

Los Angeles, Calif., Jan 28, 1905.

Gov. George C. Pardee,  
Sacramento, California.

Sir,---I address you from Los Angeles, this letter, to clearly show our position, in case it may be misunderstood in any way, and further to thank you for your manly stand on the water question.

I can readily see now, that as between any Hardy or Anti-Hardy faction, you are against us, and properly so, when your situation is taken into consideration but we Citizens do not appear before you in that light, as I have stated before, and I can truthfully say that the water question is the burning issue. To Senator Ward, Assemblyman Johnson and yourself, I believe I stated the situation clearly, yesterday afternoon, which is, that for nearly a year we Citizens have worked for an independent water supply. Even if Mr. Spreckles should commence the building of his system, it would be two or three years before we could get water, while if we accept the El Cajon proposition, as recommended by Mr. Lippincott, we will have water flowing into San Diego in the next six or eight months. Mr. Lippincott's report, which I left with you at your request, explains the seriousness of our situation and will impress itself upon you, without a question of a doubt. Mr. Lippincott even goes further and advises putting in our independent supply and also to encourage Mr. Spreckles in the development of his system, as we shall need every drop of water that can be developed in San Diego County. San Diego Citizens, you must admit, are aroused when they will organize, as we have done, go down into our pockets and put up the cash, as private Citizens for options, with great chances of losing the same, in case the City did not take said options up, as well as hiring and paying for Mr. Lippincott's services, etc. Justice demands that we be protected on our water fight, and the people of San Diego will love you for your words to Senator Ward that, "San Diego must have water." To show you our position, as stated before, the option on the Williamson tract, which is our most important option, expires on June 1, 1905. Now, Governor, take note that if the Spreckles interests could delay things for thirty or sixty days, all our work has been for nothing. We only have four months in which to pass the ordinance, ordering the City Engineer to draw plans and specifications, which will take at least four weeks, then another ordinance must be passed, allowing the proposition to be submitted to the people and vote bonds. This means a delay of four or six weeks in advertising, etc., according to law, and by the time the bonds are voted, it will be close to June first, providing immediate action is now taken by the new Council. We know that the Citizens of San Diego will raise the \$45000.00 necessary to take up the Williamson option on June 1st., provided the City has voted bonds, and will hold that property in trust, for the City, until the bonds are sold. If the Spreckles interests can put in a Board who will delay matters, and the bonds are not voted by the first of June, the situation is this---the Williamson option expires at that time and Mr. Williamson, whom I know personally, is just the kind of a man to advance his price materially, owing to the fact that the City has other

Gov. G. C. P: #2---

options around him or Spreckles is liable to step in and buy from Williamson. If either of these two things happen, it means delay, litigation and in all probability the ultimate defeat of the express wish and will of four-fifths of the majority of the Citizens of San Diego, and we are once again adrift. One thing which I did not state at Sacramento, and which should impress you greatly, in my opinion, is this; A committee of San Diego Citizens called on Mr. E. W. Scripps and persuaded him, out of the kindness of his heart, to obligate himself to pay \$35000.00 for the Fanita ranch, in order that the City could purchase same, or a part of it, and keep it out of the hands of unfriendly parties. His first payment of \$5000.00, was made several months ago, and the deal is practically a cash transaction. Governor, I believe it is your duty to know, whether or not, your appointees for the coming City Council are in favor of an independent supply of water. It is a question of Spreckles and a bunch of politicians, on the one hand, against the Citizens of San Diego, who want and demand an independent supply of water. You say you throw all the responsibility on Senator Ward. I believe that he is absolutely controlled by Mr. Hardy. Would it not have been the proper way for a Senator, who is trying to represent all the people, to have waited even a half hour, or one day, to see if any other Citizens in San Diego had any choice as to aldermen? You know, and we all know, that Senator Ward is familiar with the San Diego water situation, and what did Senator Ward actually do, after receiving the telegram of instructions from the High Five--Charles S. Hardy, D. C. Reed, L. A. Wright, C. C. Hakes and D. C. Collier? Within twenty minutes after receiving same, he had it in Assemblyman Johnson's hands, got him to endorse it and an hour after the list was in Sacramento it was in your office. This is what Senator Ward told me on Thursday---"Fletcher, the list of names was sent down to the Governor the day before yesterday afternoon, with the endorsement of us all. Too late, old man, sorry, but you should have been earlier. You are too late."---Can you see where the poor Citizens of San Diego even had a show? Does it look as if he was trying to protect all interests? No. He railroaded that thing through on orders, and five men have the nerve to say they are the whole thing, and know what is best for San Diego, forgetting that the people of San Diego, elected those twenty-seven councilmen, and the people of San Diego feel that there is at least nine of that twenty-seven which they elected, who are capable of filling the exalted position of alderman, without it being necessary to go outside as the High Five have done and put in four or five new men. After all Mr. E. W. Scripps has done, does not common decency demand that either Fred Scripps (Mr. E. W. Scripps' brother) or Capt. Schon, be appointed to fill out their term of office, instead of kicking them out like dogs and put in an outsider, Mr. Nate Nichols, who has not lived in the Precinct hardly a year? Capt. Schon has been the father of this water movement, and has worked day and night for its success. They fight his appointment more bitterly than that of any other. Not one of those five men dare to come out and work, or speak a word favorable to an independent supply of water. That being so, what show is there for us that they would appoint men favorable to our proposition? It is undoubtedly true that on you

Gov. G. C. P. #3---

depends the development of San Diego, to a great extent. On the one hand our own water supply and returning confidence in the town, and on the other hand, the continuance of corporation controlling influence and the fair name of San Diego blemished, with the curse that it is a one mans town.

Unless I hear from you, by telegraph, I shall say to the people of San Diego that you are with us on the water proposition and shall insist on naming men who are favorable to it, as you so stated to Senator Ward. This stand will make you beloved by all right thinking people in San Diego County, and all I ask is, that you insist on knowing where every appointee of yours stands on the water question.

Very sincerely yours,

Dic. R.P.

*E. Fletcher*

EXECUTIVE DEPARTMENT,  
STATE OF CALIFORNIA,  
SACRAMENTO.

2601.

August 14, 1905.

Mr. Ed. Fletcher,

(Care Fletcher-Doyle Co.,)

San Diego, Cal.

Dear Sir.-

Your letter of August 7th. was duly received, and I regretted to learn that after all you found it impossible to go to Portland to attend the Trans-Mississippi Congress. We shall miss you. As you are no doubt aware, credentials were sent to Mr. Hizar, the gentleman whom you mention. I trust he will be in attendance at the meeting.

Good news -- what you say about the San Luis Rey Valley Railroad. Some day all of the projected railroads, for which your people have been waiting so many years, will be running into the City of San Diego.

I am very glad to read what you write about Senator Ward. I think a great deal of the Senator, and never had any doubt that when you came to know him thoroughly you would feel the same perfect confidence in him that I do.

Very Truly Yours,

*Geo. C. Rood*

June 25, 1906.

Gov. George C. Pardee,  
Sacramento, Calif.

Dear Sir:-

This will serve to inform you that I have been unanimously elected Captain of Company "B" of this city and I shall take a lively interest in putting that Company on its feet.

My only fear is that I may not be able to pass the examination as it has been nearly twelve years since I was actively associated with any military company.

If I get through all right I shall make good to the best of my ability and learn part. Can you help me in any way? My examination takes place in Los Angeles in about two weeks. I believe Col. Schreiber is one of the examining officers.

Everything is moving along nicely with us here. The South Coast Land Co., is taking hold of things in good shape and it is only going to be a question of two or three years, in my opinion, before we will have things humming.

The enclosed article regarding Del Mar may be of interest to you and will be our first point of development. I am fortunate enough to be one of the directors in the South Coast Land Co., and Mr. Salmons and I are to have as our working interest, one fourth of the net profits of the entire proposition from Del Mar to Oceanside. They are treating us first class and I believe it will turn out to be the chance of my life.

The family are all well and I hope the same condition exists with you. If I can be of any service to you in the coming campaign, let me know.

With kind regards, believe me,

Very sincerely yours,

1 Enc.

June 29, 1900

Governor Geo. C. Pardee,  
Sacramento, California,

Dear Sir:-

Yours of the 26th at hand. You have no doubt received my letter ere this. You shall hear from me shortly in regard to the situation which shall be given as I see it. It will possibly be a few days before you will hear from me.

I have been named as a candidate for the Legislature and believe I could get it even against Hardy's wishes and opposition.

I can get ~~the~~ it easier by running independent and the Roosevelt Club will endorse me, I believe, also the Democrats, but I hesitate to follow it along those lines. In fact, Mr. Keller is opposed to my running. You will remember Mr. Keller as one of the game commissioners who is president of the South Coast Land Co., of which I am a directors Hardy has lost considerable of his power here and will lose more. In two years he will be snowed under. You will remember Captain Schon, for whom I fought so hard as one of the councilmen and Hardy fought hard against. Well, he ran independent and was elected Mayor by a large majority. There is a strong and growing feeling against Hardy and his methods. This culminated in the formation of the Roosevelt Club, of which George W. Maston, Dr. Burham and probably four hundred other staunch Republicans have joined. The general feeling among is in favor of you and yet I believe that Hardy will work against you. I will be able to know to a dead certainty a little later.

He controls the machine here just at present. He lost out

in the nomination for Postmaster and Newkirk, one of our staunch friends, will be re-appointed. I know that you will treat all this as strictly confidential with more to follow later as to possibilities of support for you from the coming delegation.

Yours very truly,

August 6th, 1906.

Governor George C. Pardee,  
Sacramento, California.

Dear Sir:-

The "anti-machine" republicans had a meeting the other night and picked out a ticket composed of ten representatives as delegates to the State Convention. It included such men as George W. Harston, Simon Levi, Captain Keene, Captain Pillsbury, as well as the writer.

It is going to be an up hill fight and the chances are against us. If Hardy puts up weak men we will win. If elected, there will be at least eight men who will support you from start to finish. The other two I am not about, as to how they feel towards you.

I have kept my own council and no one knows my object in entering this fight just at this time. My object is more particularly to help you and nothing has been said or done but what in case we are defeated you will be able to go to the other side and ask for support, without danger of their coming back at you, on our account.

I want to see you elected believing you are the man for the place, and what little influence I have will be exerted in your favor. The primaries are next Friday.

Believe me,

Very truly yours,

October 13, 1906.

Governor George C. Pardee,  
Sacramento, California.

Dear Sir:-

The enclosed copy of letter is explanatory and for your information. It refers to the building of a new armory which deal I have consummated and secured a ten year lease on advantageous terms to the Company.

I forward you today under separate cover an invitation to our 25th annual anniversary. Kindly note the men who will address the boys on the different subjects.

San Diego is coming right to the front, and the South Coast Land Company, of which I am director, is rapidly developing DelMar. The Company have purchased \$250,000 worth of property to say nothing of a large part of South ~~San~~ Oceanside, Carlsbad, Leucadia and other places between Oceanside and the city limits. The Company has just appropriated \$150,000 for improvements at Del Mar and we are now completing a \$50,000 hotel, \$35,000 bath house and have already completed a \$40,000 power plant. We will put in a complete water system sewer system, electric light plant, build a fine pier and are now grading and sidewalking the streets. We hope to get the Biological Station located at Del Mar and have offered approximately \$60,000 in property and cash to help the good work along. Anything you can do for us to help locate the Station at Del Mar will be appreciated. Professor Ritter seems to be the main man at the present time.

William G. Kerekhoff, C. A. Canfield and H. W. Keller are also directors in the South Coast Land Company. Enclosed find

January 14, 1932

Governor James Rolph, Jr.,  
Sacramento,  
California.

Governor:

The undersigned, Chairman of your Honorary Committee to study the influence of watershed cover on the conservation of the State's Waters and on any plan therefor, is instructed by the Committee to hand you herewith its report, with accompanying recommendations.

Your Committee agrees with the statement, made to you by the State Board of Forestry, that "unless a forest and brush cover is maintained on the great watersheds of California it would be hopeless to build up a great water system for the entire state".

In the accompanying statements and data and discussions thereof, your Committee presents the reasons for its earnest recommendation that the State and Federal Governments provide for the conservation of the cover on the forty million acres of watersheds in California, to the end that any plan that may be adopted for the conservation of the State's waters shall not soon be rendered useless by erosion from watersheds denuded of their natural vegetation-cover.

Very respectfully,

*Geo. C. Pardee*  
Chairman

J. N. Baylis, H. S. Gilman,  
Paul Bailey, A. C. Hardison,  
S. R. Black, E. I. Kotok,  
Swift Berry, Woodbridge Metcalf,  
M. A. Benedict, Walter Mulford,  
George H. Cecil, Geo. C. Pardee,  
Francis Cuttle, M. B. Pratt,  
Ernest Dudley, S. B. Show,  
Charles G. Dunwoody, J. M. Thiele, Committee.  
E. C. Eaton

clipping which may be of interest to you.

Give my kind regards to Mrs. Pardee and believe  
me,

Very sincerely yours,

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*Keep*

"SUMMARY OF FINDINGS OF THE HONORARY WATERSHED COMMITTEE"

SECTION I. The committee fully recognizes that the best possible development and conservation of the waters of the state are of the utmost importance to the continued prosperity of both the rural and urban communities of California. The committee does not hesitate to state that, in its judgment, any great increase in population in this state is impossible without the fullest feasible conservation of its waters. Without a sound program of water conservation the committee believes that California cannot continue to maintain even its present population.

SECTION II. Extensive experimental and other data are already available, establishing the fact that the protection of forests, brush and other vegetation on a watershed is an essential factor in the proper and successful conservation of water. A more detailed statement, including experimental data, is attached to and made a part of this report.

SECTION III. The proper management of the cover on the watersheds, including protection from misuse and abuse, is an indispensable part of any state-wide water plan.

SECTION IV. Fire is the greatest destroyer of the watershed cover in California.

SECTION V. Overgrazing also seriously injures watershed cover.

SECTION VI. Logging operations, if not accompanied or succeeded by widespread seed-destroying, seedling-destroying, litter-destroying, humus-destroying fires, will insure natural reforestation or other satisfactory watershed cover.

SECTION VII. In accordance with the best information now available, it appears that brush cover, as well as forest cover, is important because it permits maximum seepage of water into the soil, regulates stream-flow and prevents excessive erosion.

SECTION VIII. Destruction of the watershed cover results in soil erosion. Eroded material seals the surface soil of spreading-basins thus greatly retarding the penetration of water to the subterranean reservoirs. It also causes rapid silting of reservoirs, ditches and other engineering works. The maintenance of the watershed cover, therefore, is essential to the protection of such works. Complete destruction of watershed cover may even result in total loss of the capital investment in such major engineering works.

SECTION IX. In the light of the above facts it is evident that the forest and brush lands of the State should be protected from fire, from overgrazing and from destructive methods of logging, in order to minimize flood run-off and erosion.

SECTION X. It is the judgment of the Committee that the cover on the 40,000,000 acres of forest and brush lands comprising California's most important watersheds, can and should be safeguarded against fire by a comprehensive system of roads, trails, fire breaks, lookouts, telephone lines and other physical improvements, manned by an adequate and trained fire prevention and fire suppression organization.

SECTION XI. If the essential program for the protection of watersheds from fire is to be realized, the federal and state governments each must provide sufficient funds for adequate equipment, physical improvements and man power, on a very much larger scale than heretofore.

SECTION XII. Millions of dollars have been spent in California by the Federal and State governments to control destructive river floods and to prevent the silting of rivers and harbors. To safeguard past and future investments for these purposes, it is essential to provide sufficient funds for the maintenance of the cover on our watersheds.

SECTION XIII. Finally, the committee reiterates that the protection of the watershed cover in California is an indispensable item in any permanently effective water conservation plan.

## FORESTRY IN THE CALIFORNIA STATEWIDE WATER PLAN

### I.

#### Why do Forestry and Foresters come into the Statewide Water plan

The efforts of the American hydraulic engineers in contrast to universal European practice have been almost exclusively devoted to determining the amounts and intensity of waterflow in the major streams, ways and means of impounding and regulating the water supply, methods of conveyance, and means for its ultimate use and distribution.

If the problem of designing and developing a water resource plan were only one of determining the areal distribution of precipitation and the amount of streamflow, the answer could readily be given by the engineering profession without any further regard to the character of the ground cover and its treatment by man which is forestry.

There is no civilized nation outside of the United States in which the principle of interdependence of forestry and hydraulic engineering is not universally recognized and definitely established.

For centuries the maintenance of a suitable ground cover and of protection forests on strategic watersheds and the control and regulation of waterflow at the source have in these foreign countries gone hand in hand. It can not be sufficiently emphasized that none of these essential factors have as yet entered into consideration of any comprehensive scheme of water conservation in the United States and thus our country in this respect is far behind the times. The principle of control and regulation of waterflow at the source is in fact to the present day entirely ignored, while even Spain and Italy possess elaborate and well planned systems. California in its climatic and topographic aspects differs very little from these two countries and the advance made over many centuries in the older countries are directly applicable to our State.

Technical forestry cannot supplant the engineering phases of water conservation, but it can properly and effectively complement them. The physical condition of the land surface has a direct and significant influence on the amount of water absorbed and retained by the soil, on the time and rapidity of run-off, on the silt content of streams, and on the velocity and turbidity of the water itself. It follows that since the form of land use affects the condition of the surface, it has an important bearing on the

quantity and quality of run-off from that land. Land management, therefore is the field in which the forester has an important duty to perform. Sound forestry plans must be developed so that watersheds can exert their optimum influence on the regulation of water-flow. Briefly, this will require protection of all of the watersheds against fire; reforestation or revegetation of critically denuded lands; and assurance of proper methods for the harvesting of the forage and timber crop. This program should of necessity be supported by adequate research and investigations of ways and means for better handling of our forest and wild lands, and means of controlling erosion and of regulating streamflow.

Forestry deals essentially with the maintenance of certain types of vegetation and of soil fertility. The kind and character of vegetational cover and the use and abuse to which it is subjected is intimately related to water production. It is obvious that the manner of this treatment of watersheds which is essentially a function of forestry has an important bearing on the ultimate water crop.



THE ESSENTIALS OF ANY STATEWIDE WATER PLAN ARE:

1. That the life of reservoirs and other engineering works shall not be unduly shortened through silting up.
2. That to the greatest possible degree, rain shall be permitted to percolate into the ground, later to appear as summer streamflow or as underground water available for pumping.
3. That agricultural land be protected from destructive floods.

That these purposes are endangered by mistreatment of the cover of mountain and foothill lands is proven not only by common sense and experience but by many detailed studies made in California. The major factors can be observed by comparison of any forested hill with adjacent bare sloping fields during a heavy rainstorm.

The results of detailed studies are of particular value in showing the enormous quantities of dirt that are eroded by even moderate storms, falling on watersheds from which the cover has been removed, and the vastly greater run-off of storm waters from such areas, as contrasted to the greater percolation on well vegetated watersheds.

II.

What is the Problem in California in Terms of Area

Area. Studies of the water resources of the State show that the bulk of the precipitation in California falls within the mountain and foothill region embraced in about 40,000,000 acres.

Table 1

Forests and Wild Lands Included  
In Principal Watersheds of the State

| Regions               | Areas Within National Forests  |                     |
|-----------------------|--------------------------------|---------------------|
|                       | National Forest<br>Ownership   | Private<br>Holdings |
|                       | Area - Acres                   |                     |
| Southern California   | 3,013,118                      | 575,230             |
| South Coast           | 320,374                        | 91,261              |
| Southern Sierras      | 4,712,142                      | 1,125,000           |
| Northern Sierras      | 4,195,052                      | 1,750,000           |
| North and North Coast | 6,941,078                      | 1,357,731           |
| <b>Total</b>          | <b>19,181,508</b>              | <b>4,899,222</b>    |
|                       | Areas Outside National Forests |                     |
| Southern California   | 1,634,800                      |                     |
| South Coast           | 1,404,400                      |                     |
| North Coast           | 3,635,900                      |                     |
| Pine Region           | 7,433,840                      |                     |
| <b>Total</b>          | <b>14,108,940</b>              |                     |

Included in this vast land area are the watersheds producing the main source of supply that must meet the needs of the State in any major coordinated plan of water development. The character of these lands cannot be considered separately from the precipitation falling upon them, and must both be included in the final analysis of a water resource plan and in considering lands from the angle of water conservation the vegetative cover is the dominating factor whether forest, brush or grass.

The total land area of California has been roughly classified as falling in the following major categories:

|                            |                    |
|----------------------------|--------------------|
| Valleys and lowlands       | 38%                |
| Foothills (up to 2500 ft.) | 16%                |
| Mountains                  |                    |
| 2500-5000 ft.              | 23 $\frac{1}{2}$ % |
| Above 5000 ft.             | 22 $\frac{1}{2}$ % |

The State and Federal forestry departments are charged with the management and protection of the foothill and mountain areas aggregating approximately 62% of the total land area of the State. This 62% of the land surface is the source of the water on which the valley and lowlands live.

The foothills are mainly covered by brushfields and chaparral, with a lesser amount of woodland and grassland. These foothills have suffered disastrously from fire, so that much of the former woodland type of tree-like hardwoods has been replaced by chaparral and brush. The evidence is abundant that since the occupation of California by the white man, the coniferous forests along the Sierras have been pushed back from 5 to 20 miles on the upper limits of the foothills and the woodland type has been reduced to a mere fraction of its original importance and extent.

The forested lands consist chiefly of coniferous forests, the bulk of which are still virgin, but showing the effects of severely destructive fires to which they have been subjected in the past as well as to extensive exploitation by lumbering. Interspersed with these coniferous forests are extensive areas of brushfields, chaparral, and woodland which may, under proper management, be converted again into coniferous forest. On much of the cut-over coniferous forest, destructive logging and disastrous fires have so changed the character of the forest itself that heavy invasion of brushfields has taken place.

Ownership. Out of the 40,000,000 acres upon which the State must depend for the major portion of its annual water crop, roughly 60 per cent is of the coniferous forest type of which approximately 70 per cent is in federal ownership within National Forests and National Parks.

The great bulk of the foothills region throughout the State lies outside of the National Forests and is either in private ownership or in the public domain, not adequately administered. In the present Statewide plan only between 60 or 70 per cent of this land area constitutes the effectual watershed.

### III.

#### What is now known of the Relation between Cover and Water

After several centuries of forest management in France, Germany, Switzerland, Austria, and Italy, the principle is universally recognized that a complete mantle of forest, brush, or certain types of herbaceous vegetation produces maximum regulation of run-off and reduces erosion to a negligible degree. All of these countries even possess an elaborate system of special protection forests in mountainous regions established to accomplish these purposes.

The essential physical factors involved are after all quite simple. When rain water strikes the soil that is covered with a layer of litter and duff, it slowly and steadily filters through, percolating as clear water into the soil with least loss. On bare surface, on the other hand, the soil washes and consequently erodes; the water muddies and loses much of its capacity of free percolation. Instead of sinking into the soil, the water is lost through interrupted surface run-off. It follows that any form of vegetation that insures and maintains an effective layer of litter and duff is highly essential for the percolation of water in greatest amounts, for the reduction of surface run-off and floods and for the checking of erosion.

Experiments in California have confirmed the well-known fact that the removal or destruction of the mantle of vegetation exposes the land surface to the full forces of erosion by reducing the absorptive capacity of the soil and by increasing surface run-off, thus accelerating the process of erosion to a marked degree. These studies and observations are sufficiently conclusive to show that such effects are operating on a large scale in the watersheds in California as elsewhere in the world. The evaluation of the trend and magnitude of these processes forms an integral part of the basis for the shaping of water-management policies. In comparison with more humid regions, California is confronted with a series of special problems involving wide fluctuations in seasonal precipitation, steep topography, relatively short drainages and the prevalence of detritus-filled storage basins in the valleys.

Three forces are to be reckoned with in the mountain and foothill regions of California which profoundly modify and disturb the natural cover, namely, fire, grazing, and lumbering, but they differ materially in the type of disturbance they produce. Soon from this angle each influence should be studied and considered separately. The problems are further complicated, however, by the fact one influence frequently may overlap another, as for instance, in the case of lumbering followed by fire.

Protection against fire and other destructive agencies in long-time plans of forest management is one of the guiding principles in the administration of National Forest lands. Excepting for the California compulsory patrol law, which applies only to forested lands within the pine region, there are no Federal or State regulations prescribing what private owners may or may not do on forest or foothill lands. Use and management of these lands remain, at present, a legal right of the owner, frequently in conflict with the public interest.

Hot, dry summers favor intense and widespread burns which leave watershed surfaces bare and ash-covered, exposed to the full effects of the wash of torrential fall and winter rains. The extent of fires on California's mountain and foothill lands, her watersheds, is illustrated clearly by the following tabulation:

Table 2  
Forest and Brush Fires in California  
Totals (1928-1929)

| Causes         | Number<br>Fires | Number Acres<br>Burned |
|----------------|-----------------|------------------------|
| Lightning      | 1,073           | 167,470                |
| Railroad       | 283             | 330,442                |
| Campers        | 393             | 95,699                 |
| Smokers        | 2,375           | 697,936                |
| Debris burning | 711             | 157,565                |
| Incendiary     | 1,169           | 1,081,639              |
| Lumbering      | 266             | 15,329                 |
| Miscellaneous  | 845             | 234,459                |
| Total          | 7,014           | 2,361,539              |

Table 2 gives the total number of brush and timber fires that occurred in the watershed areas over the State under consideration for the period 1928-1929. A total of over 7,000 fires with over 2,300,000 acres burned - these are staggering figures.

Particularly noteworthy is the large area burned over by incendiary fires. Unfortunately these fires are, in the main, set by owners of land and local residents little interested in the great need of the State for the protection of its watersheds.

Studies of the Effects of Fires. The enormously accelerated erosion which follows fires on various California watersheds is illustrated with abundant evidence in the report to the California Senate Concurrent Resolution No. 27<sup>1</sup> of 1921.

A series of studies by the U. S. Forest Service<sup>2</sup> show the serious disturbances which follow in the forest itself after fires, and the degree to which the California pine region has been subjected to this influence in the past. More recent and detailed experimental work proves that complete destruction of the vegetation and the ground litter by fire increases surface run-off 15 to 20 times, and the amount of removed eroded material 100 to 1000 times. The greater the intensity of rainfall over freshly burned land, the greater is surface run-off and erosion. It must be remembered that intensities of even 1 inch per hour are not uncommon in California.

Experimental plots on the Sierra foothills show that in 1929, with 18 inches of the season's precipitation, about eight cubic yards per acre of dirt was washed off from burned-over areas, whereas on unburned plots but the barest trace of detrital material was removed. If only one-half this figure, that is four cubic yards, were applied to an acreage of, roughly, 2,350,000 burned-over land, the yardage of dirt moving down from watersheds and which, ultimately, must reach the important drainage and storage basins, is enormous.

A recent study conducted by the Los Angeles County Flood Control District shows that the chaparral cover is of inestimable value in the control of floods and in building

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1. Report to the Legislature on Senate Concurrent Resolution No. 27 (Legislature of 1921) by the California State Board of Forestry.
  2. U.S.D.A. Bul. No. 1294, "The Role of Fire in the California Pine Forests" by S.B. Show and E.I. Kotok, Dec. 1924.

up the water table. These studies as reported by the Chief Engineer E. C. Eaton, showed that intense rains falling on a brush-covered watershed washed down 400 cubic yards of debris per square mile, while the corresponding amount on adjacent burned-over areas rose to 12,000 cubic yards.

Even with the controlling influence of 300 check dams per square mile on the burned area, the detrital material still amounted to 7000 cubic yards. It is further important to note that the brush cover not only proved to be a strong check on the debris movement, but that it also effectually functioned in reducing the surface run-off. With 1.36 inches of rain per hour the burned-over area gave 1.01 inches in surface run-off while the area covered with brush produced only .42 inches. It follows that in the burned-off area only .35 inches of water were available for percolation and for the replenishment of water tables, in contrast to .94 inches of water on the unburned area.

The Effect of Grazing on this Relationship. The relation of grazing to streamflow and erosion has been studied only in a preliminary way in California by Munns. Intensive studies by Sampson, Forsling, and others, in the Great Basin Region in Utah are of indicative value to our own problem. In one of their studies, two closely comparable watersheds were grazed to different intensities, from 1915 to 1929, inclusive. On watershed "A" the plant cover was maintained at 16 per cent of the possible stocking for five years and then increased to 40 per cent, being carried at that density through the remainder of the experiment. Watershed "B" was maintained at a 40 per cent plant cover throughout the entire period. This experiment shows that where the cover was kept at 40 per cent the surface run-off from summer rains was 64 per cent and the sediment 54 per cent less than on the originally thinly stocked watershed "A". Winter run-off as measured on watershed "A" carried 53 per cent less sediment after the stocking was increased from 16 to 40 per cent. In both experiments, the effect of the restoration of cover by regulated grazing on the rate of run-off and erosion is markedly shown.

Preliminary investigations conducted in the watersheds feeding the Roosevelt and Coolidge reservoirs indicate a serious erosion problem as the result of intense grazing by livestock. The areas show a loss in some in-

stances of one-half inch of soil in 7½ months of 1928. On steep slopes below scant vegetation, the loss is as much as 2.4 inches erosion in two and one-half years. Observational material indicates that similar conditions prevail over wide areas in California.

The Effect of Lumbering on this Relationship. The effects of lumbering itself on run-off, seepage and erosion in California have not been studied systematically, but on the basis of world-wide experience applicable here, it can be stated that conservative lumbering, followed by rational treatment of the cut-over land, does not impair the value of a given area in its functions as a watershed. With the same degree of truth, it must be accepted that wasteful and destructive logging such as has been the rule in the past, and broadcast burning lowers the watershed value just in the degree to which the destruction of its cover is carried.

#### IV.

#### What is now being done to Safeguard Water Values - and what are the Obligations of the Several Agencies

The Federal Government. Almost one-fifth of California's area is in the National Forests and includes large portions of all the principal watersheds. Because of the generally high elevations of the National Forests, the precipitation is heavy and the water yield is proportionally high and consequently the management of these lands has a decisive role in the water problem. Treatment of the National Forest to produce the maximum usable water crop becomes an unescapable obligation and responsibility of the United States. This was recognized in the Act of 1897, by which the National Forest system was created and by which it is managed. The Act states:

"For the purpose of securing favorable conditions of waterflows and to furnish a continuous supply of timber for the use and necessities of citizens of the United States."

The same principle is recognized in subsequent laws dealing with the National Forests. There is every reason for California as a state, to take a strong interest in the development and management of its National Forests.

During the past 30 years, a capable, technically trained resident organization has been developed to manage the National Forests. Watershed protection has been given full attention in the handling of these public properties, and due to a high degree of administrative authority, the Forest Service has been able to take prompt action within the limits of its appropriation, when necessary to protect the water crop. This has been notably true of timber and range, in the management of which numerous curtailments of use have been made in order more fully to safeguard the water resources of the land. In the case of fire, there has not yet been complete control.

Marked progress has been made in protecting the cover and hence the water crop on the National Forests, but with the intensification of the State's water program, increased protection will be needed.

Two major steps in particular require additional attention:

1. To master the fire problem on all areas through additional roads, trails and other protection improvements and through the addition of specially trained personnel.
2. To round out natural protective units in National Forests by the acquisition of such private lands as are liable to misuse leading to a lowering of watershed value.

The recognized obligation of the United States extends beyond the boundaries of the National Forests, and involves assistance to the State in protection of the private land from fire. Through the annual appropriations made under the Clarke-McNary Act, the Forest Service now bears a substantial portion of the cost of the State's fire control effort. Expansion of this contribution is the present need.

A large area of land outside of the National Forests possessing watershed value lies in the public domain owned by the United States, but as yet unmanaged in any way. Most of these lands are in effect a public common, subject to unlimited and unrestricted use and abuse. This situation is in the long run obviously intolerable and the placing of the public domain not administered under effective public management is an immediate need of the water conservation problem in California. The most direct way to accomplish this is to add such lands to existing public reservations.

The State Government. The State must give consideration to the private holdings within the National Forests, the 20,000,000 acres of foothills outside of and adjoining the National Forests, and the Redwood region, excepting for lands within the public domain, all of which stand outside of the jurisdiction and control of the Federal government. The protection of these lands against fires, and the regulation of their use as it affects the water supply, are distinctly a State problem and a direct obligation of the State. This obligation was first recognized officially as early as 1889 by the creation of a State Forest Department, specifically charged with the protection of such lands from fire. In contrast to the Federal administration of the National Forests, the State has been confronted with difficult problems arising out of

the fact that it is not an owner of the lands it must protect. With meager funds and, frequently, lukewarm public support, it has attempted to meet its obligations through educational means, endeavoring to create popular sentiment for the prevention and control of fires. By slow stages, it is developing a machinery for fire protection covering the territory outside the National Forests. It must be noted that the owners of forest and woodlands under State protection often are interested in other than the water crop of which they themselves are not the direct beneficiaries. Under these conditions, frequently the type of occupancy and use seriously impair the watershed values. This conflict in use and values must be weighed and judged in the light of the relative need for timber, forage, recreation, and water crop. Under sound forest management, such conflicts will be avoided and all of the inherent values of forest lands safely and wisely utilized. Larger State expenditures will be needed in order to carry out an adequate protection program. Ultimately, the State may be compelled to go far beyond fire control and assume possibly the larger regulatory responsibilities dealing with use and occupancy of forest lands within important watersheds. All other civilized countries have ultimately arrived at the same conclusion.

The Water Using Districts. While the Federal and State governments have assumed distinct obligations in protecting watersheds against abuse, the water districts, as immediate beneficiaries, have an immediate interest that they should protect. This interest must go far beyond dams, reservoirs, canals, and conduits. It must embrace the watershed as the very source of the water.

What Additional Action is Needed and by Whom

1. The committee recommends that future boards and commissions on water conservation and development include the State Forester.

The protection and development of the mountain and foothill territories of California, embracing the major watersheds, are entrusted, under present Federal and State laws, to the U. S. Forest Service in the Department of Agriculture and the State Forest Service in the Department of Natural Resources. Through enabling acts a number of counties have perfected their own organizations charged with similar functions. It has already been brought out that the manner in which these lands are treated has a direct bearing on the character of water yield from a given watershed. Obviously, the forester, in his work of producing forage or timber crops, in the methods he employs in their harvesting, in the manner and degree in which he maintains or disturbs the mantle of vegetation and in the intensity of the fire protection he furnishes, may enhance or decrease the water yield on any given watershed.

The forester must coordinate his policies in the development of all of the values that the forests produce, stressing in this State the water crop. As long as water forms an all important product of our forest lands no far sighted or intelligent planning for water or even forest management can be complete unless the technical forester with his knowledge of the intimate dependence of water on vegetation takes an active part in the formulation of a comprehensive water resource plan for California. Many State and Federal commissions and boards have been created in the past to study the water problem of the State, but no place has been given on them to trained and qualified forester. Important as are the financial and engineering phases of water conservation, it cannot be overlooked that certain vital problems lie not within the scope of engineering but within that of technical forestry.

2. The committee recommends that sufficient funds be provided by the Federal Government to carry out an adequate fire prevention and protection program on the National Forests and that the State and local governments provide

similarly for all watersheds outside the National Forests. Both the Federal and State Forest Services have already prepared detailed programs for carrying out such an enlarged plan of fire control and merely await sufficient funds for carrying them into effect.

Fire is the outstanding threat to California's watersheds. All the evidence so far adduced conclusively proves that fire detrimentally affects seepage, surface run-off, and stabilization of the soil. This relationship may vary quantitatively for different climatic or forest conditions, but, nevertheless, exists on all watersheds.

From the standpoint of the committee, it is inconceivable how tremendous outlays for water development can be planned without immediate provision for a most complete system of protection against fires. Indisputable records of the past two decades show that fire protection, inside or outside of the National Forests has been inadequate.

Geo. C. Pardee  
Chairman

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