it might be desirable to have the owner and a hired man employed throughout the year, depending on the balance of work during the slack season. For most woods operations two men are the minimum efficient force. In the rush of the logging season one or two men might be added to this minimum, bringing the maximum force to probably four men. Many times they would not be needed at all.

It requires an intelligent, well trained individual with considerable capital to manage a successful forest farm. The unit should pay him a good living, at least comparable to that received by a progressive farmer of the same caliber. The average farm income in the Willamette Valley is around \$1500 per annum, with superior farmers averaging around \$2500 per annum. I have assumed that a fit income would be \$2000 base plus interest (at 4 per cent) on any capital he has invested. The investment would be figured as the balance left after all accounts payable had been subtracted from the total value of the property.

A prime requisite of stability of work throughout the year and of income from year to year is diversification of crops. This principle, which has been well developed in the case of general farms, is equally applicable to forest farms.

There are at least two means by which this can be brought about. The first is to use any suitable land for a small farmstead. This would probably not range much over ten acres at the maximum. Fruits, nuts, vegetables, pasture, grain, and hay indicate the types of products to be produced. A cow and chickens would usually be desirable.

In order to have a logical figure for the capital investment in the homestead, we have taken the average figure for the part time farms of the Willamette Valley. The area in these farms averaged 5.5 acres. The capital investment is as follows:(6)

Land	\$ 550*
Dwelling house	1349
Other Buildings	219
Livestock	82
Machinery	34
	<hr/>
Total capital investment	\$2234

This, of course, does not include any of the forest land.

The quality of the land for agriculture should be carefully investigated before any is cleared and plowed,

*Reduced from average figure, for apparently location of the average lands increased price exorbitantly.

and desirable land use considerations should be followed in all cases.

It might be desirable occasionally to locate the farm area a short distance from the forest area but in the great majority of cases this would not be so. Lost time and lack of cohesion would be the main factors disadvantageous to such a condition.

In counterbalance to these factors, however, are others both social and economic, favoring separation which should also be weighed. The social conditions of living would undoubtedly be benefitted by a grouping of farms in the valleys. Group organization would be enlarged. Utilities such as electricity could be supplied at considerable decrease of cost. The problem of school attendance for the children would be greatly simplified. This pattern is quite generally followed in Europe.

There is a general misconception as to the cost of roads in each case. Under good management, adequate roads would have to be built anyhow. "The average weight of the products per acre per year in forests is greater than that produced in annual crops and livestock operations. More roadway is therefore required per unit of area than in average farming areas."(5)

The second means of diversification would be termed forest diversification. The main product would still be sawlogs or perhaps pulpwood under conditions very favorable for such practice. The diversification elements would be

in the nature of small, intensely managed projects which would use a maximum of labor during the slack season. It is important to the understanding of this that one recognizes that any off-season work which can be done and which requires only labor is practical from the farmer's standpoint if it gains him even a small increase in total yearly income.(8)

Products which might be suitable are cedar for poles, posts, and shingle bolts; pulp or fuel wood using minor species and waste from logging; alder for furniture stock, etc., oak for fuel or furniture stock; cottonwood for pulp or excelsior; cascara; Christmas trees.(8) These products could be worked up during the winter or perhaps even during dangerous fire weather when normal woods operations would have to be closed.

The logging equipment would be a very inexpensive outfit. Actual logging of saw timber would usually only take place during the summer months, and the light "cat" would probably only have about one hundred working days a year skidding logs. It would also be used to power the loader, run the grader to build and maintain roads, and do odd jobs such as plowing on the farm, etc. Probably most of the equipment would be purchased second hand and as much repair work as possible done by the operator. The list of minimum equipment would be as follows:

Cat equipment (including cheap pan)	\$ 125
Cat (possibly A.C. 30 h.p.)	850

Felling and bucking equipment	\$ 75
Loading equipment	100
Road building equipment	250
Miscellaneous	100
	<hr/>
Total	\$1500

This outfit would be capable of logging 8 to 10 M per day under ordinary conditions.

For purposes of illustration we have assumed an average site index for the forest land of 150 (high site III) and a mean annual growth for the 100 year rotation of 500 board feet per acre per year Columbia River scale. Likewise we have assumed an average investment per acre in land and timber of \$24.80, based on the following stand data:

- 20% of land has 1 to 20 yr. old stands valued at \$4 per acre on the average
- 40% of land has 20 to 40 yr. old stands valued at \$10 per acre on the average
- 40% of land has 40 to 90 yr. old stands valued at \$2 per acre plus \$1 per M stumpage with an average volume present of 48 M per acre (75% stocking)

With this preliminary data assembled, we can proceed with the analysis of the operation in order to eventually arrive at a determination of economic size. There are two methods by which this can be done. The first might be termed the technical method of determination of size of holdings.

Technical Method:

We have said that we want the operation to have certain characteristics. Thus we have said that we are going to have so many men employed so many man-days per year. For this labor force there is a minimum, an optimum, and a maximum amount and organization of equipment. In this case we are using what I consider the optimum in that a balance is attempted among the factors of cost of equipment, output, length of season, etc.

We can apply this data to either specific or average conditions and obtain an annual cut which we could obtain under these conditions. If we then applied the correct mean annual growth per acre to this annual cut, we could tell how many acres would be required under sustained yield. Thus we have considered only the technical efficiency of the organization in determining the size of organization.

There are various factors which determine the minimum size of a show in a commercial logging operation; that is, if efficiency is to be maintained. For one thing the transportation media used must have sufficient power to handle the logs in an efficient manner. It must be possible to use the equipment at optimum capacity over as much of the operable season as outside conditions will permit. The organization of equipment must be such as to allow an efficient organization of personnel.

Application of Technical Method:

100 days skidding at 10 M per day gives 1,000 M annual cut and this spread over an area at $\frac{1}{2}$ M average growth per acre per year gives 2000 acres needed for sustained yield. Fire loss, etc., would have to be added in actual cases.

Socio-economic Method:

From another point of view, involving rural sociology, the appropriate income of the operator might be established, and then the size of forest holding best adapted to help meet that income could be determined. In this case we shall first consider the income and expense items derived from the farmstead in order to determine what the net amount he should need to derive from the forest is.

Table 1

Total base income desired		\$2000
Income of farmstead: (cash or equivalent)		
Farm produce sold	\$121	
Farm produce consumed	157	
Rent equivalent (house)	120	
Forest products consumed	<u>30</u>	
Total		\$428
Expenses of farmstead:		
Cash farm expense	\$166	
Employment expense	29	
Interest on farm investment	90	
Depreciation	<u>84</u>	
Total		<u>369</u>
Net		<u>59</u>
Net income needed from forest		\$1941

Table 2Gross income per acre per year

Item	Average cut per /a./ yr.	Unit used	Unit value loaded	Unit used	Gross value at /a./ yr. loaded
sawlogs	500	bd. ft.	\$5.50	M bd. ft.	\$2.75
piling	9	lin. ft.	0.065	lin. ft.	.58
cordwood	0.2	cord	3.00	cord	<u>.60</u>
					\$3.93 gross income /a./ year

This is a rather ticklish step for it is based on an estimate of the average quantity of materials that can be taken off the area per acre per year and an assumption of the average value of those materials. The value of the products loaded on the trucks was used because that is the first point in the logging operation at which a definite value could be assigned to the products. If all costs per M could have been worked out, one could use the value at any stage in the woods and adjust your calculations accordingly. However, the nature of the basic assumptions used forbids this.

As was said in the explanation of the technical method, we have described rather completely the amount and period of employment per year of labor and of equipment. By thus completely describing the unit, we are enabled to list many of the total costs per annum, that will be sustained. The costs that can not be thus determined are those fixed per acre costs the totals of which would depend on the amount of land held. These, however, can be subtracted from the gross income per acre per year already determined.

Table 3:

Gross income per acre per year		\$3.93
Assignable-per-acre expenses:		
Yield tax	\$0.49 /A./yr.	
Reforestation tax	.05	
Protection	.05	
Forest fire insurance(10)	.13	
Interest on land investment	<u>.99</u>	
		<u>1.71</u>
Margin/A. to meet non-assignable costs plus income desired		\$2.22

Table 4:

Non-assignable-per-acre expenses:

Operating cost and maintenance of equipment (including labor)	\$ 600 /yr.
Depreciation of equipment	300
Labor hired (excludes operator's)	1500
Interest on equipment investment	60
Miscellaneous	<u>100</u>
	Total \$2560
Net income desired from forest	<u>1941</u>
	Total \$4501

\$4501 spread at \$2.22 per acre gives 2027 acres of forest needed to assure a total base income of \$2000 per year.

There are a number of interesting facts evident in an analysis of the foregoing setup. It is important that the two methods used to estimate economic size gave substantially the same size. This should be so, provided that the operation was a properly integrated whole. If an analysis of an operation by a skilled investigator using the two methods, failed to show substantially a common economic size by the two methods, it would be evident that the equipment being used or the organization of labor and equipment was not adapted to the unit as set up. This relationship can be used very handily in studying the efficiency of existing organizations.

It is apparent that a ten acre farm of the type indicated would be much more profitable than the figures show. Especially would this be so with the type of manager necessary for the successful operation of a forest farm. In any case the farmstead is designed more to give stability to the unit than to provide a large income.

The investment necessary for the unit is quite high, about \$54,000 as approximated by the average figures used. Naturally only a well established individual would have the capital or be able to raise anywhere near the amount necessary. The forest farm could therefore not be a solution for stranded families or destitute dust bowlers. It should be noted, however, that practically all the investment is in land and growing stock. For owners of considerable timberland, it might not take but a fraction of

this indicated investment in actual cash outlay. If credit facilities were available, it might well be practical for many of these owners to organize forest farming units.

It should also be noted that interest at 4% on the whole investment was carried in the figures. This would indicate that the total earning power of the \$54,000 investment was \$2160 interest and \$2000 salary or a total of over \$4000 per year. This is 8% in the investment, which is a fair return.

Another fact which should be recognized is the sparse population which these forests could carry. It probably would be only two to three per square mile. This seems to establish as fact the statement that forest farms are only practical in areas which have already been opened up by adjacent farm lands, and other means. This might be no longer true if a time should come when intense management of the lands coupled with highly efficient small logging equipment becomes possible.

It would seem to be necessary that a considerable portion of each forest farming unit have nearly mature second-growth stands on it and practically all the rest have younger stock present. It would be hard enough at first improving the stands without having to plant large areas. It should be recognized that this factor will make it necessary to select carefully the lands which should be included in each unit.

Selective logging with short cutting cycles might be

the superior system if it could be made practical for Douglas-fir. At the present time, however, we must lean toward clear cutting. Alternate blocks left would insure reproduction. The blocks cut could very easily be so small as to nearly approximate group selection.

The better the site the better chance of success in the long run should be the watchword. Total annual growth for the unit is the determinate of the size. On the better sites less land is necessary and this means less taxes, less road costs, etc. Probably nothing under a middle site III can be used for private forestry.(3)

Slash disposal should not be much of a problem. With the small blocks and rather intensive utilization, it should be easy to control the burning. The "cat" would be available to run a fire line around the logged areas. In many cases it might not even be necessary to burn.

The operator would probably be very fire conscious, for a ten acre fire would be a good sized fire to him. It would mean perhaps half a year's cut to him. This fact might indicate a disadvantage for the small unit. A thousand acre fire would nearly wipe him out. This is what makes forest fire insurance almost a necessity. On the other hand, a fairly large fire could only wreck one or two units and would not dislocate the others at all.

THE PLACE OF GOVERNMENT

What part should government play in relation to possible forest farming units? It should not need to be stressed here that continued productivity of forest land and immediate and future financial profit are matters of concern alike to the owner and to the general public. Government, then, should have the task of safeguarding the public's interest. Public regulation will be especially necessary for both farm woodlots and forest farms for it will be difficult for them to obtain adequate technical supervision at least at first.

An important part of regulation should be some sort of land use zoning. It would tend to solidify forest areas and prevent poor use of forest land. One should recognize, however, that zoning is rather negative and only controls future settlement. By itself it can not overnight create a planned community. It can only keep farmers from attempting to develop strictly forest land into farms.

Zoning should not be static, but should provide flexible control of boundaries of districts and the provisions for land-use.(14) With changing social and economic conditions changes should be made. With this attitude the possibilities of forest farms should be investigated, and, if desirable, provisions encouraging them should be set up.

The most valuable government contributions would be more of a cooperative nature than of a regulatory one.

Some of the various forms which this cooperation might take can be listed as follows:(7)

Protection against fire

Forest and forest-products research

Forestry extension

Utilization extension

Forest planting or providing planting stock

Cooperatives (enabling legislation and advice)

Forest credits

Forest fire insurance

Forest taxation

We shall discuss some of these briefly in the following discussion.

The development of serious forestry extension work would probably be more needed than any other improvement in governmental cooperation. By this means it should be possible to duplicate the tremendous improvement in management which the agricultural extension has fostered. It would seem that a forest unit would need to be much more completely planned before actual development could be successful than would a farm unit. It is possible to organize an efficient unit on nearly any good farm land regardless of size, but it would seem that between the efficient farm woodlot and the commercial forest is a no-man's land where neither is efficient.

If the social benefits of forest farms warrant, it might be desirable for public agencies to provide low

interest bearing credits to properly organized units. Perhaps a forest bank patterned after the Farm Loan banks could be organized. Under private credit organization it would be very hard to obtain interest rates that would put them on an equality with larger companies in this regard.

A possible source of government aid in establishing at least enough units to serve as an experiment would be the Resettlement Administration. Perhaps a few forest resettlement projects would be a good thing. Also it might be possible for the state to cooperate with some qualified small forest owner who has a small farm area and considerable forest land in blocking out his land with some available state land to form a suitable unit for experimental purposes. In this way no one would need to put out much cash and yet a practical demonstration would be achieved.

THE PLACE OF COOPERATION

Apparently forest farms could be ideal for inclusion in farm forestry cooperatives. The co-ops could fill in the weak spots in forest farm organization by employing trained foresters to provide technical supervision and by owning and operating trucks to haul the products to civilization centers. At the same time the added volume of output and stabilized output would be invaluable to the cooperative itself.

The recognized functions of cooperatives are:(5)

1. grading and refinement of products before sale
2. improvement of bargaining power
3. control of plants and of sales by land owners
4. ownership by producers of capital stock as a means of savings
5. realization of the educational values inherent in cooperative effort of any kind
6. provision of a place of business and continuous service for exchange of products among members and for increasing production and use of local products

J. A. Cope of the Tioga Woodland Owners' Cooperative at Ithaca, N. Y. states that forest cooperatives should confine themselves to the harvesting and marketing of raw forest products without attempting to process them.(1) He also says that in order for them to be successful the individual owner must get the same or a higher price for the products sold through the cooperative, and the periodic cut from each forest must be controlled to insure permanence of yield.(1)

CAUTION

It is essential that over-optimism on the part of either private promoters or government does not lead to over development of public services. This has led to high taxes and has tended to discourage continuous forest

production in some regions.(9) This is illustrated in the highly tax delinquent counties of northwestern Oregon where overdevelopment during the boom in logging led to high bonded indebtedness and greatly increased tax levies.(2)

It is better to underdevelop at first and to gradually improve as it becomes evident as to the extent of development necessary for the long-term benefit of the area. It is always easier to build up than to undo unnecessary improvements.

It would be very foolish to attempt extensive development of forest farms before education had been pushed far enough so that prospective operators were in a position to carry on without constant supervision. Extension work would need to be vastly improved. It would be desirable that farm forest cooperatives be developed before the forest farms were organized so that the operators would have something to lean on if conditions became tough soon after they started.

UNFAVORABLE FACTORS

It would seem that there would be a tendency for such small owners to switch over to pulpwood and fuelwood operation and so overcut at the slightest difficulty. They would have no heavy equipment nor any stacks in mills, etc., which would make this impossible. This would result in inefficiency and be socially undesirable. Sufficient

pulp and fuel wood is available from the utilization of waste in saw timber logging and in the inferior stands on poor sites.

The efficiency of farm forests is rather low and this does not auger well for the middle class forests. However, farmers have considered woodlots as merely waste lands not good for farming and so not to be improved. Forestry enterprises would not be under that handicap. The lack of training of proprietors, however, would be very serious.

When a small forest owner attempts to institute better management on his land, he is at once faced by two problems. The first is that he will not be able to harvest nearly as much of products, and the second is that during the first cut much of his material will be of inferior quality. He may also get a poorer price because of his trading disadvantage.

It might be that inheritance taxes would tend to destroy the small forest unit where transfer of stock is not possible. This has not occurred in farms but perhaps forest units are more easily thrown out of gear by division, etc.

Compared to farm forests, the forest farm would have less possibility of utilizing the low quality material produced. Even if they both used the same amount of this material the comparative consumption is another matter. If this material could not be utilized, the forest farm would be at a great disadvantage.

FACTORS FAVORING

There are a few more advantages of the forest farm which have either not been touched upon or have not been stressed sufficiently.

With intelligent operators in charge of the forest farms able to direct the enterprise and perform much of the labor, the management is devoid of the heavy supervisory costs that are unavoidable in larger enterprises. The incentive of personal interest with the above means lower production costs and higher acreage returns. This may render forest farms by far the cheapest method of restoring over-exploited forests.(5) The application of this concept will probably be limited, however, by the owners' lack of capital to undertake the reconstruction of severely over-exploited stands. The public interest would indicate government aid in this regard. A tremendous advantage of the forest crop over crops requiring complete annual harvest lies in the practicability of varying annual cuts in response to current market conditions.(5) It is possible to store the products in the living trees until favorable prices would increase the returns. Stability of output would not allow this factor to be carried to extremes, but it does enable one to increase the average unit price.

Another factor favorable to forest farms is that reproduction costs would be nil because plenty of seed would be available due to the small size of areas cut annually.

CONCLUSION

An overall objective which I hope this paper has reached is to bring out the fact that it is possible to start with a concept of greatest benefit to the public welfare, apply this to certain definite regional conditions, and evolve a logical efficient pattern of ownership that will satisfy both the social concept and the basic practical considerations of efficiency.

Further, that given this desirable pattern, it is possible, through research, to determine the appropriate size for each forest unit and to ascertain the best means of developing a unit of that size and of managing that unit to produce a proper distribution of age-classes. "These means may involve the reduction, expansion, or consolidation of present holdings."(12)

The more concrete objective was, of course, to study the possibilities and problems of developing forest farm units in the Willamette Valley and to develop means of determining the economic size of such units.

We have discussed already various conclusions that can be reached. Briefly some of the more important ones are:

Forest farms are suitable, to some extent at least, for the Willamette Valley. Activity in developing them, however, will unquestionably proceed at a slow rate because of the absence of men with knowledge combined

with necessary capital.(5) Education, the development of governmental services such as forestry extension, and an advance in forest cooperatives must proceed farther than at present before much progress can be made.

In general we might conclude with a listing of the requirements of good management on these forests: stabilization of ownership, 2. rebuilding the timber stands to their former productiveness, 3. providing patterns of taxation and ownership tenure that will eliminate economic pressure for excessive exploitation, 4. providing for community benefits from nearby forests, and 5. utilization of employment possibilities.

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