

Report of Reforestation in the Philippines

The Need of Forests

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POPULAR MISCONCEPTION ON THE VALUE OF FORESTS.

Forests, to the unthinking layman, are vast extensions of land filled with vegetation of little utility except for lumber and other wild products like rattan, almaciga, etc., but by and large of so very little economic value that the lands can very well be considered as idle lands. Hence, the connotation of the common word "gubat" as something untidy which would be better removed or stripped off of its vegetation and converted into a cultivated plot. It is, therefore, a common concept that because forest trees do not yield any commercial crop except the long-dated product as lumber, the more forests are cleared and converted into agricultural lands the better off and wealthier will be the community.

Not understanding the natural function of forests, townspeople find it impossible to understand why it should be a crime to enter into areas which the government has not certified as potentially agricultural, since to them all public lands should eventually be classified as agricultural and the only reason why a particular tract of land is not released is because the land classifier has not gotten around to it or because of the standing timber still on it. And so the expedient way is to occupy it or "squat on it," even before it is released in order to have a preferential right once the land is finally released.

To many people, to hold vast tracts of land under forest and to prevent settlers from coming in and having their own small holdings is a great loss and a high impedi-

ment to the economic development of the country. For them, it is hard to understand the principle of land classification under which the government after making use of all the scientific knowledge regarding land use and soil conservation and after examining the circumstances of the various areas, declares them as either (a) agricultural or (b) pasture or (c) forest lands. *But why a particular parcel of land was classified pasture or forest and not agricultural and what criteria were used in reaching this decision, to the unthinking layman appears whimsical and capricious; and if farmers wish to invest their time and resources to cultivate a particular parcel of land, it would be the popular view that the government should yield and have the land reclassified as agricultural.*

Herein lies the cause of the utter lack of public support for the implementation of the "kaiñgin law" which makes it a crime to trespass on forest lands. In the eyes of the many, this technical trespass is no moral trespass at all, and this is undoubtedly the reason why there are so very few instances of any municipal or provincial authority or member of Congress who has pleaded against the intrusion into forest lands, (the only two exceptions are the Governor of Cebu and Bohol, two provinces where soil erosion has already inflicted devastating damage), while on the other hand there have been many, many instances of pressure from authorities for the release of forest lands for agriculture.

VITAL FUNCTION OF FORESTS IN SOIL FORMATION AND SOIL CONSERVATION.

And yet *forests are in truth nature's agent for soil formation and soil conservation.* Paradoxical as it may seem, *without forests there would be no agricultural lands.* The easiest way to convert rich agricultural lands into useless, arid deserts is to destroy the surrounding forests. Hence, even if we were not to obtain a single stick of timber or a piece of rattan or any forest product from our forests, we would still be obliged to defend our forest lands if we wish to conserve the fertility of our agricultural areas and protect the interests of our farmers.

The beneficent effect of forests against water and wind erosion has been proven again and again in all parts of the world, and in the Philippines it is a established fact that the greatest enemy of agricultural production is water erosion. Erosion exhausts the productive potentiality of land by carting away from the earth surface that valuable topsoil responsible for maintaining a vigorous agriculture. Lost with the topsoil are the life-giving minerals of enormous value, and the water that carries them finally empties into the sea far from being used by cultivated crops.

To an average citizen, while forests have that obvious function, the phenomena involved why they do so, is not fully known. It is easy to recognize that when rain strikes a bare soil, it splashes the soil particles from the rest of the soil mass. The particles are thus dislodged and carried away by the runoff. The runoff with the soil particles in suspension passes thru the tiny pores and channels as it moves downward thru the soil layers. Later the silt and clay clog the tiny openings and consequently these tiny pores and channels can no longer admit water thru them so the water has to move on the surface of the ground and thus soil erosion starts.

But under a forest cover, the process just described rarely takes place. As the rain-

water hits the thick canopy of leaves of the trees, its impact is absorbed and it drops down with reduced pressure to hit another layer, this time the forest litter. The rainwater is absorbed by the litter, and when this becomes soaked, the water merely moves down to the soil surface in a lightly loaded form. Evidently, the pores and channels in the soil remain open and surface runoff does not occur except under heavy downpour. Many desirable conditions are attained in this chain of events. The rainwater that would immediately have runoff on a bare soil to cause erosion is prevented under the forest condition. The organic matter accumulated together with porosity of the soil enables the forest soil to hold more water and thus prevents frequent floods. On the other hand, that portion of the rain water that wets the leaves of the forest trees are again evaporated into the air. It should be realized also that tremendous amount of water is needed just to wet the forest litter consisting of dead leaves, twigs, branches, limbs, etc. And the binding effect of the surface roots although not the chief factor in soil erosion control effect a considerable help in preventing soil losses. The roots of the forest trees, once decayed, leave veritable pipes to conduct water deep into the ground for storage.

Thus *forest conservation is soil conservation,* it is the best way to protect our farm lands from rapid depletion of their fertility. *But forests* do not only perform this defensive function of preventing erosion, but they also *contribute positively to increasing the fertility* of the surrounding farm lands by storing organic materials in the forest litter and from which most essential plant nutrients are gradually transported by alluvium to the lower lands, enriching the flooded rice-fields and replenishing the fertility removed from them by the harvested food crops. Stripped of forest cover, the highlands become vulnerable to erosion, the soil loosens and the humous content which binds the soil particles disappears, the topsoil is washed

away and the subsoil is exposed. The result is that the lower fields become piled up with deposits of silt, stones and gravels, fertility declines and the land becomes finally barren. The addition of mineral fertilizers might restore in part the fertility of the lands, but this can hardly replace the rich fertilizers provided by nature from organic material.

Veritably, *forests are nature's vast factories and rich storages of fertilizer for the lowlands.* A really enlightened agricultural policy would plan carefully the conservation of the forests necessary for each region and would mobilize the farmers to militantly defend against further encroachment of the neighboring forest lands. This would insure the farmers the perpetuation of the fertility of their lands and the conservation of the essential water supply. It is a matter of record that wherever forests have been removed, rainfall becomes less regular and droughts more recurrent. With increasing aridity, the sub-soil water table lowers, and it becomes doubly difficult to raise crops as the roots have to go deeper to reach the water supply.

PECULIAR NATURE OF TROPICAL LANDS.

The foregoing considerations regarding the relation of forest cover to soil fertility apply to all parts of the earth, but they apply with more strength to tropical lands where owing to climatological reasons, soil fertility is intrinsically fragile and easily vulnerable to destruction.

Comparatively, recent studies on tropical soils on all continents—Asia, Africa and Central America—have discovered some remarkable similarities in soil characteristic, most important for a realistic national policy on soil conservation. Tropical lands differ radically in many respects from those in the temperate zone, and many farming practices applicable to the latter have been found to have ruinous results when applied to tropical lands. It is now widely accepted

that unirrigated tropical uplands can not be continuously plowed for the plantation of food crops without causing a rapid deterioration in soil fertility. It is here where the shifting system of cultivation—called *kaingin* in the Philippines, *Milpa* in Mexico, *Ladang* in Java, *Roca* in Brazil, *Ray* in Indo-China and *Masole* in Belgian Congo—is so prevalent. This system, so strangely uniform in all tropical lands, and so highly deprecated because of its harmful effect on soil fertility, is after all the only system of cultivation adapted to unirrigated tropical uplands; and if temperate zone agricultural practices were applied with deep plowing and mechanized power, the effects would still be more disastrous. The reason is fundamental, because tropical soil—aside from flooded ricefields—can not hold their fertility principally due to the fact that at the normal tropical temperature (above 75 degrees F) organic compounds rapidly decompose and upon contact with water have a tendency to leach out fast, leaving the soil devoid of plant nutrients. It has been observed in Africa and Brazil that wherever modern mechanized agriculture has been practised, cleaning the land more thoroughly, and by deeper plowing exposing the soil more to the sun, the results are still worse than those observed under the “*kaingin* system,” the fertility of the soil vanishes even more rapidly.

On unirrigated tropical lands, the only cultivation that seems reasonably enduring is tree agriculture, like coconut, cocoa, coffee, banana, etc., under which the soil is kept under the shade of the tree canopies and the roots bind the soil, thus combating leaching and erosion. The only probable exception to this rule is sugar cane, under which tropical lands seem not to deteriorate fast although plowed, probably because the crop takes a longer time, nearly a year and the soil thus suffers less from sun exposure.

Though this generalization regarding tropical uplands might be subject to several qualifications, it is now widely accepted that tropical lands are not as rich as one would

expect from their luxuriance and their fertility is fragile and easily destroyed once the forest cover is removed.

MISUSE OF LAND AND ITS CONSEQUENCES—CONTEMPORARY EXAMPLES.

A strict adherence to the principles of land classification and a strict enforcement of the rules governing the use of lands according to their respective capabilities is most imperative in tropical lands. The only alternative is rapid fertility destruction and farm misery.

In the Philippines we have several shining examples of rank neglect and misuse of land. Perhaps the most glaring case is that of Cebu where in spite of all government efforts, vegetation continues to recede and *water erosion keeps on becoming worse and worse every year.*

A similar experience can be observed in the district of Buenavista, Bulacan. In this place, famous for the political controversies which centered on its acquisition by the government, the soil fertility has been so depleted that farmers can expect a rice yield seldom higher than 10 cavanes per hectare. In order to replace the soil fertility in this region, a long and arduous process will be necessary which will perhaps take more than a generation. In the Koronadal Valley, unless steps are taken promptly to counteract the forces exhausting the soil, the ultimate results will be similarly disastrous. For the present savannahs standing on Koronadal's very thin soil, if cultivated by plowing, offer the classical example of misuse of tropical lands.

And so, we might go on to many other regions. It is told that Ilocos regions once were fertile lands, they were among the first ones to be settled by the Spaniards, and yet now they are classified as among the most infertile districts, and their population is continuously looking for other lands where it may emigrate. Coincidentally, the surrounding highlands have been most heavily denuded.

What is most tragic about misuse of land is that while those who settle on what should otherwise have been kept under forest do get a very miserable subsistence level crop themselves, by their destruction of the forest cover they impair the fertility of the surrounding good agricultural lands. And so while no new good land is acquired, even what otherwise would have been good land becomes bad. A famous author called this latter, exhausted tropical land as land leprosy—such far reaching evil effects can it have—for it is a vicious spiral, as the areas of good land diminish, more forest lands are opened and destroyed, and these in turn destroy more good lands.

ECONOMIC VALUE OF FORESTS.

On the other hand, these fragile and delicate soil lands which are so incapable of sustaining agricultural cultivation, when kept under forest are not so idle from the national economic point of view. The Philippine forests may be classified among the richest in the world, and the demand for our woods is steadily growing from year to year. In the year 1953, the exports for logs and lumber were valued at ₱46,769,487.08 ranking third in the country's exports aside from the valuable contribution to the domestic economy in the building of the much needed housing for our growing population.

On the basis of an average density of 150 cu. m. of merchantable timber per hectare of forest land, at the present ruling price of approximately ₱30.00 per cu. m., the gross yield per hectare is ₱4,500.00. If we estimate a cutting cycle from first growth of 50 years, the annual growth yield would be around ₱90.00 per hectare. We would remember that this yield is obtained on soil otherwise poor for agriculture, and it should also be pointed out that a great deal can still be done to improve on the utilization of our timber—it is estimated that at present only 25 per cent of a tree is converted into merchantable lumber, and by modern utilization plants it is possible to expect a utili-

zation as high as 70 per cent.* If in addition we consider that there are other products like rattan, gum copal, firewood, etc., we can appreciate how utterly erroneous is the notion that forest lands are idle lands in the sense that they do not contribute much to the gross national product.

In other countries such as America, Australia and New Zealand, the governments and even private enterprise have gone to the extent of buying out vast extensions of private lands in order to convert them into forests, and these man-made forests are proving to be profitable investments.

REFORESTATION WORK IN THE PHILIPPINES

BRIEF HISTORY OF PHILIPPINE REFORESTATION WORK.

The need for artificial reforestation has been long felt in the Philippines. As early as 1910, a forest nursery was established at the same time as the school of forestry was opened under the University of the Philippines in Los Baños, Laguna. Practical methods of planting cogonal areas were tried and the species suitable for the planting were determined. By 1914, approximately 120 species were tried in the nursery and plantation of the school, and by 1916, this number had increased to 600. At present there is a good number of species which have been found suitable for reforestation, among which are Molave, Narra, Supa, Para rubber, taluto, kalantas, malaruhut, teak, mahogany, ipil, lumbang, banaba, agohe, bitaog, baguilumbang, akle, tindalo, ipil-ipil and madre-cacao.

Pilot Plant Period 1916-1936.

The initial attempt to embark on extensive planting of barren lands was in 1916 when the Philippine Legislature appropriated the sum of ₱10,000 under Act 2649 for the reforestation of the Talisay-Minglanilla Friar Lands Estate in Cebu Province, con-

taining an aggregate area of 4,095 hectares. The Bureau of Forestry immediately established the project, now known as Cebu Reforestation Project, to demonstrate to the public the necessity of putting the land to its best use and how much can be done in the way of reclaiming waste and rocky lands through artificial reforestation. The difficulty encountered at the start was the ejection of the squatters who were very hostile to the project. In spite of this, the work progressed rapidly as available funds warranted and 73 per cent of the area was planted. Due to lack of funds, however, the work had to be stopped for some time. The squatters, taking advantage of the temporary abandonment of the project, returned to the estate and made clearings on the areas planted to ipil-ipil and other fast growing forest species.

In 1919, three new projects were opened. Up to 1926, the expenses for reforestation were taken from the general appropriations of the bureau, and because these were limited, the work was confined to experimental planting, establishment of small plantations, studies on treatment of seeds to hasten germination, and species suitable for reforestation purposes. In 1927, the amount of ₱50,000 was appropriated under Act No. 3238 to continue the activities of planting. This made possible the opening of the Cinchona Plantation at Bukidnon during the year and of three other new projects up to 1931. From 1932 to 1936, the amount of ₱310,000 was made available for expenditures. No new project was opened as the money was just enough to maintain the then existing projects. *Full Scale Reforestation 1937-1941.*

In 1937, under Commonwealth Act No. 245, the amount of ₱258,198 was appropriated. This was the biggest appropriation authorized for a single year since the beginning. Because of the increased volume of work brought about by the substantial increase of appropriation, the office of the Forester in Charge of Reforestation Projects

* When this high utilization is achieved, the yield might treble, to around ₱250 per hectare per year.

was organized. Extensive and intensive planting surveys were conducted to determine the area needing planting, and gather data for a long-range reforestation plan.

In 1938, the total amount of ₱1,256,375 was appropriated under Commonwealth Acts Nos. 300 and 304. During the year, 12 additional projects were established. Reforestation became so important an activity of the Bureau of Forestry that in 1938, the office of the Forester in Charge of Reforestation Projects was organized into, and made to function as, a Division of Reclamation and Reforestation. In that same year, five more new projects were established.

When the war broke out in 1941, the total amount of ₱1,689,710 was appropriated for reforestation under various Acts of Congress.

War Period.

Since the beginning up to the outbreak of the war, the Government had spent about 3½ million pesos for an extensive reforestation program. At the outbreak of the war, the work was very well in progress in the 35 reforestation projects established in the various parts of the Philippines, distributed as follows: 11 in Northern Luzon, 14 in Central Luzon, 1 in Southern Luzon, 6 in the Visayas and 3 in Mindanao. Four of these projects were located in established forest reserves, 7 in national parks, and the rest in the watershed of the Agno, Pampanaga, Abra and Cagayan rivers and in other places where the problems of flood and erosion, flood control and water conservation are of such a nature and character as to demand immediate attention. For reforestation purposes, 1,841,980 hectares of open lands had been intensively studied. Out of this area, 963,740 hectares or 53 per cent needed immediate planting. About 467,700 hectares of the area needing reforestation had already been included within the jurisdiction of the existing 35 projects.

The total area of the plantation before the war was 26,660 hectares classified as fol-

lows: fully-stocked, 5,200 hectares; partially-stocked, 16,500 hectares; and unclassified, 4,960 hectares. The number of trees living in the plantation was estimated at 687 million, of which 25 million were of the more desired timber species and 662 million were ipil-ipil. The nursery exclusively for cinchona growing had an area under maintenance of 51,570 square meters with an annual capacity of about one million seedlings. At the outbreak of the war, the area of fully-stocked cinchona plantation was 344.26 hectares containing about 1,200,000 cinchona trees.

The forest nurseries during the years of enemy occupation were neglected. They were partially or fully destroyed and were rendered wholly inoperative. Nursery houses, water systems, seeds and transplants beds, etc., were bombed or burned and tools and equipment looted.

A large portion of the plantations were cleared for cultivation by evacuees. All the young seedlings died due to suppression by grasses, while many older trees were cut and utilized for firewood. Only a few of the projects were kept in operation but no planting was done therein as the work was confined mostly to guarding the salvaged property and equipment, and protecting from fire the few trees that were found surviving in the plantation. Only about 15 per cent or 4,000 hectares of the prewar plantations survived the ravages of the war.

Immediate Post War Period.

Before the war, reforestation work was carried on with funds under the Coconut Oil Excise Tax. During the first year after liberation, there was difficulty in securing funds to enable the Bureau of Forestry to reopen

Many thousands have the ability to achieve outstanding success in every undertaking of life—politics, literature, music—if they were willing to give themselves and overtime to one achievement. Getting is the result of giving. When one directs all his energy into one channel, and gives himself wholly to one task, something will happen.

—*The Speaker's Library*

the projects. No fund for reforestation was made available until January 3, 1946, when the amount of ₱540,000 was appropriated for the purpose under Commonwealth Act No. 718, of which, however, only ₱216,000 was released for the fiscal year ending June 30, 1946. With this initial appropriation, only 29 were reopened of the 35 reforestation projects in existence before the war. The work was confined to the rehabilitation of the nurseries, recovering looted equipment and tools, reconstruction of water systems, nursery sheds and office buildings, sowing seeds on nursery beds, construction of fire lines and cleaning the plantations. New areas had to be located for nursery sites as most of the old ones were overgrown with saplings and poles and were converted into arboretum. A total area of 37,730 square meters has been reconstructed as forest nurseries. The acquisition of needed equipment, especially planting tools, was very much delayed on account of the inavailability of those tools in the local market.

For the fiscal year ending June 30, 1947, the total appropriation available for reforestation was ₱280,000 under Republic Act No. 80. The Cinchona Plantation in Bukidnon was allotted an initial capital of ₱144,000 as a revolving fund for its maintenance. Due to adverse peace and order conditions in the vicinity, the Western Pangasinan Reforestation Project was temporarily closed. A total area of 117,053 square meters was main-

tained for forest nursery. There were planted new area covering 393 hectares and approximately 227 hectares of the old plantations were replanted.

REFORESTATION UNDER REPUBLIC ACT NO. 115.

Commencing on July 1, 1948, a new and more permanent source of funds was available for reforestation work. Under Republic Act No. 115, a separate fund was constituted by levying the amount of ₱0.50 on each cubic meter of timber from the first and second groups, and ₱0.40 on third and fourth groups, cut and removed from any public forest for commercial purposes.

Under this law, at the present rate of logging, the Government is assured of around a million pesos annually, and this law provides that the funds thus collected will be exclusively used for reforestation work. During the last five years ending on June 30, 1953, the disbursements under this fund averaged ₱883,328 yearly, but of this amount only 85% was disbursed for purely reforestation work, the balance having been spent for salaries and wages of personnel not directly connected with actual reforestation work, such as rental of buildings, expenses for scaling, accounting, auditing, etc. The following table shows the income, appropriation and actual expenditures for reforestation from 1947 onwards:

Fiscal Year	Income	Appropriation	Actual Expenditures
1947-48	₱ 437,515.71	₱ 200,000.00	₱ 246,016.44
1948-49	862,985.20	986,679.00	855,583.80
1949-50	908,087.73	974,096.40	969,601.49
1950-51	1,192,390.32	821,000.00	800,384.61
1951-52	1,310,255.44	921,858.05	921,326.34
1952-53	1,025,694.52	1,376,480.00	1,423,750.86
TOTAL 1948-1953	₱5,299,413.22	₱5,080,203.45	₱4,970,647.10
Average Yearly	₱ 938,915.96	₱ 949,614.18	₱ 883,328.72
1953-54	522,510.49*	1,050,560.00	672,194.74*

The following table shows the work accomplished as of June 30, 1953, in the various reforestation projects arranged in their order of establishment:

* Up to February 28, 1954, or for eight months.

Name of reforestation project	Location	Date established	Proposed Area to be reforested (Hectares)	Area of Nursery (Sq. M.)	Area Actually planted (Hectares)	Percentage
1. Makiling	Los Baños, Lag.	1910	3,900	74,111	433	11.1
2. Cebu	Camp 7, Cebu	5-1916	2,690	4,749	666	24.6
3. Caniaw	Bantay, Il. Sur	1919	35,236	54,216	246	0.7
4. Arayat	Arayat, Pampanga	1919	3,710	15,000	525	14.2
5. Impalutao	Impasugon, Buk.	5-1927	1,000	29,998	299	29.9
6. Ambuklao	Bokod, Benguet	4-1928	29,090	4,000	376	1.2
7. Cinchona	Kaatoan, Malaybalay	8-1929	6,410	71,260	450	7.0
8. Paraiso	Nueva Era, Il. N.	5-1930	26,166	45,101	577	2.2
9. Salinas	Pingkian, N. Viz.	3-1931	5,430	56,531	320	6.0
10. Siquijor	Larena, Siquijor	4-1937	260	11,054	283	100.0
11. Carranglan	Carranglan, N. E.	5-1937	14,800	57,286	594	4.0
12. Marinduque	Boac, Marinduque	5-1937	3,480	190,000	126	3.6
13. Itogon	Itogon, Mt. Prov.	6-1937	32,500	13,200	406	1.2
14. Bohol	Carmen, Bohol	7-1937	2,920	86,520	595	20.3
15. Bulusan	Bulusan, Sorsogon	8-1937	795	10,000	48	6.0
16. Cabunagan	Bauko, Mt. Prov.	10-1937	27,300	42,816	831	3.0
17. San Jose	San Jose, N.E.	5-1938	20,000	66,764	569	2.8
18. Aringay	Pugo, L. Union	5-1938	14,930	17,500	60	6.4
19. Roosevelt	Dinalupihan, Bat.	5-1938	1,480	3,390	82	5.4
20. Magat	Bagabag, N. Viz.	6-1938	20,050	10,000	112	0.5
21. Lagangilang	Lagangilang, Abra	6-1938	38,500	235,000	276	0.7
22. Kennon Rd.	Benguet, Mt. Prov.	6-1938	5,200	5,234	460	9.0
23. Canlaon	Murcia, Neg. Occ.	6-1938	6,120	22,890	247	6.0
24. Sto. Tomas	San Marcelino, Zam.	8-1938	10,000	68,764	113	1.1
25. Baguio	Benguet, Mt. Prov.	10-1938	30,560	5,085	754	2.4
26. Consuelo	Sta. Fe, N. Viz.	2-1938	12,000	160,000	63	0.5
27. Nasiping	Gattaran, Cag.	5-1939	4,720	55,690	167	4.0
28. Malaybalay	Malaybalay, Buk.	5-1939	1,750	27,813	251	14.0
29. Manleluag	Mangatarem, Pang.	6-1939	91,700	40,400	24	0.2
30. Bacnotan	Bacnotan, L. Union	8-1948	115	30,000	15	13.0
31. Nabua	Nabua, Cam. Sur	2-1949	1,500	81,496	148	10.0
32. Liuanag	Tumauini, Isabela	3-1949	5,100	25,054	121	2.3
33. Dingle	Dingle, Iloilo	8-1949	260	6,885	128	56.0
34. Malasag	Cagayan, Or. Mis.	9-1949	900	58,499	108	12.0
35. Sibalom	Sibalom, Antique	12-1949	5,620	15,000	12	0.2
36. Basilan	Basilan City	1951	1,500	15,766	41	0.3
TOTAL			467,692	1,717,072	10,526	2.2

* Up to February 28, 1954, or for eight (8) months.

EVALUATION OF THE WORK ACCOMPLISHED:

Since the reforestation work was started, the Government has spent about ₱10,000,000 and the area at present covered with forest plantations under the various projects measure about 10,500 hectares. This might lead one to believe that the cost of reforestation averages at the high figure of nearly ₱1,000 per hectare. Such conclusion, however, would not be warranted since a large portion of the disbursements was invested in survey work, acquisition and preparation of the nursery sites, and in repairing and replacing the vast losses caused during the war. At the start of the war, there were 26,600 hectares under reforestation and out of these 85%

was destroyed. In addition, the appropriations for reforestation were very irregular and the work had by necessity to be spasmodic and intermittent, depending on the availability of funds. The record of disbursements for reforestation work are as follows:

1916	₱ 10,000.00
1927	50,000.00
1932-1936	310,000.00
1937	258,198.00
1938	1,256,375.00
1941	1,689,710.00
1947-1954	5,888,858.00
TOTAL	₱9,463,141.00

It is only after 1948 that a steady source of funds for reforestation was created under

Republic Act No. 115 and the statistical data available for the last five years can hardly justify the drawing of any valid conclusion as to the average cost of reforestation. It is believed that if the work were well organized and the necessary funds supplied steadily from year to year, the cost of reforestation per hectare will be brought down to a much more reasonable figure. In the United States, it is claimed that the cost of reforestation averages around \$10.00 to \$12.00 per acre or ₱60.00 per hectare. In the Philippines, our cost might considerably be higher due to our harder climate.

The following unit cost data compiled by the officers in charge of the different projects might be of interest:

1. Cost of raising per 1,000 seedlings of Benguet pine	₱ 1.52
2. Cost of raising per 1,000 seedlings other than Benguet pine	4.335
3. Cost of potting per 1,000 seedlings including cost of potting materials	20.15
4. Cost of weeding per 1,000 sq. meters of nursery	32.90
5. Cost of planting per 1,000 bare-root seedlings	34.00
6. Cost of planting per 1,000 potted seedlings	43.15
7. Cost of planting per 1,000 earth-balled seedlings	125.18
8. Cost of planting per hectare with bare-root seedlings	76.36
9. Cost of planting per hectare with potted seedlings	79.75
10. Cost of planting per hectare with earth-balled seedlings	206.19
11. Cost of brushing plantation per hectare	91.20
12. Cost of construction 1,000 meters of fire-line (5 to 8 meters wide)	134.60

MAGNITUDE OF THE TASK AND MAIN DIFFICULTIES ENCOUNTERED

The principal cause for the destruction of our forests and the conversion thereof into

extensive cogonal areas is the roving or shifting system of cultivation, commonly called *kaiñgin*. This primitive form of agriculture carried on from time immemorial continues until now unabated notwithstanding the vigorous penalties meted out by Commonwealth Act No. 447 commonly called the "Kaiñgin Law."

It is now estimated that there are at present 5,073,000 hectares of cogonal lands constituting approximately 17.4% of our total land area. This barren, desolate and impoverished regions are mostly located in the watersheds of our principal rivers and therefore are in urgent need of reforestation if, for nothing else, but to control the increasingly devastating floods which occur yearly during the rainy season. *Even if we were to artificially reforest one-half of this area and the planting were at the unprecedented rate of 10,000 hectares a year, it will still take 250 years to accomplish the task.*

What makes the problem more tragic is that the task is still growing, now kaiñgins are still being made, usually in the wake of timber logging operations and consequently the situation is not even stabilized, let alone improving. It is probable that around 25,000 hectares of forest areas are logged over annually. A considerable portion of these areas falls under the agricultural classification, and therefore would not need reforestation; but a very large portion should be kept under forest, and in these areas, natural regeneration should be encouraged which would bring about the desired reforestation at a much lesser cost. The fact is, however, that much of this logged-over areas inevitably fall under squatter occupation and it becomes impossible, nay useless, to practice any modern system of sustained yield logging.

PROBLEMS INVOLVED AND SOME RECOMMENDATIONS HOW TO IMPROVE PUBLIC SUPPORT FOR FOREST CONSERVATION.

Heretofore, the campaign in favor of forest conservation, outside of the forest ser-

vice, has always been waged by lumber interests and there has been a general disinterest, nay apathy or even antagonism on the part of agricultural elements. This should not be so and must be changed as farmers must be convinced that forests and foresters are their best allies and they should consider it part of their activities to defend the surrounding forest lands against encroachment. It is said that in Scandinavia, the natural resources are comparatively meager, and the exceptionally high standard of living is only achieved because *the people participate wholeheartedly in the long-range program for the perpetual use of forest, crop and pasture lands based on enlightened and articulate public opinion.*

The resistance to land use control and disinterest in forest conservation in the Philippines arises partly from lack of faith in the scientific principles involved and partly from the all too widespread and most dangerous notion that we still have enormous quantities of public lands, potentially agricultural, and we can therefore afford to be wasteful in our land utilization policies.

To build faith in scientific principles and practices among the townspeople, particularly the unlettered, is no easy task. We might point out, however, that around two generations ago, an almost similar situation obtained regarding the science of medicine when physicians had to contend against herb and witch doctors. And yet now, the Philippine population can be said to be completely health conscious with unlimited faith in the science of medicine. By the time soil science achieves the same degree of public faith, the problem of reforestation will probably be more than half solved. As in medicine, it will allow the adoption of preventive measures which are always many times cheaper than curative process. A policy of "land hygiene" might be launched with the aim of preventing infection in land sickness and thus keep our forests and watersheds in a healthy and vigorous condition.

Perhaps it might be helpful to establish

certain definite zones or regions, whether coinciding with provincial boundaries or not, but which make up reasonable topographical units, with the aim to bind together the people in each zone so that they may all pull together in putting soil scientific principles into practice. Perhaps thus the people might actually see the difference in the productivity of their lands with and without forests.

DETERMINATION OF THE PERMANENT FOREST AREAS AND UNEQUIVOCAL DEMARKATION OF THE FOREST LINES.

Since until now, areas under forest continually pass on to agricultural classification, it is natural for townspeople to expect that this process will continue in the future, and the notion of permanent forest areas does not seem to them understandable. In order to change this general attitude, it might be advisable for the National Government to announce a formal declaration establishing the policy of permanent forest areas, the determination once made to be final and the areas so determined never again to be subject to revision for re-classification. This will remove the existing uncertainty and will destroy the incentive which induces squatters to settle on forest areas.

These permanent forest areas should be determined as early as possible and boundaries marked in a most unequivocal way to prevent trespass due to ignorance or misunderstanding. Whenever possible, the forest line should coincide with natural topographical boundaries like rivers, ravines, etc., so as to make the boundaries more easily defensible.

WHERE TO CONCENTRATE THE REFORESTATION WORK.

Admittedly, the funds available will never be enough to perform all the required reforestation work at the same time. It is the common problem of scarce means, and the policy should be to invest funds where they may be expected to yield most. The

choice will be between the old, highly denuded areas or the recently logged-over sectors of the lumbering areas. Lately, the Department of Agriculture and Natural Resources issued a new regulation whereby one-third of the reforestation fund must be invested in work on lumbering areas and the remaining two-thirds to be devoted in the continuation of the work at the old denuded areas. Though this new regulation might work considerable hardship in maintaining the present reforestation sites, and some of them might have to be abandoned temporarily, still the enforcement of the new regulation might put to test the effectivity of the preventive measures discussed in the foregoing paragraph. Certainly *it seems highly folly to invest large sums of public funds in reforestation while at the same time new lands are being deforested.*

In addition, *at the lumbering areas, a cooperative plan might be worked out with the concessioners whereby the latter would assist or even contribute financially in the reforestation work of their particular areas.* It is felt that most concessioners would gladly agree to help in this work if only they were assured of a reasonable permanency in their concession rights.

A word might be also said regarding the wisdom of concentrating efforts on projects which can be carried out within the financial capacity of the reforestation fund. To spread the funds among too many projects may have the detrimental result scattering efforts, making it impossible to attain efficiency. It is recommended that the financial requirements of reforestation projects be carefully studied and minimum requirements be established with a view to avoiding the opening up of new projects unless the necessary funds are available. A good objective would seem to be to attack few projects but to do them well.

WHAT TO DO WITH THE NEWLY OPENED REGIONS.

The present administration has embarked on an aggressive policy to rapidly open up

new lands by building a vast network of road, particularly in the island of Mindanao. It would seem highly important to take advantage of this golden opportunity to put to practice the scientific principles of land use control and soil conservation. It is vital that as the new lands are thrown open, the permanent forest areas be determined as early as possible and a plan be designed to enforce a strict adherence to the policy of forest conservation. Otherwise, these lands will be doomed to the same fate as abserved in older regions with all the dire consequences.

It might be appropriate to recall here that Japan with its population of 82,900,000 and a total land area of 36,848,000 hectares still keeps 22,500,000 hectares or *almost two-thirds of its land are under forest.* The comparative figures for the Philippines are: Population — 20,000,000, Land Area — 29,000,000 hectares and Area under forest — 16,487,600 hectares.* This high percentage of forested areas in Japan might be one of the causes of the high-crop yield per hectare in that country; it is a fact that the Japanese Government is well known because of its zealous protection for its forest lands.

Our new areas in Mindanao are probably the nation's last reserves, and if we allow them to be wantonly wasted away, the next generation will have nothing to fall upon and the pressure of population for more lands will be much more serious than what it is at present.

SCIENTIFIC ORIENTATION.

Reforestation is only one of the many phases of the bigger problem of developing a national consciousness for a scientific way of life. Unless and until we succeed in getting the Philippine population imbued with a pervading underlying attitude of applying science to economic production with all the concomittant restraints which this discipline requires, it is impossible to expect a true and enduring progress in our economic growth. Our people must be convinced that they have to live in harmony with nature,

in accordance with the proven scientific laws or else nature will always have the last word.

HOW TO WIN THE PUBLIC MIND.

To attain the objective envisaged in a really effective movement for forest conservation and reforestation, it is essential to carefully prepare a well-designed program to break the present public inertia and indifference, and inspire the public imagination in favor of trees as trees, not necessarily because of the fruits derived from trees.

To a very large sector of the public, a tree not bearing edible or otherwise useful fruits is a useless tree and is better removed. The logical consequence of this attitude is that forest trees since they bear no useful fruits are also useless and, therefore, merit no attention. This whole attitude must be corrected and the campaign should aim to develop a public love for trees, because of their highly beneficial effect on soil, because of the shade they give, and because of the incomparable beauty they impart to any landscape.

In waging this campaign, several media may be utilized, but some of these have been resorted to so much in the past, such as the Arbor Day observance once a year when appropriate speeches are made, articles published in the newspapers, and school

children made to plant one tree each. These practices are already well known and are so familiar that they almost verge into the trite. Something new must be promoted if we are to make any headway.

We propose the establishment of Woodland Parks or City Forests in as many cities or municipalities as possible. It is significantly noteworthy that in our capital city of Manila with its over a million and one-half inhabitants, there should be one Woodland Park. And so it is with all other Philippine cities or towns where all the parks and plazas are treeless, brown patches, of hardly any utility to the townspeople. In all foreign metropolis like London, Paris, New York, San Francisco, Tokyo and even lesser cities, there are always one or several Woodland Parks where residents may leisurely take a stroll at the height of noon and which are important points of interest for visiting tourists. In the Philippines, a tropical country where shade is so very important, our parks are treeless and shadeless.

If a movement were to be started to establish new Woodland Parks or to convert the present ones by planting suitable trees, a healthy rivalry might be aroused between cities, thus stimulating a widespread interest in trees as trees. Preferably these Woodland Parks should be located in the center of the cities or as near to it as possible. In this respect we would recommend the conversion of the Sunken Garden of Manila, or at least the part in front of the Legislative Building, into the first Woodland Park. Undoubtedly, it would enhance the beauty of our capital city and would be a forceful way to convey the merits of the importance of trees.

Coupled with the program of Woodland Parks, there should be a long-range educational campaign supported by brochures and diverse types of literature explaining the values of trees and forests. These campaigns can be well assisted by some slogans such as: "Keep Philippine Fields Green," and "He conserves the Forest who loves the Soil Best."

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