HEARING ON CHAIRMAN'S DRAFT, H.R.——, "THE COMMUNITY PROTECTION AND HAZARDOUS FUELS REDUCTION ACT OF 1999," TO SAFEGUARD COMMUNITIES, LIVES, AND PROPERTY FROM CATASTROPHIC WILDFIRE BY AUTHORIZING CONTRACTS TO REDUCE HAZARDOUS FUELS BUILDUPS ON FORESTED FEDERAL LANDS IN WILDLAND/URBAN INTERFACE AREAS WHILE ALSO USING SUCH CONTRACTS TO UNDERTAKE FOREST MANAGEMENT PROJECTS TO PROTECT NONCOMMODITY RESOURCES

HEARING

BEFORE THE

SUBCOMMITTEE ON FOREST AND FOREST HEALTH

OF THE

COMMITTEE ON RESOURCES
HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTH CONGRESS

FIRST SESSION

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TUESDAY, FEBRUARY 9, 1999

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON FORESTS
AND FOREST HEALTH,
COMMITTEE ON RESOURCES,
Washington, DC.

The Subcommittee met, pursuant to call, at 2 p.m. in Room 1334, Longworth House Office Building, Hon. Helen Chenoweth [chairman of the Subcommittee] presiding.

Mrs. CHENOWETH. The Subcommittee on Forest and Forest Health will come to order.

Before we formally move any further, I want to introduce to you the new members of this Committee. Mr. Duncan is one of our senior members on the Resources Committee. He's subcommittee chair in charge of aviation on the Transportation Committee, and it is an honor for us to have him sharing his place on the Forests and Forest Health Subcommittee. Mr. Duncan comes from Tennessee.

Mr. Wayne Gilchrest comes from Maryland, and I have served with Mr. Gilchrest for 4 years now on the Resources Committee. He brings to us some very critical thinking and astuteness that I look forward to working with him on.

Mr. Hill, from Montana, of course, is one of our members who was with us last year. Welcome back, Rick Hill. And Mr. Sherwood from Pennsylvania. He's been involved in forestry business for a long time. And we're thrilled to have another Pennsylvanian on this Committee. And Mr. Robin Hayes from North Carolina. Again, really thrilled to have Mr. Robin Hayes on the Committee and look forward to all that you will add.

So I want to welcome all of these new members to the Committee. I look forward to having our Democrat members with us at the next hearing. Likely we will be having a hearing when there will be votes called. We won't be voting today until 6 p.m., so I think that we hopefully will be able to move through this hearing without too many interruptions.

The Subcommittee, as you know, is meeting today to hear testimony on the Community Protection and Hazardous Fuels Reduction Act of 1999. Now, under rule 4(g) of the Committee rules, oral opening statements of the hearings are limited to the Chairman and the Ranking Minority Member.

Since the Ranking Minority Member, Mr. Pat Kennedy, is not here today, the gentleman from Rhode Island, we will accept his opening statement in a written form. But this will allow us to hear from our witnesses sooner and help members keep to their schedules. Therefore, if any other members have statements, we would welcome them to be included in the hearing record under unanimous consent.

According to the Forest Service, large areas of national forests in the interior West are in very poor health. Symptoms include tree stands that are too dense with crowded small trees, undergrowth and accommodated dead materials on the ground, and also the composition of trees has changed, with an increasing amount of fire intolerant trees replacing the more fire resistant species.

The incidences of epidemic disease and insect infestation has also dramatically increased. In my district alone, hundreds of thousands of acres of forests have been devastated by a fur beetle outbreak. Aggressive and active forest management is needed at this time immediately to combat this infestation.

In these dense stands where many small, dead and dying trees often form fuel ladders to the crowns of larger trees, wildfires have become large, intense and catastrophic. Catastrophic wildfires compromise the Forest Service's ability to implement congressional directives to manage national forests for multiple uses and for the sustained yield of renewable resources. These wildfires damage water supplies, adversely affect ambient air quality and destroy fish and wildlife habitat.

Also, the damage caused by catastrophic wildfires to the soil sustainability reduces the ability of the land to support future stands of trees and greatly increases the potential for massive soil erosion. In addition, catastrophic wildfires pose hazards to human health, safety, and property. At the beginning of the century, a clear delineation existed between the urban centers and what was considered rural America. Now this no longer exists, because over time cities have grown into suburbs and suburbs have blended into what was once considered rural.

This complex landscape has come to be known as the wildland/urban interface, forests and grasslands which are intermixed with housing, businesses, farms and other developments, posing new challenges for fire management and suppression.

From fiscal year 1986 through fiscal year 1994, the 10-year rolling average of and costs for fighting fire grew from $134 million to $335 million, or by 150 percent. It is now approaching $1 billion annually. In 1996, wildfires burned over 6 million acres and cost

nearly $1 billion to fight. While not the biggest fire season ever—in 1930 over 52 million acres were scorched—but the 1996 fire season is regarded by many fire experts as the most severely impacting.

The largest contributing factor to this consensus was the fire intensity caused by the accumulated fuel buildup. According to a GAO report, congressional efforts to reduce these buildups are a race against time, and I quote, "before damage from uncontrollable wildfires becomes widespread." The fires in Florida last year were a reminder of the serious nature of this problem.

In the 105th Congress I introduced H.R. 2458, the Community Protection and Hazardous Fuels Reduction Act, to address reducing catastrophic wildfires that occur as a result of hazardous fuels buildup. I am not introducing that bill today, but rather a working draft of that bill, as I am interested in getting everyone's input. We have the ability, we have the technology and the obligation to resolve this issue. We simply need the political will, and I believe this legislation is a small, but much needed step in the right direction, and I will look forward to working with interested members from both sides as we move this bill forward.

Before I move on to introduce the first panel, I do want to notice Ann Bartuska, who is here today with the Forest Service. I would like to recognize Ann and congratulate her for her new appointment as Director of Forest Management. Ann comes to this position with many years of experience, and I have worked with her and have great respect for her, and I look forward to working with Ann to find solutions to many of the problems that we face in our national forests. We welcome you, Ann.

Now I would like to introduce the first panel of witnesses. It is my pleasure to introduce to you Mr. Barry Hill, Associate Director of the General Accounting Office. He is Resources Community and Academic Development Division head at the GAO.

As explained in our first hearing, it is the intention of the chairman to place all outside witnesses under oath, and this is a formality of the Committee that is meant to assure open and honest discussion, and you have been before us so many times, Mr. Hill, you do understand this. It doesn't affect the testimony that is given. And I believe that all of the witnesses were informed of this before appearing here today and they have each been provided a copy of the Committee rules.

Now, Mr. Hill, please rise. Raise your right hand. I will administer the oath.

[Witness sworn.]

Mrs. CHENOWETH. Thank you. Mr. Hill, will you introduce your associate, please?

Mr. HILL. Thank you, Madam Chairman. With me today is Chet Joy, who led our work on this project, and we also have to my right Charlie Egan and to my left Ross Campbell, who will be helping us with the charts that we will be showing today.

Mrs. CHENOWETH. Thank you, Mr. Hill, we will direct questions to you, and then you can call on whomever you wish.

STATEMENT OF BARRY HILL, ASSOCIATE DIRECTOR, RESOURCES COMMUNITY AND ECONOMIC DEVELOPMENT DIVISION, GENERAL ACCOUNTING OFFICE

Mr. HILL. Thank you. Thank you. It is a pleasure to appear again before this Subcommittee today to discuss our observations on the threat that national forest catastrophic wildfires pose to nearby communities in the interior West. If I may, I would like to briefly summarize my prepared statement and submit the full text of the statement for the record.

Mrs. CHENOWETH. Without objection, so ordered.

Mr. HILL. I would like to begin my statement with a brief clip of a videotape provided to us courtesy of the Learning Channel.

[Videotape.]

Madam Chairman, this videotape illustrates what we believe is a very serious problem in the interior West, the dangers that arise when population and catastrophic wildfire exist together. This afternoon we will discuss what the problem is and why it exists, what is being done about it and what are the barriers to effective action. Let me start by discussing what the problem is.

The Forest Service estimated in 1995 that about 39 million acres or about one-third of these forests are at high risk of catastrophic wildfires. Experts have estimated that the window of opportunity to take action before widespread damage occurs is only about another 10 to 25 years.

On the basis of the best available information, efforts to resolve this problem by the year 2015, the midpoint of that window, may cost as much as $12 billion or about $725 million per year. However, the Forest Service's current plan to do so may leave as many as 10 million acres still at high risk at that time.

The interior West region we are talking about is the dry inland portion of the western United States shown on the map to my left. For those of you who may not be able to clearly see these exhibits, they are also included as appendices to my formal statement.

There are many reasons why national forests in this region are in their current state. Historically the region's lower elevation forests were subject to frequent, low intensity fires. The location of these frequent fires which are generally dominated by ponderosa pine are depicted in the exhibit to the right. Frequent fire generally kept the trees in these forests few in number and their undergrowth sparse, as shown in our next exhibit, which is a 1909 photograph of a ponderosa pine stand in the Bitterroot National Forest in Idaho.

Many past human activities, including some prior to Forest Service management, eliminated these frequent fires. As a result, tree stands have become much more dense, as shown by our exhibit here on the right, which is a photograph taken from the identical spot 80 years later in 1989. The most significant contributor to this increase in tree stand density has been the agency's decades old policy of suppressing wildfires.

Our next exhibit shows the change since 1910 in the number of acres burned annually by wildfires in national forests, over 90 percent of which occurred in the interior West. You will notice that for about 75 years, fire suppression was very successful. However, in 1984, this turned around, and since then the number of acres

burned annually has been increasing. The reason for this is because the increased stand density also caused increases in less fire tolerant species of trees, resulting in high accumulation of fuels for fires.

Because of these accumulated fuels, fires are now much more likely to become large, intense and catastrophic wildfires. The increase in the number of large fires since 1984, and in the number of acres that they burn, which has more than quadrupled, is shown in our next exhibit. Since 1990, 91 percent of these large fires and 96 percent of the acres burned were in the interior West.

A 1998 estimate of the locations of forests in the interior West that are at medium or high risk of catastrophic wildfires are shown in our next exhibit. Especially troubling are the hazards that these large fires pose to human health, safety and property, especially along the boundaries of forests where population has grown rapidly in recent years.

Our next exhibit shows the recent population growth in this so-called wildland/urban interface. Areas shown in blue are counties where the population grew at a rate faster than average. You will notice that these areas are often concentrated around the national forests, which are shown in green. In addition, as shown in our next two exhibits, the costs to both prepare for and to fight these increasing numbers of catastrophic wildfires are also increasing rapidly, largely because of the higher costs in interface areas.

As these exhibits show, the average annual cost of fighting fire grew from $134 million in 1986 to $335 million in 1994, or by about 150 percent. 95 percent of these costs were incurred in the interior West. Moreover, the costs associated with preparedness increased from $189 million in 1992 to $326 million in 1997.

It should be clear, Madam Chairman, that many communities adjacent to the national forests in the interior West face serious wildfire threats.

The Forest Service has taken several steps to address this situation. It has refocused its fire management program to increase the number of acres on which to undertake fuels reduction activities and has restructured its budget to better ensure that funds are available to carry out this important work. The Congress has supported the agency in this task by increasing funds for fuels reduction and authorizing a multiyear interagency program to better assess problems and solutions, as well as demonstration projects to test alternative approaches for reducing fuels.

However, we believe these efforts may fall short, partly because the agency's current plans will require it to continue devoting substantial resources to maintaining conditions on other forests that are currently at lower risk of fire. Moreover, it appears to us that the Forest Service does not yet have a cohesive strategy for overcoming four major barriers to reducing accumulated fuels.

The first of these barriers is that all methods for reducing fuels can adversely affect achievement of other agency stewardship objectives. For instance, the use of controlled fires to reduce accumulated fuels is limited by the possibility that such fires often might get out of control and by the effects on air quality and the smoke from these fires. Alternatively, mechanical removal of fuels, includ-

ing through timber harvesting, is also limited by its adverse effects on watersheds and wildlife.

Second, both the agency's fuels reduction program and its timber program contains incentives that tend to focus efforts on areas that do not present the greatest fire hazards.

Third, the agency's timber sale and other contracting procedures are not designed for removing vast quantities of material with little or no commercial value. The final barrier to be overcome is the high costs of removing accumulated fuels. Fuel reduction activities are expensive and will likely have to continue indefinitely.

In conclusion, Madam Chairman, the increasing number of uncontrollable and often catastrophic wildfires in the interior West and the growing risks they pose to human health, safety, property and infrastructure present difficult policy decisions for the Forest Service and the Congress.

Does the agency request and does the Congress appropriate the hundreds of millions of dollars annually that may be required to fund an aggressive fuels reduction program? What priority should be established? How can the need to reinforce fire into these frequent fire forests best be reconciled with air quality standards and other agency stewardship objectives? What changes in incentives and statutorily defined contracting procedures will facilitate the mechanical removal of low value materials?

These decisions should be based on a sound strategy. That strategy in turn depends on data being gathered under the Forest Service's and the Department of Interior's joint fire science program to be conducted over the next decade and subsequently integrated into individual forest plans and projects. However, many experts argue that the agency and Congress are in a race against time and that the tinderbox that is now the interior West simply cannot wait that long. Taking aggressive, strategic agency actions now would likely cost less than just allowing nature to take its inevitable course.

Madam Chairman, this concludes my prepared statement. We would be pleased to respond to any questions that you or other members of the Subcommittee may have.

[The prepared statement of Mr. Hill may be found at end of hearing.]

Mrs. CHENOWETH. Thank you, Mr. Hill. That was very interesting testimony.

Mr. HILL. Thank you.

Mrs. CHENOWETH. And I want to congratulate you again on such a fine presentation.

The Chair recognizes Mr. Duncan for questioning. And I want to remind members that Committee rule 3(c) imposes a 5-minute limit on questions. So we will be operating the lights. Thank you.

Mr. Duncan.

Mr. DUNCAN. Well, Madam Chairman, as you know, I am a little under the weather today, so I am not going to ask a lot of questions or say a lot today, and I don't have any questions at this point. But I do want to take this opportunity to say how pleased I am to be on this Subcommittee. I noticed in the last Congress, with great interest, that you conducted a very active and very interesting Subcommittee in the last Congress, and you and I have been good

friends ever since you first got here. So I am very pleased to be serving with you.

I read a few days ago in the Knoxville News Sentinel that the amount of land in private and commercial forests in Tennessee was now 50 percent; a little over 13 million acres. And that doesn't count where we have in my—I have a mainly urban-suburban district, but I also have the Great Smokey Mountains National Park and the Cherokee National Forest and other areas similar to that in my district.

So I am very much looking forward to and interested in serving on what I feel is a very, very important Subcommittee, and I thank you very much.

Mrs. CHENOWETH. Thank you. The Chair recognizes the gentleman from Maryland, Mr. Gilchrest, for questioning.

Mr. GILCHREST. Thank you, Madam Chairman, and I, too, appreciate being on the Subcommittee. I don't have a full range of forest acreage like we have seen on these charts and graphs in the State of Maryland, but it seems that every year I deal on at least the House floor with forestry issues, and so this is an attempt to be a more astute observer of these conditions and what Congress is attempting to do with these beautiful lands around the country.

So I am here to learn a lot, Madam Chairman. I appreciate the opportunity to serve on the Committee. And you come from a rather jewel of a state, Idaho, where I spent a little time in the Boom Mountains between the Moose Creek River and the Lochsa River near Powell Ranger Station, a little place called Elks Summit, and it would be my goal to get back there again before the sun sets on my career in Congress. So maybe we can.

I just have three quick questions. One is, does GAO have any recommendations—you made a statement in here that one of the problems of dealing with this fire situation between the wildlands and the urban centers is; if you burn it EPA might not allow permits based on Clean Air Act regulations. What is the status of that?

And your recommendation to the Forest Service, burn when conditions are favorable to burn. You can't burn, I guess, when the forests is filled with 6 feet of snow, but neither do you want to burn in the forest when it is 100 degrees outside and everything is dry. So do you have any recommendations in that area?

The second question is, it seems that you said that the Forest Service—I think I got this right—has more of a tendency to focus on areas where there is high value commercial timber, rather than real areas that are fire hazards.

And the third question is, well, you have—you mentioned the fourth barrier that must be overcome in developing a cohesive strategy for undertaking effective fuel reduction efforts is their high costs. And if you could just address that.

Mr. HILL. Okay. Let's start with the recommendations. We are finishing up work on an ongoing job we have in this issue, and we are planning to issue a report in the spring, probably in the April time frame and at that time we will have recommendations. We don't have any right now, because we are still waiting on some work that the Forest Service is doing regarding their plans for updating their estimate and developing a strategy and a priority in

terms of how they are going to go about attacking the problem here.

So the recommendations that we will be presenting in that report will be more in the lines of things I think the Forest Service has to consider or factors that have to be incorporated in any plan or strategy they have. And, certainly, paramount to anything that is done here is something that we did see in the draft bill, was basically just getting a handle on where are these high-risk areas, where are the areas of the high-risk forest versus the urban interface, and then having them develop some type of a plan or a strategy for how are we going to focus whatever efforts we do and target the work that they do to clear out some of the undergrowth and the fuel that is on the forest floor in order to mitigate or minimize the problem.

Mr. JOY. I am just going to say, as Mr. Hill said, that that is probably the critical thing. And although we aren't commenting on the bill per se because it is not a bill yet, nonetheless, that is a critical aspect of it, which the Forest Service I guess later this month will be addressing. And once we have that in hand I think, as Mr. Hill said, we will be able to address that.

The other point you brought up about the Clean Air Act and the EPA, is that right now the Forest Service and EPA are in sort of a 3-year experiment to look at different ways of handling that issue of smoke, and presumably——

Mr. GILCHREST. Does there seem to be any flexibility? You have this huge danger of forest fires. One of the ways of getting rid of it is controlled burns, one of the obstacles to control burns is the Clean Air Act. When you burn the forest, smoke goes up, it has got to be different than what is coming out of a back of a car. I mean this stuff, it is particles.

Mr. JOY. It has smaller particulate matter, which the 2.5 micron thing—as stated earlier, persons in the Forest Service that we have spoken with and visited over the last year and a half in several forests—and they have all indicated that it is going to be very difficult to figure out a way around that or to figure out a way to make the two work together. But, you know, mother nature doesn't file with the EPA, and so that is another issue.

With regard to focusing on the high value timber areas, it is true, as I think as our statement says, that one of those barriers is that there are two programs essentially, program areas, that deal with this problem of fuels. One is the timber program for mechanical removing, another is the fuels reduction program, which involves both mechanical removals and is for the controlled burning you mentioned, Congressman Gilchrest.

Now, the difficulty with both of those is that the Forest Service has a goal for getting a lot of acres done under the appropriated fund for fuels reduction. It is only human nature, as the forest people at the ground level tell us, to go do the easy acres first, as many as you can, and that means doing less expensive ones. The ones around the urban areas are very expensive, so they are not getting to those.

Under the timber program, there's also an incentive to not focus on the most difficult ones, that is, the most hazardous ones. The timber program has to pretty much try and pay for itself so it has

to get larger timber out. That is not often the kind of material involved here.

The last question about cost is that if you have to get rid of an awfully lot of material that has been accumulating, as carbon on the surface for many, many years, and it is not particularly valuable commercially, then we face a real challenge here of where does the money come from.

And we have an estimate in our testimony. The CRS made a somewhat different, more limited, type one. We estimated the total. All of those numbers are pretty much in the ballpark. And they are a lot bigger than anybody currently in any form is contemplating spending at either end of the avenue to date, so far as I know.

Mr. GILCHREST. Thank you. Thank you, Madam Chairman.

Mrs. CHENOWETH. Thank you, Mr. Gilchrest.

Mr. Sherwood.

Mr. SHERWOOD. Thank you, Madam Chairman. I am very delighted to be on this Committee and it is—I know you might be a little interested in the fact that we now have two Pennsylvanians. But Mr. Peterson and I represent the area that grows the finest hardwood saw logs in the world. We have the northern beech, birch, oak, maple, Pennsylvania black cherry. And so my experience has been around people who manage hardwood forests for profit, and they have to pay all the taxes and comply with all the laws, and they try to manage their forests over a long period of time. A hardwood forest is a long cycle, and yet they are able to do that and do their culling and their timber standing improvement with the revenues that are generated from the sale of the timber, and that would be the focus on my question.

I understand that the material that you need to remove to prevent fire in the urban/wilderness interface area is of very little or of no value. But the Forest Service owns a hugely valuable resource in their timber. And it would—I would like to have someone talk to me about their ability to manage their timber, so that it would bring in enough revenue to also solve the problems that being the largest landowner in the country entails.

Mr. HILL. That is a difficult question. Let me see if I can provide some meat to it. The problem you have here is exactly as you state, the material we are talking about is of low or no value basically. And the way the timber program is set up, you designate a sale area, you go in there and you harvest the timber, and there are various funds that the Forest Service has for going back and restoring those sale lands. And that seems to work rather well in a sale area.

Unfortunately, the bulk of—the majority of this problem lies outside of designated sale areas where those funds really can't be used to clear out the undergrowth. That is where the cost comes in. The question always come up, why not use the timber program to help solve the problem, and to some extent that can be done. However, the problem is so large that you cannot rely on the timber program for doing the job.

The numbers that we have show that timber sales were used to basically clear about 95,000 acres, which is less than 5 percent of what they would need to do on a yearly basis in order to solve the problem. So although there's an opportunity there for using the

timber program to help resolve some of this problem, it is not the sole solution. There's a lot of other things that would need to be done in order to resolve it in the long run.

Mr. JOY. Congressman, if I might just add, it is not—I think it is agreed and I think we have stated that timber can be a useful mechanism for reducing fuel. One of the difficulties here is, though, that the forests have a number of other required uses by law, for wildlife, fish, et cetera, that limit the amount of timber that can be taken because of effects on them, and that is one aspect of it. And this second aspect of it—that limits how much you can expand it.

Mr. SHERWOOD. I understand it. I am not for wholesale cutting to the timber, but all healthy forests have to be harvested from time to time. And I would think that there would be so much timber value that we would have money left over. And that is what—as I become a little more involved in this, that is the figure I would like to see addressed for the—or the theory I would like to see addressed.

Mr. JOY. Noted.

Mr. SHERWOOD. Thank you.

Mrs. CHENOWETH. Thank you, Mr. Sherwood.

I do want to assure the members of the Committee that my bill covers the national forests all over the Nation. And so I am just really thrilled to welcome our eastern members into the Committee, because indeed this bill will affect your—whatever national forests that you have in your state. It is a 5-year pilot program, and we will allow testing in also the eastern states, too.

Mr. Hill, in your testimony, you said that there was 39 million acres or nearly 40 million acres that are considered very vulnerable to high risk catastrophic wildfires. You also had a display that showed a lot of red, and I noticed, could we see that display again? There was a concentration of the red in Idaho.

Mr. HILL. Northern Idaho.

Mrs. CHENOWETH. That had gotten my attention in northern Idaho.

Mr. HILL. Yes, it does.

Mrs. CHENOWETH. Yes. Is that representive?

Mr. JOY. Yes, Madam Chairman, that is the area that has been designated as—identified as being a high risk of catastrophic fire.

But there is, Madam Chairman, one thing I would want to point out. This is not a map prepared by the Forest Service, nor it is by us either, but by in fact an outside organization, a private consultant for foresters. The Forest Service, as you know, is going to be presenting some other maps. I presume they won't look terribly different from this, however.

Mrs. CHENOWETH. All right. For the record would you mind identifying the outside source?

Mr. JOY. Yes, that was, and I believe he has spoken before this Committee himself for the group, a study which was headed by, among others, Neil Sampson, who had testified here before, Dr. Neil Sampson.

Mrs. CHENOWETH. Fine, thank you.

Mr. Hill, does the agency have a good understanding of where the boundaries of the wildland/urban interface really are, in your opinion?

Mr. HILL. Not at this time. They are currently studying that situation right now, and they are in the process of defining what the urban interface is and mapping it. And the last we heard they had not even settled on a final approach yet in terms of how they were going to do this. But supposedly they will at least have a proposed approach in place, we expect by this spring.

Mrs. CHENOWETH. Good. I look forward to that.

Mr. HILL. We do, too.

Mrs. CHENOWETH. Mr. Hill, the GAO has reported extensively concerning the lack of accountability within the Forest Service. Is this concern just financial in nature, or does it apply to the forest health concerns you testified to as well?

Mr. HILL. I think it applies to everything. Accountability to us just—I mean, certainly there has been a lot of emphasis and focus placed on the financial management accountability problems that the Forest Service has. But I think there's also a problem that we pointed out in the past in terms of performance accountability. Being held accountable for what funds you are receiving and how you are spending those funds and what you are accomplishing with those funds.

And I think that is a problem that we documented quite heavily in the past and in numerous Forest Service programs and areas.

Mrs. CHENOWETH. I think I saw a release today where we are in the hole $45 million on our timber funds. And I look forward to being a sustained unit within the Forest Service, the timber fund, once again, hopefully. I am an eternal optimist and I look forward to that happening again.

Mr. JOY. Madam Chairman, in further response to your question about performance accountability, this is again where I think what Mr. Hill pointed out was so important—to have a good definition of where the wildland/urban interface is and what the hazards are within that so you can prioritize and establish some performance measures for what you are accomplishing; that is, how much are fuels being reduced where.

Without those kinds of performance measures being very well-defined, then it is very difficult to tell whether progress is being made. And that is why our concern on that point. And there are lots of things you can buy with $45 million besides the value of the timber.

Mrs. CHENOWETH. That is right. Very well stated.

I want to ask you, gentlemen, do you have anything else you would like to add for the record?

Mr. HILL. No, not at this time. But we are certainly looking forward to issuing our final report in early April, and that will paint the complete picture and provide recommendations.

Mrs. CHENOWETH. I was advised by Mr. Crandall, our director on the staff, that it would be available in April and I am really looking forward to it.

Again, I want to thank you for your very valuable testimony. And at this time, this panel is excused.

Mr. HILL. Thank you.

Mr. JOY. Thank you.

Mrs. CHENOWETH. I will introduce our second panel of witnesses now as we are readying the table.

Mr. Jim Coufal, President of the Society of American Foresters; Mary Coulombe, director, Timber Access and Supply, American Forest and Paper Association. Welcome.

Now if the witnesses will please stand and raise your right hand, I will administer the oath.

[Witnesses sworn.]

Mrs. CHENOWETH. Let me remind the witnesses that under our Committee rules they must limit their oral statements to 5 minutes, but that your entire statements will appear in the record.

The chairman now recognizes Mr. Coufal to testify.

STATEMENT OF JIM COUFAL, PRESIDENT, SOCIETY OF AMERICAN FORESTERS

Mr. COUFAL. Thank you, Madam Chairman. My name is Jim Coufal, and I am President of the Society of American Foresters. With your permission I will summarize our statement and then hand in a written statement.

Mrs. CHENOWETH. Thank you.

Mr. COUFAL. Your opening statement and then the statement from Mr. Hill have very well painted the picture of the situation, the steps that had been taken, some of the problems that still exist, and so my comments will be relatively brief, because that has been so well done before me.

I just want to say, first that the Society of American Foresters is a membership organization of nearly 18,000, and it constitutes the scientific and educational association representing the broad profession of forestry in the United States. SAF's primary objective is to advance the science, technology, education and practice of professional forestry for the benefit of society. Our preamble and code of ethics says that stewardship of the land is the cornerstone of our profession. So we are concerned with the biological situation.

We also have a cannon that says we are ethically bound to advocate and practice land management consistent with ecologically sound principles, and this is all in the context of service to society, which I will probably mention again.

I am especially pleased to be here today and I thank the Subcommittee for its continued support for the profession of forestry, and thank you, Madam Chairman, for this opportunity.

I will make four brief points. And I think another reason for being brief will be apparent in the first point. The first point is this; that in September of 1997 the SAF provided comments on an earlier version of this bill. You and your staff have addressed our concerns and have produced a bill that SAF supports. Working together we believe has produced an improved bill, and again we thank you for that opportunity and look forward to future work together.

The forests and communities that are the focus of the bill are too important to be embroiled in partisan politics. We believe this bill is a good faith effort to address a very serious problem and hope that it will attract bipartisan support.

The second point, the Forest Service estimates that from 39 to 40 million acres of forestland are at risk from catastrophic events, as we have earlier heard. We know that the agency is producing risk maps of the sort we have seen to describe the location of these areas and we eagerly await having that material in our hands so we can further analyze the situation.

We believe that the current proposed bill provides an important tool to address some of those problems. The legislation provides an innovative funding mechanism, one that allows using the proceeds from harvesting activities solely designed to reduce hazardous fuels to perform other forest management activities that often cannot pay for themselves, the kind we also heard about earlier.

We also believe the bill allows the Forest Service and the Bureau of Land Management the flexibility to make long-term investments in the forest while reducing the threat of catastrophic wildfire. And long-term investments is a very important point. Forests are not 1-year ventures or 2-year ventures but 80 or 100 or 200 years.

Additionally we believe the bill focuses on the wildland/urban interface, recognizing all the other areas, but we think this an area that deserves great attention since human lives and human property are at risk.

Point three, the bill also seems consistent with aspects of SAF's upcoming report on the national forests and public lands administered by the Bureau of Land Management, a scholarly report that will be available in approximately 5 or 6 weeks, which we would be happy to share with you, Madam Chairman, and the Committee.

While this report will address a range of issues surrounding the management of national forests, public lands, it will very likely recommend that Congress set clear and appropriate goals for these agencies, but the land managers be given appropriate decision, discretion, to implement those goals, and that Congress ought to find innovative funding mechanisms to support these kinds of activities.

We believe this bill addresses all three of those issues appropriately, even if it is a pilot bill, and perhaps the first step towards greater things.

Fourth, the bill is one tool to address the problem. The Forest Service and the BLM will need other tools and significant funding over a sustained period to address the hazardous fuels buildup in the national forests and public lands. Although this legislation is a welcome step in the right direction, the proceeds from these hazardous fuels reduction sales will not be enough to address all aspects of a very serious issue.

The Congressional Research Service study estimated that the costs of reducing these fuel loads would be about $3.5 billion. The cost of reducing hazardous fuels and investing in these lands are quite high. The costs of doing nothing can be much higher.

Thank you for the opportunity to testify, and we will also be providing a—and have provided copies of the October 1997 issue of the Journal of Forestry, which addresses wildland/urban fire issues, and I would be pleased to answer any questions. Thank you.

[The prepared statement of Mr. Coufal may be found at the end of the hearing.]

Mrs. CHENOWETH. Thank you, Mr. Coufal.

Madam, Mrs. Coulombe. We welcome your testimony.

STATEMENT OF MARY COULOMBE, DIRECTOR, TIMBER ACCESS AND SUPPLY, AMERICAN FOREST AND PAPER ASSOCIATION

Ms. COULOMBE. Good afternoon, Madam Chairman and members of the Subcommittee. Thank you for this opportunity to provide the views of the American Forest and Paper Association on this working draft of the Community Protection and Hazardous Fuels Reduction Act.

I am Mary Coulombe, Director of Timber Access and Supply for the American Forest and Paper Association. I am presenting my testimony today on behalf of the association's members, companies and allied groups. AF&PA members include forest land owners, manufacturers of solid wood products and producers of pulp and paper products. Our members own about 14 percent of the forest land in the United States, some of which is in the wildland/urban interface or abuts it.

Chairman Chenoweth, we are very pleased to see your continued commitment to addressing the wildland/urban interface fuels issue through the consideration of this working draft. This bill addresses a part of the very serious situation of hazardous fuels buildup on the national forests due to a variety of factors, as we have heard. The wildland/urban interface area is part of a much larger area of forest land that is at risk of tree mortality from insects and disease and catastrophic wildfires. As we have heard, the Forest Service has previously testified that they believe over 40 million acres of national forest lands are at such serious risk.

We believe that is a conservative estimate, and the number of acres at significant risk will continue to climb because of a lack of appropriate forest management on Federal lands. By appropriate forest management I mean the ability of the Forest Service to plan and conduct forest management projects in a timely and efficient manner in order to deal with serious forest health situations.

The gridlock that has brought the Forest Service timber program to a standstill now affects its ability to adequately manage the national forest and insure healthy vigorous forests for future generations. There are many examples in our history when we as individuals or as a society have ignored serious situations, only to ultimately endure a catastrophic event before we are willing to take action. That is the situation in our view today.

The buildup of hazardous fuels in the wildland/urban interface threatens lives, homes, commercial properties, as well as water, wildlife, recreational opportunities and scenic qualities. And as we saw with the catastrophic fires in Florida, it is not just a problem in the West. The AF&PA is very supportive of the Chief of Forest Service's direction as he has outlined in words regarding restoring and maintaining the health of forest lands managed by the Forest Service.

We are concerned, though, that the programs of the Forest Service are not matching these words. If we knew what the fuels and fire conditions are in these interface areas and what the threats are to private and public properties and values, why can't the Forest Service do the necessary forest management activities to reduce the risks and threats of wildfire?

Our association believes that it is irresponsible to follow the course of the zero cut timber extremists who would rather risk peoples lives, their homes and the forest, instead of managing forests for healthy conditions. This is akin to those who insist to let other countries destroy the environment rather than possibly managing our own human resources.

Chairman Chenoweth, we are pleased that this legislation includes some innovative ways to finance products needed in the interface area. One feature of the legislation we think is particularly attractive is the opportunity for the Forest Service to share in the costs of the forest management project using funds from the program that most benefit the project. With innovation and will, these projects can represent a win-win situation, a win for the environment and a win for local communities who waive benefit from opportunities this legislation will provide.

We also believe that this legislation is complementary to the pilot stewardship contracting projects authorized in the 1999 omnibus appropriations bill. Your bill will add to the tool kit for vegetation management to meet multiple objectives. We do have one concern, not with the legislation as you are considering, but with the capacity of the Forest Service to implement this legislation.

The Forest Services lost a great deal of forestry and contracting expertise through retirements and downsizing. We are concerned that the Forest Service would spend a considerable amount of time in writing regulations, training Forest Service people, planning projects, doing the environmental analyses and meanwhile the risk will continue to grow. We are not suggesting the Forest Service shortcut any required processes, but the Forest Service must make these projects the highest priority at all levels of the organization or they simply will not happen.

Thank you for taking the leadership on this important issue, Chairman Chenoweth. I will be happy to answer any further questions by you or the members of the Subcommittee.

[The prepared statement of Ms. Coulombe may be found at the end of the hearing.]

Mrs. CHENOWETH. Thank you, Ms. Coulombe.

The Chair recognizes Mr. Gilchrest.

Mr. GILCHREST. Thank you, Madam Chairman.

I guess I can address this question to either one or both, two quick questions, in your opinion, what do you believe is the cause for the gridlock—I think those are your words, the cause for the gridlock in the Forest Service to prevent or not act on these potential catastrophic conditions? And the other question is, there's going to be some recommendations I guess that you have seen that are contained in the draft bill of the chairman, and there will certainly be some recommendation on the part of GAO. GAO's testimony, as I read it, says that it is potentially 20 years in the time frame that the Forest Service uses to implement a strategy or a program that will eliminate these catastrophic conditions in the wildlands/urban interface.

Do you have a recommended time frame for implementing the program that is either suggested in the chairman's bill or what might be suggested in GAO?

Ms. COULOMBE. I'll take a first shot at answering that, Mr. Gilchrest. In my opinion, the cause of the gridlock—actually there are many causes to the gridlock. I think I would point to two particular things; one of them is the lack of connecting the various programs in the Forest Service, including the timber program, to the work that needs to be done here.

Perhaps I might share that I spent 26 years with the Forest Service before I moved to the American Forest and Paper Association. I was a district ranger and a forest supervisor on the Plymouth's National Forest in California, and what I saw there was at the highest levels there needs to be a recognition that this is truly the catastrophic problem that it is, and that the funding must be requested from the Forest Service to the administration and then on to Congress.

Mr. GILCHREST. So you are saying from your experience with the Forest Service could Secretary Glickman say these are our priorities, implement those priorities, would it be that simple? I mean nothing is simple, that could be a step in the right direction?

Ms. COULOMBE. I think that could be a step in the right direction, absolutely. I think that there also needs to be, as this bill does and as some of the other things do, innovative mechanisms for accomplishing the projects.

I think the third thing that is in this case one of the most serious things is the amount of time and planning that it takes to actually accomplish anything on the ground in the Forest Service, and that is a result of people, it is a result of regulations and the planning requirements.

It is just as if things are tied into knots. It is very hard to get from the conception of a problem to the implementation of doing something about it on the ground.

I will pass the mike to Mr. Coufal. He make want to address this issue particularly.

Mr. GILCHREST. If my time has not run out.

Mr. COUFAL. I am not sure that I will be adding anything to what Ms. Coulombe has said, but perhaps rephrasing it and perhaps being a little more blunt.

First let me say that I think the men and women of the Forest Service are the among the finest forestry professionals in the world. They have great integrity and devotion to the resources and the people. But I have observed them for 40 years now as buffeted and turned around by conflicting laws and regulations, by administrative rules and regulations that are conflicting, by public values that are in great conflict as any I have ever seen or experienced. They are working in a fish bowl where people shoot at them from every direction. I cannot blame them for the level of detail that they need to work with for occasionally making a mistake or going slow. I think that is something that needs to be recognized and rectified.

The second point I would make is that I have taken to saying forestry isn't rocket science, it is much more complex. It is a moving target of biology, physical environment, people, the spread of urban interface. There is nothing that you can say is fixed in time, in place; it just changes time after time. So it is not going to be an easy task, but it is one that we must get at immediately.

Mr. GILCHREST. Thank you.

Mrs. CHENOWETH. Mr. Gilchrest, are you through?

Mr. GILCHREST. First of all, that is a great quote. It is not rocket science, it is more complex. That is very good.

Quickly, do you have any sense for the appropriate time frame for the implementation of this strategy to help prevent these wildfires, urban interface things?

Ms. COULOMBE. I would say what I don't think is an appropriate time frame, and that is if there is 40 million acres, and if the current funding levels are only going to allow a million acres at the most a year, that is 40 years. That is unacceptable.

And I think if we are looking at some of the information that we have seen about the insect and disease potential mortality over the next 15 years, that we ought to be looking at a 15-year horizon. We really ought to be hearkening to what it is going to take, and let me go beyond the urban interface here, but in much of northern Idaho and other places, like the map showed, we will see the collapse of the forest.

So it is that serious, in my view, and that means we can't wait 40 years.

Mr. GILCHREST. Thank you.

Mrs. CHENOWETH. Thank you, Mr. Gilchrest.

Mr. Hill.

Mr. HILL OF MONTANA. I thank you, Madam Chairman.

I think Mr. Gilchrest has certainly zeroed in on the problem. In essence, my understanding of this is that there is some conflict whether or not the Forest Service needs to have some specific authorizing language for it to move forward to put an emphasis on dealing with the fire hazard.

In the last year's appropriation bill, we gave authority, I think, for 29 stewardship projects. This is in essence what one of the appropriate uses of the stewardship contracts should be. I know in Montana it has become politicized. They are trying to involve a large citizens' group rather than saying what does the science tell us.

Do you believe that the Forest Service has the authority currently to undertake the steps that it needs to address the magnitude of the problem in the interior West without a separate authority that the Chairman would propose? I would ask either of you to respond to that.

Ms. COULOMBE. I believe that the Forest Service has a large extent of the authorities, plural, that it needs to do this. I think what is missing here, though, is some of the contract—the innovative contracting mechanisms that are embedded in this bill that allows the trading of goods or services. The 29 stewardship projects may or may not test the real needs to get at the problem we are talking about. Our understanding is they are small. They are boutique projects in many cases, and yet we are talking about thousands of acres that may need to be treated over long periods of time.

We wholeheartedly support the stewardship pilot projects, and we have been encouraging the Forest Service to think beyond the small boutique projects and look at some projects which test large extensive areas over 5 to 10 years of time so we can really get a handle on whether or not those contracting authorities are going to

be the assistance that we think that they are in helping getting this job done. So there is that.

I think this bill in addition, as I said, creates another tool in the tool kit that is necessary in order to focus some attention and to allow a special fund, for instance, a special mechanism for the Forest Service to be encouraged, if you will, to go forward with these.

Mr. HILL OF MONTANA. I was not here during the questioning of Mr. Hill, but in the report he indicated that the 39 million acres that are in need of treatment would require about $700 million per year of commitment. In your view does the Forest Service have the authority to move forward with the——

Ms. COULOMBE. No.

Mr. HILL OF MONTANA. Anything close to that?

Ms. COULOMBE. No.

Mr. HILL OF MONTANA. Do you know how much they proposed in fiscal year 1999 to spend on this issue?

Ms. COULOMBE. No.

Mr. HILL OF MONTANA. I believe it was about $65 million, about 9 percent of what the annual commitment is that is necessary, and that would be to resolve the problem by the year 2015.

Thank you, Madam Chairman.

Mrs. CHENOWETH. Thank you, Mr. Hill.

Mr. Sherwood.

Mr. SHERWOOD. Thank you.

I am becoming overwhelmed by the size of the problem. You use the term "the collapse of the forest." I wanted to ask you if you meant by that that the urban wilderness interface problem was a start on the fire situation, or that the forest generally was cluttered with underbrush and debris, because I see them as different problems a little bit. If that is true in urban areas, I could see possibly cleaning out mechanically, but if you are talking about 40 million acres, the cost and the scope of the mechanical cleaning of this debris to me would be of a magnitude that even the Federal Government can't do that.

And I go back then to the fire situation, the set fires, and I wondered how—if that fire—I realize we have EPA problems, but if it is done in the wintertime when there is snow cover, isn't it a lot easier to control, but does it destroy your ladder, which is the objective? I realize that was a little rambling, but I have a couple of questions there.

Mr. COUFAL. Ms. Coulombe was the one who used the term "collapse of the forest," I believe, but I can take a quick crack at it. I think collapse of the forest is something that we need to think about in the sense that I can clearly imagine the world having forests long after I can imagine the world having people. The forest will go on. But the kind of forest that can provide the goods and services and values and aesthetics that we want, will it happen on all 40 million acres? Probably not. Will it happen in a given locality? Probably yes. If I am a citizen in that given locality, I want to know that my government is interested in taking care of my needs, not 40 years from now, but now, because the likelihood is probably just about equal in one spot as the other. So collapse of the forest, forest health is kind of part of the idea that it is much more complex. They are not easily defined, but there is a big prob-

lem that we have to start working on, even if we can't define it exactly, and that is a quick response, sir.

May I take a moment for a little levity, I hope. I happen to be from New York. I thought we had the finest hardwoods in the world, sir.

Mr. SHERWOOD. I take exception.

Mr. COUFAL. But the point is that ecological and political boundaries are different.

Ms. COULOMBE. I would like to address a couple of the points that you made.

I don't think that when we talk about the urban/wildland interface that we are just talking about areas around big urban areas. We are not necessarily just talking about Santa Barbara, Oakland, Lake Tahoe, Boise, Boulder, those kinds of places.

There are many, many places in our national forests that are being subdivided for residential use and for vacation homes. On the Plymouth National Forest where I was forest supervisor, there are huge tracts of private land within the forest that had been subdivided for residential homes, and very much surrounding those subdivisions did we have a situation with the urban/wildland interface where it represented serious problems with fuels buildup. It represented serious problems with being able to do anything about those fuels, and even more serious problems about having people understand that they were living in a situation in which they might lose their homes.

So think beyond your traditional view of urban. I think this is very important. I think we are talking about areas all over the West that have subdivisions within them where we have property, homes, and people are living.

Mr. SHERWOOD. Thank you.

And the fire issue, is that a controlled scientific forestry technique today?

Ms. COULOMBE. Well, I can tell you it has been a long time since I worked out in the woods, but I think there are real experts when it comes to doing prescribed burning. I think I worked with some of those people. I think the situation, again, of having forest landscapes fragmented with dwellings and with people living there, as well as the smoke and air quality concerns, makes the idea of doing large, broad prescribed burning very, very difficult if not impossible in many areas.

Mr. COUFAL. I agree.

Mrs. CHENOWETH. Thank you, Mr. Sherwood.

I do want to say with regards to the bill that is the subject of this hearing, we heard some very interesting testimony from both of you. There isn't 40 years to take care of this problem, if we cleaned up a million acres a year. $3.5 billion is a startling number. But we hope to get a start with this bill to prioritize those areas that are the worst and to be able soon, much sooner than later, to be able to go in and protect private property and begin to protect not only private property, but also the integrity of the forest itself, hopefully being able to build fuel breaks and create fuel breaks and so forth.

The 40 years that you have testified to, you know, it is not hard to calibrate that out at a million acres a year, and it is an overwhelming problem.

I want to congratulate both of you on outstanding testimony, and I want to thank you for your help in the bill.

I do want to ask Mr. Coufal, there are many reports, especially the GAO report, that questioned the accountability of the Forest Service. Do you worry about the agency's ability to administer these projects?

Mr. COUFAL. I do in the very same sense that I expressed earlier, Madam Chairman. That is that as an observer of the Forest Service, a professional observer of the Forest Service, I see them operating with an awful heavy load of conflicting laws, rules, regulations, things that have happened by accretion without necessarily clarifying what went on before, just an added burden. And in that sense I really think that they have a difficult time administering any of their problems because they have to answer to so many people, and Congress, which is natural, but also very difficult.

Mrs. CHENOWETH. Mrs. Coulombe, what are your thoughts on that?

Ms. COULOMBE. As I testified, I am very concerned about—from a number of different perspectives on the agency's ability to do these projects. I really want to underscore the fact that my experience tells me that unless the agency at the highest levels decides that this is one of its highest priorities and that is communicated up and down the organization through a variety of mechanisms, that it will be very difficult to see these projects really come to fruition and test the kinds of things and pilot the kinds of things that you are hoping will happen.

Mrs. CHENOWETH. You testified to the fact that we don't have 40 years to wait. You have also confirmed in your testimony that we have 40 million acres that are in critical condition, seriously critical condition. If we continue at the pace that we have for the last few years, how do you see those numbers of acres increasing over the next 2 or 4 years if we don't begin, Ms. Coulombe?

Ms. COULOMBE. I am at a bit of a loss to answer that because we have been waiting for the information that Mr. Hill mentioned in terms of the acres of risk potential, both from catastrophic fire and from insect and disease, and I want to underscore that those are two aspects of this problem, not just the fuels buildup.

My sense is that in the area of insect and disease, we are going to continue to see that problem grow, and we can—I think they can chart out pretty well what effects that has. In the case of the wildland/urban interface, any time we have got drought, any time we have got a lack of active management, you just continue to see it, to see the problem escalate. Again, the other aspect of this is we continue to see the urban growth boundaries grow. We continue to see subdivisions within national or adjacent to national forests. So the problem grows on that side as well as the problem within the Forest Service itself, so it has two dimensions.

Mrs. CHENOWETH. It does.

Mr. Coufal.

Mr. COUFAL. Thank you.

The 40 million acres at risk are, I am sure, not a homogeneous mass, and even within that group can be prioritized. We have talked about the wildland/urban interface, but more truthfully it is the wildland/rural interface. We talked about the problems with insects and diseases, and in making such prioritization I would think we want to look at where human lives and human property are at risk and give them the first attention.

Secondly, I think we all recognize the allowable cut on our national forests have gone down significantly over the last 10 years. Some don't need programs of this sort, they need recognition that there is honest opportunity for higher allowable cuts on the national forests.

Mrs. CHENOWETH. Thank you very much. I want to thank you both for your very valuable testimony, and we welcome any further addition that you would like to make within 10 days, and the staff may be asking you additional questions by mail.

[The information may be found at the end of the hearing.]

Mrs. CHENOWETH. Thank you.

Ms. COULOMBE. Thank you.

Mr. COUFAL. Thank you.

Mrs. CHENOWETH. Now I will introduce our final witness, Mr. Larry Payne, who is the Assistant Deputy Chief for State and Private Forestry of the United States Forest Service.

Mr. Payne, if you will please stand and raise your right hand.

[Witness sworn.]

Mrs. CHENOWETH. Please proceed.

STATEMENT OF LARRY PAYNE, ASSISTANT DEPUTY, STATE AND PRIVATE FORESTRY, UNITED STATES FOREST SERVICE

Mr. PAYNE. Madam Chairman and members of the Subcommittee, I appreciate being asked to come here today to testify on this draft bill for the administration. I would—as the others have done before me, I would like to request that my written testimony go into the record, and for the sake of time, I will just summarize it briefly.

Mrs. CHENOWETH. Without objection, thank you.

Mr. PAYNE. As you said in your introduction, my name is Larry Payne, I am the Assistant Deputy Chief for State and Private Forestry.

It is my understanding that we had some comment and some input on the previous draft bill back in September of 1997 in the 105th Congress, and we appreciate the work that you have done to address those concerns in the new revised version of the draft bill.

We also want to make clear that there is implications in that for the Bureau of Land Management in your draft legislation, and I wouldn't want anything I say here today to be construed as speaking for the Bureau. This is just Forest Service and administration.

We appreciate the modifications that you made in the past on this bill. We continue to have concerns on certain elements of the draft legislation, and I would like to summarize those if I could now and then explain to you, to the Madam Chairman and the Subcommittee, some efforts that we have under way that we think are quite helpful.

We have four major points that I would like to cover. The first point is that we believe at the Forest Service that we have sufficient authority, both existing authority and some of the new expanded authorities, that we have to do a better job of meeting the objectives that you have in your draft legislation.

We have what we consider substantive concerns on the cost effectiveness and the special funds provision of the draft legislation.

In addition, we have some concerns on the definition of certain terms, like what exactly is wildland/urban interface, that is an area, and other witnesses talked about that earlier.

And also we believe that the appropriations that are available to the Forest Service in different forms and different methods and the expanded authorities that we have been given or we expect to be given are adequate and sufficient to help us meet this need in fuel reduction.

The conclusion of those concerns is that we believe that the bill, the draft legislation, is unnecessary at this time, and I would like to talk about some of the efforts that we have under way that we think are going to take us in a positive direction. One of those has already been mentioned today, and that is the forest risk health mapping that we are now doing where we are going to have on a map the high-priority, the high-risk areas mapped out for fire, insect and disease, wildland/urban interface areas, and threatened and endangered species. It is our effort to set priorities and focus efforts on where to meet the highest priority needs.

Other efforts that we have under way, you could call current authorities with the Cooperative Forestry Assistance Act and with the Knutson–Vandenberg Act and the Brush Disposal Act. Among the three of those, they give us quite broad authorities, depending on, of course, the funding and the focus and prioritization of the agency. Those give us, we believe, sufficient authority to move on this.

In addition, it has been mentioned here before we have stewardship contracting as a major investment in the Forest Service with some special authorities in 22 pilot projects that we will be trying in this coming year. In addition, we have six new stewardship projects that will be added in northern Idaho and Montana. It is our belief and our hope that we are going to learn a lot from these, and that to do anything on a broad basis now would be a bit premature.

One other item. We have a new budget line item of $15 million planned for the year 2000 for forest health treatment that will happen outside of the timber production areas, and we believe that will be helpful.

In conclusion, Madam Chairman and Subcommittee members, we agree with the priority that your draft legislation gets at and the importance of it. Although we have serious concerns, we certainly support that priority. We think that there needs to be more analysis and more discussion; and for the reasons I mentioned earlier, we think that the bill is unnecessary at this time.

I would be happy to answer any questions you may have at this time.

Mrs. CHENOWETH. Thank you, Mr. Payne.

[The prepared statement of Mr. Payne may be found at the end of the hearing.]

Mrs. CHENOWETH. Mr. Gilchrest?

Mr. GILCHREST. Thank you, Madam Chairman.

Mr. Payne, the 22 stewardship contracting pilot projects, they deal specifically or in part with the draft legislation for the fuels reduction?

Mr. PAYNE. They are a wide range of projects that deal with several treatments and several conditions that we are trying to address.

Mr. GILCHREST. Are there some specifically for fire?

Mr. PAYNE. Yes.

Mr. GILCHREST. Does it deal with this vague term, depending on where you come from, I guess, urban/suburban/wildlands interface areas? Does it have anything to do with a few houses at risk because of forest fire or a whole new community that has recently been built?

Mr. PAYNE. We have those in all kinds of conditions where we are testing those. Of the 28, there will be some in that urban/rural interface arena.

Mr. GILCHREST. And some in that urban/rural interface arena that test how to deal with it?

Mr. PAYNE. Yes.

Mr. GILCHREST. Has that started yet, that pilot program?

Mr. PAYNE. We will be ready to go on the bulk of those beginning this spring.

Mr. GILCHREST. How long is a pilot project supposed to run?

Mr. PAYNE. Depending on the projects, 3 to 5 years. We hope within the first 2 years we will learn a lot about how to work those and what new authorities we need above and beyond.

Mr. GILCHREST. And that can be applied to the 30-40 million acres where there is a potential problem?

Mr. PAYNE. That is one tool, so to speak, for that.

Mr. GILCHREST. The forest risk mapping where you will get a lot of the data to help to prioritize the areas most at risk for the catastrophic fire, when will that be done?

Mr. PAYNE. We are in the process of validating that information right now, and I would say from what I am hearing it will be a matter of weeks to a month. We are in the process of validating that.

Mr. GILCHREST. Can you comment, Ms. Coulombe, and also Mr. Coufal, and also, I think, GAO made comments about your basic strategy to resolve—you never resolve the problem. We will always have this problem. But people who testified today are talking that it can take the Forest Service 40 years to do this. It can take the Forest Service 20 years before they come up with a strategy, test the strategy and implement the strategy. Can you comment on the Forest Service's ability to adequately complete the task at hand without using the GAO report because you feel you don't need it or without using the Chairman's bill? Does the Forest Service have gridlock, and can you get past that gridlock and implement a program?

Mr. PAYNE. Let me attempt to answer that, and I will do so with all due respect for the panelists that spoke before me. We all have opinions.

I believe that it is an immense problem nationally that we face, far more in the West than we do in the East. I have faith and I have quite a bit of confidence that we, the Forest Service, we, the Department of Agriculture, and other agencies and counties and States, there are many more of us that have to resolve this than just the Forest Service, but I believe we have the authority and the wherewithal, and when we get the commitment and the priority and the focus on this, I believe that it is manageable and resolvable, but it is much more than just the Forest Service. We do a lot of work with cities, towns and landowners.

Mr. GILCHREST. I will close with this question. Do you see part of the problem as homes being built, permanent homes or second homes, on private land within a national forest? Is that a problem from your perspective as far as where they build and droughts and catastrophic fires, and is there any way to prevent that?

Mr. PAYNE. It is definitely part of the problem, and I don't know if prevention is the answer, but working with the landowner is. My brother has a place in Spokane that is the wildland/urban interface; and my sister is in Coeur d'Alene and my parents in Missoula, and all three of them are in that environment you describe. It is part of working with the landowner and their responsibility to manage some of their own lands, though, and that is what we try to work with, landowner education in those areas. It is definitely a problem.

Mr. GILCHREST. We will have lunch sometime in Lolo Pass.

Thank you, Madam Chairman.

Mrs. CHENOWETH. Thank you, Mr. Gilchrest.

Mr. Sherwood.

Mr. SHERWOOD. Good afternoon.

Do you basically agree or not with the statement of the three people that were on before you about what a serious problem we have here?

Mr. PAYNE. I agree that it is a serious problem. I use the word immense, too. It is a large and complex problem also, yes. I agree with that.

Mr. SHERWOOD. Well, I was paying attention before, I think, but it doesn't appear to me that it is a problem that the Forest Service has a particularly active role in trying to do something about. Now, if I oversimplified that, you can help me with it.

Mr. PAYNE. I think perhaps you might have oversimplified it a bit. It is also a matter of opinion as to how fast we are going to resolve the issue. The Forest Service is in the process of targeting units of measure like acres burned and trying to focus our attention on the outcomes that we are really after. It isn't enough anymore to go burn 10,000 acres, it is more important to burn that 30, so we are developing performance measures that are going to shift our priorities away from some of the traditional measurements and towards some of those things that are really high priority, very sensitive areas.

Back to what I said earlier, I have some faith in some of the things that we are doing right now to refocus our efforts.

Mr. SHERWOOD. And you used the term "burn"?

Mr. PAYNE. That is part of my upbringing in the Forest Service. There are many ways to treat hazardous fuels mechanically. There

is prescribed fire, small forest products sales. I use "burn" sometimes as the first one when I talk, but there are a variety of methods.

Mr. SHERWOOD. It seems to me that we all agree that we have a very serious problem, but I am hearing that you don't think you need help in solving the problem, but I haven't heard enough from you as to what you are doing about it for me to agree with you.

Mr. PAYNE. Okay. Let me—I am not sure I can address that in the short time I have, but we do need help. We need help from the Congress, from the States, from other Federal agencies like EPA. We are not in it alone. It is too big of a job. If we have support in our funding and in our pilot tests for these projects that we are implementing, we get continued support for our budget line item of $15 million in the 2000, and many of those things that we are trying to push forward to get ahead using the existing authorities that we have, we think that the legislation that is drafted, what we are here today for, is unnecessary at this time.

We would like some more time to put into practice what I am saying here today.

Mr. SHERWOOD. What specifically do you think you could accomplish with that $15 million?

Mr. PAYNE. That is going to give us—that is not the total answer. Again, it is one more tool, but it will allow us to do some forest health treatments. It could be thinning to doing some watershed restoration work, to removal of material, and there will be probably several treatments that we can use that for.

Mr. SHERWOOD. But if we have a problem of the magnitude that we have been told earlier, what percentage of that problem would that get us on the road to?

Mr. PAYNE. From a percentage standpoint it is not actually that large. We are still counting on, and as you look at this over the long term, we are probably doing probably close to 1.5, 1.4 million areas a year in fuel treatment. In the outer years we need to be doing about 3 million acres a year. When we plan it out over that length of time, that is where the significant impact will come from.

Mr. SHERWOOD. One final question. How effective do you see the link between timber sales and timber sale revenues and the mechanics of your timber contracting to help solve this problem? In other words, A, you either have the revenue from the timber sales; or, B, we get the people when they harvest a block in this area to treat a block in this area. What do you think of that? In the East when you sell a piece of timber, they leave you with the roads.

Mr. PAYNE. The Knutson–Vandenberg Act and Brush Disposal Act gives us the authority and funding to treat those areas connected to timber sales, so I would quickly say that they do help. The timber sale program, of course, is going down.

Mr. SHERWOOD. Thank you.

Mrs. CHENOWETH. Thank you, Mr. Sherwood.

Mr. Payne, I want to recall back 4 years ago in this Committee when we heard the Forest Service testify that there was a forest health plan called the Western Forest Health Initiative, and that that plan would take care of this problem. We haven't seen any on the groundwork to speak of at all, and what has happened in that 4 years is that it appears the problem has grown exponentially. So

we are hearing today testimony from Mr. Coufal and Ms. Coulombe and from your own chief that say there are 40 million acres of high-risk forest. I hear you testify to the fact that you are moving ahead with another plan now.

You know, I feel like the Chairman is on the horns of a dilemma. I don't know whether to ask for more funding for the Federal Forest Service or less funding. If we give you more funding, what are you going to do with it? If we give you less and try to get you to focus more on the States to take care of their own forests, maybe that is a better way to go. I am asking for the rubber to meet the road. I want to see a plan. I am hearing you testify that you are moving on it, but is your mapping done, for instance?

Mr. PAYNE. Very close. We are validating the data right now. It is my understanding that we have a hearing before you on the 24th, I believe.

Mrs. CHENOWETH. Will the mapping be finished by the 24th?

Mr. PAYNE. It is my understanding that it will be.

Mrs. CHENOWETH. It is your understanding?

Mr. PAYNE. The last I heard it would be.

Mrs. CHENOWETH. The buck stops with you. Will you have it ready on the 24th?

Mr. PAYNE. I will say yes.

Mrs. CHENOWETH. We gave you expanded authority on only 28 pilot projects. This bill covers much more than that. Can you give me the total acres that are covered by the pilot projects, the 28 pilot projects?

Mr. PAYNE. I can't off the top of my head right now. If you give me a moment, I can ask one of my assistants.

Mrs. CHENOWETH. I will.

Mr. PAYNE. Thank you.

I am told that we don't have the acreage numbers with us. We will provide that, but whatever number we do provide, it is not a large amount of acres. They are just tests so we can learn what changes we might need to pursue in contracting. We will provide that.

[The information may be found at the end of the hearing.]

Mrs. CHENOWETH. So you do recognize that this bill gives you authority far beyond the 28 pilot projects we gave you in the appropriations bill?

Mr. PAYNE. Oh, yes, Madam Chairman.

Mrs. CHENOWETH. So based on the fact that we heard testimony on the record today that some of our forests are in near collapse, and I know in northern Idaho we are truly there, I am very alarmed. I would hope that you would welcome this new authority, and I hope that in time as we mature the bill, that you will welcome it, because we need an active, on-the-ground managing Forest Service to bring us out of the swamp that we really are in with our national forests, and it is being widely recognized now. So I look forward to your cooperation in working with you.

Mr. Payne, in your testimony you did state that your current budget sufficiently funds the agency's ability to cover these high-priority areas that this bill would provide for you? Can you give us a list of the high-priority areas, including those six projects in

northern Idaho that the Chairman is particularly interested in, as well as all of them? Can you do that?

Mr. PAYNE. I can do that, but not at this time.

Mrs. CHENOWETH. The GAO did suggest that you cannot do it now. Will you have it ready for the next hearing?

Mr. PAYNE. On the 24th?

Mrs. CHENOWETH. Yes.

Mr. PAYNE. To have the specific pilot project lists?

Mrs. CHENOWETH. Yes.

Mr. PAYNE. I will do that.

Mrs. CHENOWETH. That is good, because the appropriations bill was passed quite a while ago.

Now, Chief Dombeck continues to say that 39 million acres are at high risk for catastrophic fire, and this 39 million acres constitutes one-third of all of the forested acres managed by the Forest Service. One-third of your jurisdiction is now considered in a catastrophic situation. In your testimony you stated the administration's fiscal year 2000 budget adequately funds restoration activities on these lands by adding $15 million to those activities, yet the Chief has stated that hundreds of millions of dollars will be needed to go into restoration activities. We heard today testified to that it would take no less than $3.5 billion. That just about knocked me off my chair; $3.5 billion to restore our forests in adequate time to save our forests. How do you reckon with the conflict in your testimony compared with the statements by your Chief compared with what we heard today?

Mr. PAYNE. Let me back up, Madam Chairman. I don't want to leave the impression that what we got this year will fix the problem. My point is that over time, with the authorities and the appropriations that are available to us, they are sufficient for us to make adequate progress on the problems. I would not say that for this year alone.

I am saying if we refocus our priorities in the agency, and fully utilize the authorities that we have, and get support from all of those many people that we talk about, that we—it is unnecessary for us to get the bill that you suggest. So it is not a 1-year statement, it is over time.

Mrs. CHENOWETH. Mr. Payne, I have many, many more questions to ask you, but I see that I have the red light on, too, and I will just close with one more question and submit the other questions to you in writing. You may want to address some of the questions on the 24th, otherwise you may answer them in writing, as you know.

[The information may be found at the end of the hearing.]

Mrs. CHENOWETH. My final question is: You stated that our definitions of wildland/urban interface and hazardous fuels buildup are too broad. This bill is still only in a draft state, so I would appreciate your suggestions in defining these terms better. Would you mind submitting your definitions for these terms soon so we can begin to work on them?

I believe that if we are going to have a functioning Forest Service, you are going to need broader authority. You will need to be funded, but I want to know that the Forest Service is ready to han-

dle it. So would you commit to me to have those definitions ready for us by the 24th or even sooner, let's say within 7 working days?

Mr. PAYNE. I can certainly share with you in a general sense or in writing at a later date our best current research to date on what that urban interface is.

[The information may be found at the end of the hearing.]

Mrs. CHENOWETH. Thank you, Mr. Payne, and I do want to welcome you in the Committee. If you sense a bit of urgency from the Chairman and other members of the Committee, I think you can understand that when we are faced with testimony and on-site, on-the-ground observations on my part, that there is a real sense of urgency, much more so than there ever has been before. So I look forward to working with you, and welcome.

Mr. PAYNE. Thank you.

Mrs. CHENOWETH. Mr. Gilchrest, do you have any other questions?

Mr. GILCHREST. I had a question about the fires in Florida. Was the main cause of that fire drought or forest management or a combination? What was the ratio between Federal, State and private land?

Mr. PAYNE. I am going to have to ask for some help on that question, Mr. Gilchrest.

The answer I was given was 12 percent Federal lands; and yes, indeed, it was a combination of drought and the vast vegetation and urban interface in Florida. That was quite an event.

Mr. GILCHREST. Thank you.

That is not one of the pilot areas, Florida? You said Idaho and Montana.

Mr. PAYNE. We have six new ones in northern Idaho and Montana. The other 22 are various places around the West.

Mrs. CHENOWETH. We will be holding a hearing in Florida in the middle of March on those fires, so it will be very interesting.

Mr. GILCHREST. Thank you. The Chairman gave me this time, and I really appreciate it, Helen.

The issue about the 3-year—is it a 3-year study with EPA to determine the impact of controlled burns on the emissions that will help determine how to do that as a tool, use it as a tool?

Mr. PAYNE. Let me ask for some assistance on that one. I am not personally familiar with the specifics.

We are not sure of the exact time frame, but the study is to look at the impacts of an increased prescribed burning program and the impacts on the social side for towns and communities. We would be happy to answer that question more thoroughly in writing.

[The information may be found at the end of the hearing.]

Mr. GILCHREST. We will follow up.

Mr. PAYNE. Please do.

Mr. GILCHREST. Thank you.

Mrs. CHENOWETH. Thank you, Mr. Gilchrest.

I want to thank the witnesses for their testimony and the members for their questions. If there are no further questions, the Chairman again thanks the witnesses and the members, and this Subcommittee stands adjourned.

[Whereupon, at 3:51 p.m., the Subcommittee was adjourned.]

[Additional material submitted for the record follows.]

STATEMENT OF JAMES E. COUFAL, PRESIDENT, SOCIETY OF AMERICAN FORESTERS

Madam Chairman, my name is Jim Coufal, President of the Society of American Foresters (SAF). The almost 18,000 members of the Society constitute the scientific and educational association representing the profession of forestry in the United States. SAF's primary objective is to advance the science, technology, education, and practice of professional forestry for the benefit of society. We are ethically bound to advocate and practice land management consistent with ecologically sound principles. I am especially pleased to be here today and I thank the Subcommittee for its continued support of professional forestry. I thank the Chair for the opportunity.

In September of 1997, we provided comments on an earlier version of this bill. You and your staff, have addressed our concerns and have produced a bill that SAF supports. Working together has produced an improved bill.

The forests and communities that are the focus of this bill are too important to be embroiled in partisan politics. We believe this bill is a good faith effort to address a very serious problem, and hope that it will attract bipartisan support.

The Forest Service estimates that 40 million acres of forestland are at risk from catastrophic events. The agency is currently producing risk maps to describe the location of these areas, and we eagerly anticipate the release of that information. This bill provides an important tool to address some of those problems. The legislation provides an innovative funding mechanism of using the proceeds from harvesting activities solely designed to reduce hazardous fuels to perform other forest management activities that cannot pay for themselves. The bill allows the Forest Service and the Bureau of Land Management (BLM) the flexibility to make long-term investments in the forest while reducing the threat of catastrophic wildfire. Additionally, the bill focuses on the wildland urban interface, an area that deserves great attention as human lives are at risk.

The bill also seems consistent with aspects of our upcoming report on the national forests and the public lands administered by the BLM. While this report will address a range of issues surrounding the management of national forests and public lands it will likely recommend that Congress set clear and appropriate goals for these agencies, that land-managers are given appropriate discretion to implement those goals, and that Congress ought to find innovative funding mechanisms to support those activities. This bill addresses all three of those issues appropriately.

This bill is one tool to address this problem. The Forest Service and the BLM will need other tools and significant funding over a sustained period to address the hazardous fuel buildup on the national forests and public lands. Although this legislation is a welcome step in the right direction, the proceeds from these hazardous fuels reduction sales will not be enough to address all aspects of this very serious issue. A Congressional Research Service study estimated the cost of reducing these fuel loads at $3.5 billion. The cost of reducing hazardous fuels and investing in these lands are quite high, but the cost of doing nothing is higher still.

Thank you for the opportunity to testify. I am also providing copies of the October 1997 issue of the Journal of Forestry which addresses wildland urban fire issues. If you have any questions, I would be happy to answer them.

STATEMENT OF MARY J. COULOMBE, AMERICAN FOREST & PAPER ASSOCIATION

Madam Chairman and Members of the Subcommittee:

Thank you for the opportunity to provide the views of the American Forest & Paper Association on the Community Protection and Hazardous Fuels Reduction Act. I am Mary J. Coulombe, Director of Timber Access and Supply for the Association. I am presenting my testimony today on behalf of the Association's member companies, associations, and allied groups. AF&PA members include forest land owners, manufacturers of solid wood products, and producers of pulp and paper products. Our members own about 14 percent of the forest land in the United States, some of which is in the wildland/urban interface or abuts it.

Chairman Chenoweth, we are pleased to see your continued commitment to addressing the wildland/urban interface fuels issue through reintroduction of this bill in the 106th Congress. This bill addresses a part of the very serious situation of hazardous fuels buildup on national forest lands due to a variety of factors. The wildland/urban interface area is part of a much larger area of forestland that is at risk of tree mortality from insects and disease and catastrophic wildfires. The Forest Service has previously testified that they believe over 40 million acres of national forest lands are at such serious risk. We believe that this is a conservative estimate and the number of acres at significant risk will continue to climb because of a lack of appropriate forest management on Federal lands. By appropriate management, I mean the ability of the Forest Service to plan and conduct forest management

projects in a timely and efficient manner in order to deal with serious forest health situations. The gridlock that has brought the Forest Service timber program to a standstill now affects its ability to adequately manage the national forests and ensure healthy, vigorous forests for future generations.

There are many examples in our history when we as individuals or as a society have ignored serious situations, only to ultimately endure a catastrophic event before we are willing to take action. That is the situation today. The buildup of hazardous fuels in the wildland/urban interface threatens lives, homes, commercial properties, as well as water, wildlife, recreation opportunities and scenic qualities. And, as we saw with the catastrophic fires in Florida last year, this is not just a problem in the West.

The American Forest & Paper Association is very supportive of direction that the Chief of the Forest Service has outlined in words regarding restoring and maintaining the health of the forest lands managed by the Forest Service. We are concerned though, that the programs of the Forest Service are not matching these words.

If we know what the fuels and fire conditions are in these interface areas and what the threats are to private and public properties and values, why can't the Forest Service do the necessary forest management activities to reduce the risks and threats of wildfire? Our Association believes that it is irresponsible to follow the course of zero-cut extremists who would rather risk people's lives, their homes and the forest, instead of managing forests for healthy conditions. This is akin to those who insist that its better to let other countries spoil the environment rather than responsibly managing our own renewable resources.

Chairman Chenoweth, we are pleased that this legislation includes some innovative ways to finance the projects needed in the wildland/urban interface area. One feature of this legislation that we think is particularly attractive is the opportunity for the Forest Service to share in the costs of a forest management project, using funds from the programs that most benefit from the project. With innovation and will, these projects can represent a win-win situation. A win for the environment and a win for local communities who may benefit from the opportunities this legislation will provide.

We also believe that this legislation is complementary to the pilot stewardship contracting projects authorized in the 1999 Omnibus Appropriations Bill. Its language authorizing the expansion of contracting authorities will add to the "tool kit" for vegetation management to meet multiple objectives and obtain desired future conditions.

We do have one concern, not with the Legislation, but with the capacity of the Forest Service to implement this legislation. The Forest Service has lost a great deal of forestry and contracting expertise, through retirements and downsizing. We are concerned that the Forest Service would spend a considerable amount of time in writing regulations, training forest service people, planning the projects, doing the environmental analyses and meanwhile the wildfire risk on the interface lands will continue to grow. We are *not* suggesting that the Forest Service short-cut any required processes, but the Forest Service must make these projects the highest priority at all levels of the organization, or they will not happen.

Thank you for taking the leadership on this important issue, Chariman Chenoweth. I'll be happy to answer any questions from you or other members of the Subcommittee.

STATEMENT OF LARRY PAYNE, ASSISTANT DEPUTY CHIEF FOR STATE AND PRIVATE FORESTRY, FOREST SERVICE, UNITED STATES DEPARTMENT OF AGRICULTURE

MADAM CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE:

Thank you for the opportunity to appear before you today to discuss draft legislation for community protection and hazardous fuels reduction. I am Larry Payne, Assistant Deputy Chief for State and Private Forestry. The Forest Service testified for the Administration on a similar bill, H.R. 2458, at a hearing before this Subcommittee on September 23, 1997 during the 105th Congress.

I preface my remarks by saying that the Administration has not had sufficient time to analyze fully the most recent draft of this bill, thus my testimony reflects only our initial reaction. Also, we understand that this draft bill affects the Bureau of Land Management (BLM), and today's remarks should not be interpreted as a representation of BLM's concerns.

In summary, we appreciate the modifications reflected in the draft bill which address some of our previous concerns. However, we continue to have concerns about certain elements of the draft bill.

Our four major points of concern:

We believe that we currently have sufficient authority to accomplish most of the objectives of this draft bill;

We have substantive concerns about the cost-effectiveness and special funds' provisions in the draft bill;

We continue to be concerned about the definitions for certain terms, and;

Appropriations are already available to address fuels treatment priorities in the wildland/urban interface, including expanded authority for use of the roads and trails fund for forest health-related work, if needed.

We believe that in combination these factors make the proposed draft bill unnecessary.

BACKGROUND

The Forest Service has a number of efforts currently underway that place a priority on forest and ecological health. An ongoing forest health risk mapping effort has provided preliminary information on forest health risk factors related to fire, insect and disease, wildland/urban interface, and threatened and endangered species. This information, at a broad scale, will help identify areas of the country that are in a high risk category.

Current authorities such as the Cooperative Forestry Assistance Act of 1978 provide the Administration with significant means to address the conditions of public lands as part of the urban interface issue. The Knutson–Vandenberg Act and the Brush Disposal Act of 1916 allow for forest protection, reforestation and restoration inside timber sale area boundaries and the abatement of fuels generated by harvest activities.

The Forest Service has a national strategy for stewardship contracting. Pursuant to section 347 of the Department of Interior and Related Agencies Appropriations Act, 1999, we are currently examining a variety of new tools for addressing forest and ecological health and other ecosystem concerns through vegetative management. Twenty-two stewardship contracting pilot projects have been identified, and consistent with the terms of this legislation we will be adding up to 6 new pilot projects in Region 1 (Montana and northern Idaho) of the Forest Service. A number of these projects are primarily designed to address hazardous fuels problems.

For example, in the interior mountain West, the Upper Swan–Condon project on the Flathead National Forest is designed to improve forest conditions, reduce forest fuels, and create stand conditions where prescribed fire can be used as a long-term management tool. Another pilot project on the Lolo National Forest is utilizing an end-results contract to sell and harvest timber in a manner that will more closely approximate natural occurrences like wildfires.

Some of the pilot projects explicitly address the hazardous fuels issue within a wildland/urban interface context. Illustrative are the Winiger Ridge and Mt. Evans projects in the Colorado front range. These projects are being carried out in cooperation with the Colorado State Forest Service.

We expect to have these projects underway beginning this spring and will be monitoring and reporting the results with the public and Congress as we proceed. Until we have had an opportunity to complete and evaluate the results of these tests, and collaborate with the public on them, we feel it would be premature to propose broadly applicable solutions.

Appropriations for fiscal year 1999 will provide sufficient funding in fire and forest health to address high priority areas of immediate concern, specifically wildland/urban interface areas. Also, the 1999 Appropriations Act authorized the use of the roads and trails fund for forest projects, if needed.

Another potential solution to deal with flexibility in addressing forest stewardship needs is the new forest ecosystem restoration and improvement line item of $15,000,000 proposed in the fiscal year 2000 budget. This would enable the Forest Service to implement treatments such as thinning, partial cutting and other vegetative treatments to restore or maintain watershed health. This money would give managers flexibility in planning and integrating projects that are outside timber production areas and are in need of money to fund.

CONCERNS

We have substantive concerns related to the draft bill that merit more analysis and discussion. The section that addresses contracting is vague as to how the cost efficiency determination is to be made. This section also would authorize using the receipts derived from the sale of forest products to offset some or all of the costs incurred by the purchaser in carrying out a required forest management project—in essence the trading of goods for services. It is likely that the draft bill would bear a PAYGO cost. The existing stewardship pilots are testing this concept with specific

sideboards and improved performance-based contracting procedures in place, and will provide a basis for evaluating what new authorities, if any, are needed.

Another section deals with the establishment and initial funding for "Special Funds." The draft bill would require both the Secretary of Agriculture and the Secretary of the Interior to establish and maintain a special fund for planning, offering, and managing eligible forest products sales. The Special Funds would be funded in part by transfers of $10,000,000 from amounts available to the Seretaries for the reduction of hazardous fuels. We believe this is unnecessary. Funds within the appropriated budget for forest and ecological health protection, forest management, and fuels management are currently used for these types of projects. The creation of this special fund is unnecessary and would increase the work load and complexity in terms of budget and accounting by creating a new line item to manage and track. In a broader context, the creation of a new special fund or "trust fund" would raise the highly contentious incentives issue. For example, some will be concerned that unnecessary timber harvesting would be proposed in order to add to, or perpetuate, the fund. Other questions include: (1) whether payments to states are reduced; (2) if these new accounts would merely siphon funds away from the existing K–V Fund and other accounts; and (3) whether it is wise to initially reduce scarce appropriated funding for hazardous fuels reduction.

Finally, the concerns raised in previous testimony regarding definition of terms remain unresolved. While some of the definitions, such as "wildland/urban interface" and "hazardous fuels buildup" have been modified from previous versions, they are still vague and too broad to be practical. For example, the definition of wildland/urban interface is so broad that it would include anything from a single dwelling adjacent to forest lands to a high density urban housing development adjacent to or within forest lands. The agency strongly believes that broadening the definition would stretch our resources to areas that are simply not at risk of human and property losses, thereby jeopardizing our efforts in areas that are truly in danger.

CLOSING

Madam Chairman, while we agree that protection of communities, lives, and property in wildland/urban interface areas is a national priority, and agree with the need to continue our efforts to reduce threats of high intensity wildfires to human life and property, we have serious concerns about some of the aspects of the draft bill. The budget does authorize the use of the K–V Fund from open sales for priority hazardous fuels reduction projects, regardless of the site where the funds were collected. This change will enable the Forest Service to begin addressing this urgent need. In addition, we believe that the 28 stewardship pilots that we are undertaking, and the public participation we will undertake as we implement them, will assess the need for changing any of our existing authorities. We also believe that existing appropriations adequately address our high priority needs, and that existing authorities are adequate to address forest and watershed health needs. For these reasons, we feel this draft legislation is unnecessary.

This concludes my statement. I would be happy to answer any questions you or other members of the Subcommittee may have.

United States General Accounting Office

GAO

Testimony

Before the Subcommittee on Forests and Forest Heal
Committee on Resources,
House of Representatives

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WESTERN NATIONAL FORESTS

Nearby Communities Are Increasingly Threatened By Catastrophic Wildfire

Statement of Mr. Barry T. Hill, Associate Director
Energy, Resources, and Science Issues,
Resources, Community, and Economic
Development Division

GAO/T-RCED-99-79

Madame Chairman and Members of the Subcommittee:

We are here today to discuss the results of our work to date for you on the wildfire hazards faced by communities located adjacent to national forests in the dry, inland portion of the Western United States (hereafter referred to as the "interior West"). About 60 percent of all national forests managed by the Department of Agriculture's Forest Service are located in this region of the country, which generally extends north and south from the Canadian to the Mexican borders and east and west from the Black Hills in South Dakota to the Cascade mountain range in Washington and Oregon, the Coastal range in California, and the southwestern deserts. (See app. I.)

Historically, the tree stands in many forests of this region developed distinctive characteristics in response to frequent low-intensity fires and a lack of rainfall, which slows the decomposition of dead and downed trees. However, human activities over the last century and a half have introduced changes in the structure and composition of these tree stands. These changes have raised concerns about the resulting potential for more large, intense wildfires on national forests and about the threats that they may pose.

My testimony today presents our observations to date on (1) the extent and seriousness of threats posed by national forest wildfires to nearby communities in the interior West, (2) agency efforts to address them, and (3) barriers to successfully implementing these efforts. Our work draws on visits over the last year and a half to several Forest Service field locations, as well as interviews with and review of data provided by, agency and outside experts. We will complete our work and issue a report to you on this, as well as wildfire threats to national forest resources, in the spring of this year.

In summary, Madame Chairman, the information that we have gathered to date suggests the following:

-- During this century, two major changes have occurred in the national forests of the interior

West. First, the Forest Service's decades-old policy of putting out fires in the national forests resulted in increased undergrowth and density of trees creating high levels of fuels for catastrophic wildfires. (See appendixes III and IV.) This has transformed as many as 39 million acres of the interior West's national forests into a tinderbox. Second, the number of people living along the boundaries of national forests has grown significantly. As a result, the increasing number of large wildfires, and of acres burned by them pose increasingly grave risks to human health, safety, property, and infrastructure in these areas which are commonly referred to as "wildland/urban interface" areas.

-- During the 1990s, the Forest Service began to address this problem by (1) establishing an objective of increasing the number of acres on which excessive fuel levels are reduced, (2) announcing a priority for such reductions in wildland/urban interface areas, (3) restructuring its budget to better ensure that funds are available for such reductions, and (4) proposing demonstration projects to test innovative approaches for reducing fuels. The Congress has supported these efforts by increasing funding for fuels reduction, authorizing demonstration projects, and authorizing a multi-year research program to better assess problems and solutions. However, these efforts are in a race against time and may fall short.

--These efforts may fall short because the Forest Service lacks a cohesive strategy for overcoming several barriers to effectively and efficiently reducing fuels on national forests. These barriers include (1) potential conflicts between fuel reduction efforts and other agency stewardship responsibilities, including protecting air quality, watersheds, and wildlife habitat; (2) program incentives that tend to focus efforts on areas that may not represent the highest fire hazards; (3) agency contracting procedures that are not designed for removing large amounts of materials with little or no commercial value; and (4) the high costs of such removals, which may be as much as several hundred million dollars annually.

CATASTROPHIC WILDFIRES ON NATIONAL FORESTS INCREASINGLY THREATEN NEARBY COMMUNITIES

The most common type of forested lands in the national forests of the interior West are at warm, dry, lower elevations and are generally dominated by ponderosa pine. These are known as "frequent fire interval" forests because, before pioneers settled in these areas, fire historically occurred in them about every 5 to 30 years. (See app. II.) Because frequent fires kept these forests clear of undergrowth, fuels seldom accumulated and the fires were generally of low intensity, largely consuming grasses and undergrowth and not igniting the highly combustible crowns, or tops, of large trees. However, various human activities, but primarily the decades-old policy of suppressing fire in the national forests, have generally prevented fire from playing its historical role of limiting the forests' density and clearing undergrowth and downed material.

Without frequent fires, vegetation has accumulated, many tree stands have become denser, and less fire tolerant tree species have become more prevalent. (See apps. III and IV.) In these currently denser stands in the national forests of the interior West, many smaller dead and dying trees now form fuel "ladders" that conduct fire into the crowns of larger trees. Under these conditions, large, intense, and catastrophic wildfires have become increasingly numerous. For example, over the last decade, the number of acres of national forest lands burned by wildfires, more than 90 percent of which were in the interior West, has increased, reversing the trend of the previous three-quarters of a century. (See app. V.) Moreover, since 1984, the average number of fires annually on national forests that burn 1,000 acres or more has increased from 25 to 80, and the total number of acres burned (including nearby lands) by these fires has more than quadrupled, from 164,000 to 765,000. (See app. VI.) Since 1990, 91 percent of these large fires and 96 percent of the acres burned by them were in the interior West. According to the Forest Service, 39 million acres on national forests are now at high risk of catastrophic wildfire, and virtually all of these lands are located in the lower-elevation, frequent-fire forests of the interior West that are dominated by ponderosa pine. (See app.

VII.)

In recent years, the number of people living along the boundaries of the national forests has grown rapidly. (See app. VIII.) As a result, the increasing numbers of larger, more intense fires pose grave hazards to human health, safety, property, and infrastructure. Not only have lives been lost, but because smoke from such fires contains substantial amounts of fine particulate matter and other hazardous pollutants, the fires can pose substantial health risks to people living in this wildland/urban interface. Catastrophic wildfires threaten not only human health, lives, and property, but also infrastructure vital to nearby communities. For example, the 1996 Buffalo Creek fire, which burned several thousand acres and threatened private property in the wildland/urban interface southwest of Denver, left forest soils subject to extreme erosion. Subsequent repeated rainstorms washed what ordinarily would have been several years' worth of sediment into a reservoir that supplies Denver with water. As a result, the Denver Water Board has estimated that it will incur several million dollars of ongoing expenses for dredging the reservoir and treating water--an amount that is several times the cost of fighting the fire.

Finally, the growing number of large wildfires and acres burned--coupled with the increasing complexity of fire suppression in the wildland/urban interface--has greatly increased the costs of suppressing fires. From fiscal year 1986 through fiscal year 1994, the 10-year rolling average of annual costs for fighting fires grew from $134 million to $335 million, or by 150 percent, in constant 1994 dollars. (See app. IX.) Since 1990, 95 percent of these costs were incurred in the interior West. Moreover, the costs associated with preparedness, including the costs of keeping equipment and personnel ready to fight fires, are also increasing. For the 6 fiscal years from 1992 through 1997, these costs increased from $189 million to $326 million, or by 72 percent.[1] (See app. X.)

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[1]Federal Lands: Information About Land Management Agencies' Wildfire Preparedness Activities (GAO/RCED-98-48R, Dec. 18, 1997) and Federal Lands: Wildfire Preparedness and Suppression Expenditures for Fiscal Years 1993 Through 1997 (GAO/T-RCED-98-247, Aug. 4, 1998).

THE FOREST SERVICE IS ATTEMPTING TO ADDRESS WILDFIRE THREATS

In recent years, the Forest Service has taken steps to address the increasing threat of catastrophic wildfires on national forests. In 1995, it announced its intention to refocus its fire management program on reducing accumulated fuels. Specifically, a 1995 internal agency report recommended increasing the number of acres on which accumulated fuels are reduced annually from about 570,000 to about 3 million by fiscal year 2005.[2] In 1997, the Chief of the Forest Service said the agency intended to implement this recommendation and that the agency planned to continue reducing fuels on 3 million-acres per year through fiscal year 2015. By that time, the agency believes that it will have adequately resolved the problem of national forest lands being at high risk of uncontrollable, highly destructive wildfires.

To implement its increased emphasis on reducing accumulated fuels, the Forest Service restructured and redefined its fiscal year 1998 budget for wildland fire management to better ensure that funds are available for these activities.[3] In fiscal year 1998, it announced that the funds appropriated for reducing fuels would be allocated to emphasize protecting communities at high-risk in wildland/urban interface areas. The agency has also (1) revised its wildland fire management policy to more clearly spell out its responsibilities and reimbursable costs so that nonfederal parties can understand the consequences of not working with the agency to reduce the risk of wildfire on their adjacent lands and (2) proposed a number of pilot projects in collaboration with willing nonfederal partners to demonstrate the role of mechanical methods (including timber harvesting) of removing materials to reduce accumulated fuels.

The Congress has supported the Forest Service's efforts to reduce accumulated fuels by, among other things, increasing the funding for these activities in recent years. In addition, in acting on the

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[2]Course to the Future: Positioning Fire and Aviation Management, U.S. Department of Agriculture, Forest Service (Washington, D.C., 1995).
[3]FY 1998 Budget Explanatory Notes for the Committee on Appropriations, U.S. Department of

agency's fiscal year 1998 budget, the House and Senate appropriations committees approved a restructuring of the Forest Service's budget to better ensure that funds are available for reducing accumulated fuels. The committees also earmarked $8 million in fiscal year 1998 for the agency and the Department of the Interior to begin a multiyear program, called the Joint Fire Science Program, to gather consistent information on accumulated fuels, methods of reducing them, the potential effects on other resources of these different methods, and their relative cost-effectiveness. The agencies currently lack adequate data in all of these areas and, in January 1998, the agencies issued a plan for conducting this research program.[4] Moreover, as requested by the Forest Service, the Congress also authorized, in the agency's fiscal year 1999 appropriations act, demonstration projects for reducing accumulated fuels.

Many experts believe that these efforts by the Forest Service and the Congress efforts are in a race against time. A 1993 assessment of forest health in the interior West, published in 1994, concluded that only a "brief window of opportunity" of perhaps 15 to 30 years exists for management intervention before damage from uncontrollable wildfires becomes widespread, setting the stage for a repeat of the current problems far into the 21st century.[5] More than five of those years have already passed. Furthermore, the Forest Service's current plans may significantly underestimate the number of acres on which fuels must be reduced annually to adequately reduce fire hazards. Specifically, the agency's current and planned allocations of appropriated fuels reduction funding largely emphasize maintaining satisfactory conditions on lands in other regions of the country which currently have low levels of accumulated fuels so that conditions on these lands do not also become hazardous. Because maintaining current satisfactory conditions on these lands will require continued fuels reduction on about 1 million acres per year, only about two-thirds of the planned 3 million acre per year annual national fuels reduction effort will take place each year in the interior West, where

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Agriculture, Forest Service (Feb. 1997).

[4] Joint Fire Science Plan, Department of the Interior and U.S. Department of Agriculture, Forest Service (Washington, D.C., 1998).

[5] Assessing Forest Ecosystem Health in the Inland West, Forest Policy Center (Washington D.C., 1994).

virtually all of the most serious problems are located. As a result, as many as 10 million acres in the interior West may still have excessive fuel levels and may remain at risk of uncontrollable, catastrophic wildfire at the end of fiscal year 2015.

The Forest Service, however, may be able to substantially reduce fire hazards without reducing fuels on all 39 million acres currently at high risk of catastrophic fire. For example, it may be able to construct fuelbreaks--i.e., areas where excessive fuels have been removed--in strategic locations to isolate areas with excessive fuels and thus limit the spread of large fires. However, the Forest Service has not yet developed a strategy for constructing fuelbreaks or implementing any alternative strategy to accomplish the same purpose. Thus, until the agency develops such a strategy, it will not have a basis for eliminating any current high-risk areas from its fuels reduction efforts or for assuring the Congress and the public that hazards to nearby communities will be adequately reduced.

THE AGENCY LACKS A COHESIVE STRATEGY FOR OVERCOMING SEVERAL BARRIERS TO REDUCING ACCUMULATED FUELS

Several significant barriers must be overcome in developing a cohesive strategy to reduce wildfire hazards on the national forest of the interior West. The first of these barriers is that methods for reducing accumulated fuels can sometimes be difficult to reconcile with other legislatively mandated stewardship objectives, including meeting clean water quality standards and protecting threatened and endangered species. For instance, many agency and outside experts believe that, ultimately, avoiding catastrophic wildfires and restoring forest health in the interior West will require reintroducing fire through burning under controlled conditions to reduce fuels. However, winter snows limit the time available for burning, and dry summer weather creates a high risk that, given the massive levels of accumulated fuels, controlled fires will escape and become uncontrollable, catastrophic wildfires. Moreover, several officials and experts we spoke with believe that emissions from controlled fires on the scale needed to adequately reduced accumulated fuels would violate federal air quality standards under the Clean Air Act and that the act would thus not permit the

desired level of burning either immediately or possibly even in the long term. The Forest Service and the Environmental Protection Agency, which administers the Clean Air Act, are currently conducting a 3-year experiment to better determine the impact of emissions from controlled fires.

For these reasons, many experts agree that fuels must be reduced in most areas of the interior West, at least initially, by mechanical means, including commercial timber harvesting, in conjunction with controlled burning. The Forest Service currently uses its timber sales management program to reduce accumulated fuels.[6] However, the use of timber harvesting to reduce fuels has been limited by concerns about its adverse effects on other stewardship objectives, including wildlife habitat and watershed conditions. Specifically, in fiscal year 1997, timber harvesting was used to reduce fuels on only about 95,000 acres, or less than 5 percent of the acres that are projected to need fuel reduction annually to achieve the agency's long-term goal. Forest Service officials told us that it was not likely that commercial timber harvesting could be increased enough to adequately reduce fuels on the vast amount of acreage needing such reductions.

A second significant barrier that must be overcome in developing a cohesive strategy is that both the timber sales management program and the fuels reduction program funded by appropriations currently contain incentives which tend to focus efforts on areas that may not present the greatest fire hazards. For example, under its fuel reduction program, the Forest Service's lone performance indicator measures the number of acres treated. Agency field staff told us that funding for forests often depends on their ability to contribute to the agency's annual acreage target. As a result, in order to reduce fuels on more acres, they often focus treatments on areas where the costs of reducing fuels are low, rather than on areas with the highest fire hazards, including especially wildland/urban interface areas. These areas often have significantly higher per-acre fuel reduction costs because greater care must be taken to avoid fire and smoke hazards of controlled burning, raising costs.

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[6]FY 1999 Budget Explanatory Notes for the Committee on Appropriations, U.S. Department of Agriculture, Forest Service (Feb. 1998).

Additionally, while timber harvesting may make useful contributions to reducing accumulated fuels in many circumstances, reducing fuels with the funds allocated for timber sales management also results in an incentive for forests to focus on less critical areas. The Forest Service stresses that its timber sales management program is increasingly being used for efforts to improve forest health, including efforts to prevent catastrophic fires.[7] However, the agency continues to rely on timber production to fund many of its programs and activities, and all three of its budget allocation criteria for timber activities relate solely to the volume of timber produced or offered. As a result, as forest officials told us, they tend to focus on areas with high-value commercial timber rather than on areas with high fire hazards.

A third barrier is that the Forest Service's contracting procedures do not facilitate the removal of the large volumes of low-value material as is necessary to reduce accumulated fuels. Most of the trees that need to be removed to reduce accumulated fuels are small in diameter and have little or no commercial value. For example, to return experimental forest plots near Flagstaff, Arizona to historical conditions, 37 tons per acre of nonmarketable materials had to be disposed of by placing them in a pit and burning them. However, the agency's contracting procedures for commercial timber sales--as well as for service contracts that do not involve selling timber but are let simply for the service of removing excess fuels--were not designed to (1) facilitate the systematic removal of large volumes of low-value material over a number of years, (2) readily combine funds for conducting timber sales with funds for reducing accumulated fuels, or (3) allow contractors to retain this low-value material to partially offset the costs of its removal. In 1998, for instance, Agriculture's Office of General Counsel determined that only 6 of 23 contracting demonstration projects proposed by the Forest Service to demonstrate the role of timber harvesting in reducing accumulated fuels could proceed under the agency's existing statutory authority. This was because remaining projects would have involved removing more material of minor commercial value than is allowed under service contracts or letting contractors keep some material in exchange for removing it. In the fiscal

[7]National Summary: Forest Management Program Report for Fiscal Year1997, U.S. Department of Agriculture, Forest Service, FS-627 (July 1998).

year 1999 Omnibus Consolidated Appropriations Act, the Congress authorized the Forest Service, through fiscal year 2002, to enter into 29 individual project contracts under which (1) the value of the material removed may be used by the contractor to offset the costs of removal, and (2) there is no limitation on the value of the material to be removed. However, more general authority temporarily granted to the agency in the early 1990s to enter into "land stewardship contracts"--under which contractors were allowed to retain material they removed in exchange for achieving desired conditions in the national forests--has not been renewed.[8]

The fourth barrier that must be overcome in developing a cohesive strategy for undertaking effective fuel reduction efforts is their high cost. Revenue generated by the sale of many excess fuel materials will not cover the costs of their removal. Agency officials and outside analysts agree that reducing accumulated fuels in the interior West may require hundreds of millions of dollars a year in appropriated funds. Our preliminary analysis of the Forest Service's fuels reduction costs--which, according to the agency's data, average about $320 per acre for the combination of burning and mechanical removal that is necessary in the interior West--indicates that as much as $12 billion, or about $725 million a year, may be needed to treat the 39 million acres at high risk of uncontrollable wildfire by the end of fiscal year 2015. These costs might be less if the agency reduced current hazards on the 39 million acres selectively, in accordance with a strategy or set of priorities. Currently, however, the agency is planning to spend only $65 million for fiscal year 1999 to reduce accumulated fuels--or less than one-tenth of the annual level that may be needed to accomplish the agency's goal—and it has not developed an identifiable strategy or priorities for applying these funds, nor has it even identified the interface areas that are at high risk.

In conclusion, Madame Chairman, the increasing number of uncontrollable and often catastrophic wildfires in the interior West, as well as the significant costs to resolve the problem of increasing

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[8]See Forest Service Timber Sale Practices and Procedures: Analysis of Alternative Systems, Congressional Research Service (95-1077 ENR, Washington, D.C., 1995) and M. Mitsos, Improving Administrative Flexibility and Efficiency in the National Forest Timber Sale Program: Scoping

hazards to human health, safety, property, and infrastructure present difficult policy decisions for the Forest Service and the Congress: Does the agency request, and does the Congress appropriate, the hundreds of millions of dollars a year that may be required to fund an aggressive fuel reduction program? If enough funding is not appropriated, what priorities should be established? How can the need for reintroducing fire into frequent fire forests and conducting mechanical removals best be reconciled with the requirement to maintain air quality standards and fulfill other stewardship objectives? What changes in incentives and contracting procedures are needed to facilitate the mechanical removal of low-value materials?

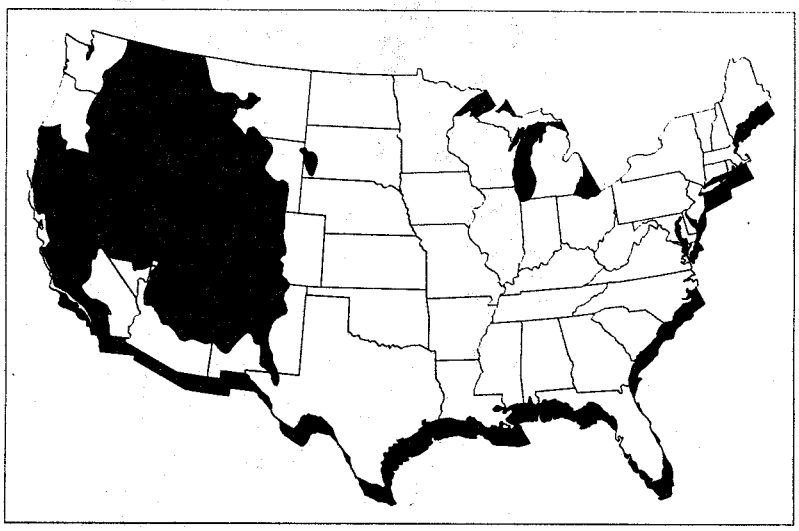
Such decisions should be based on a sound strategy. However, the Forest Service has not yet developed a cohesive strategy for addressing several difficult barriers to improving the health of the national forests by reducing fuels. Developing a strategy will depend in large part on data being gathered under the Forest Service and Interior's Joint Fire Science Program, which as noted earlier, is directed at correcting these deficiencies. However, a Forest Service official involved in implementing the program told us that the agency may need a decade to complete many of the research projects under the program. It may also take another decade or longer to revise or amend forest plans to incorporate the program's findings and begin implementing individual fuels reduction activities. Many experts argue that the tinderbox that is now the interior West cannot wait that long. They also believe that inaction--or simply allowing nature to take its inevitable course--will cost more not only in funds for fire suppression but also in lives and damage to human health, property, and infrastructure than would undertaking strategic actions now.

Madam Chairman, this concludes our prepared statement. We will be pleased to respond to any questions that you or Members of the Subcommittee may have.

Session Summary, Pinchot Institute (Washington, D.C., 1996).

Appendix I

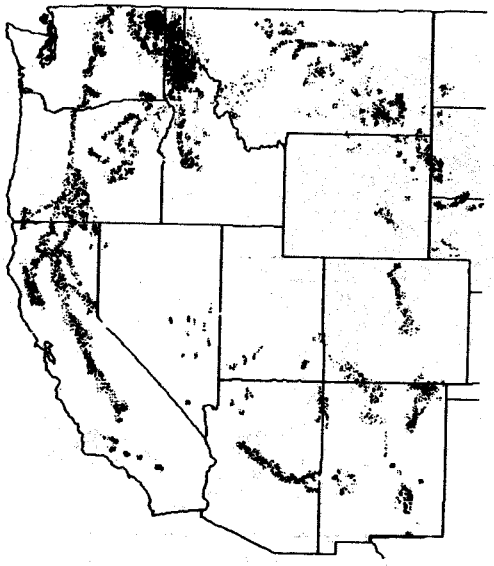
The Interior West



Source: Forest Service.

Appendix II

Location of Frequent Fire Forests in the Interior West



Source: Forest Service.

Appendix III

1909 Photograph of Typical Open Ponderosa Pine Stand in the Bitterroot National Forest in Idaho

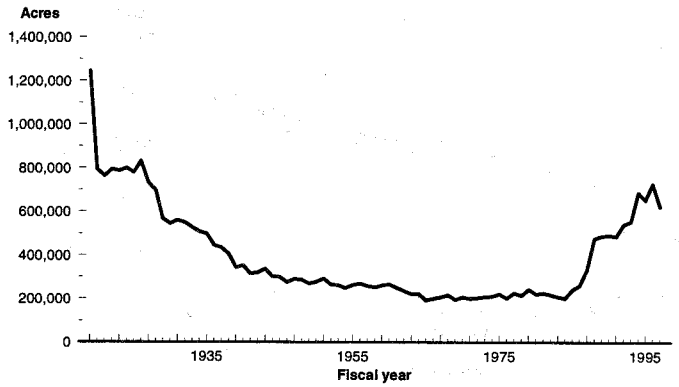
Source: Forest Service.

1989 Photograph Taken From the Same Spot in the Bitterroot National Forest in the Same Direction

Source: Forest Service.

Appendix V

Number of National Forest Acres Burned by Fire, 1910-97

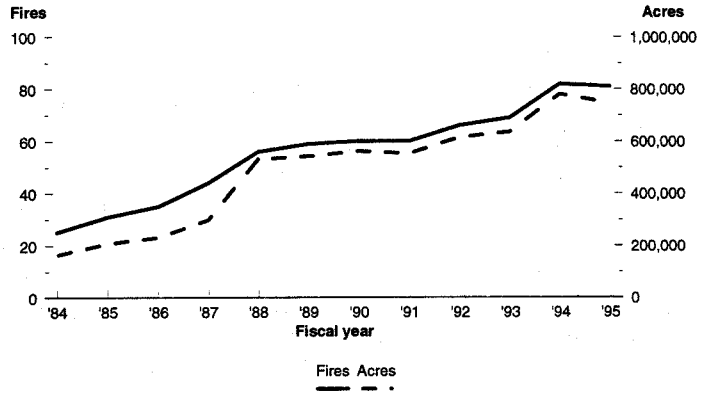


Notes: 1. The number of acres represents the 10-year rolling average at each point.

2. Since 1990, 90 percent of national forest acres burned by fire were in the interior West.

Source: GAO's presentation of data from the Forest Service.

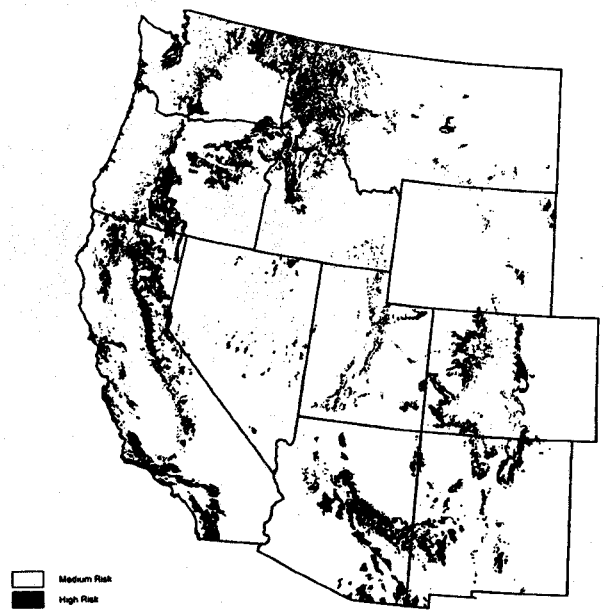
Number of and Total Acres Burned by Large Wildfires on All National Forests, 1984-95



Note: Since 1990, 91 percent of large fires, >1000 acres, and 96 percent of the acres burned were in the interior West.

Source: GAO's presentation of latest data available from the Forest Service.

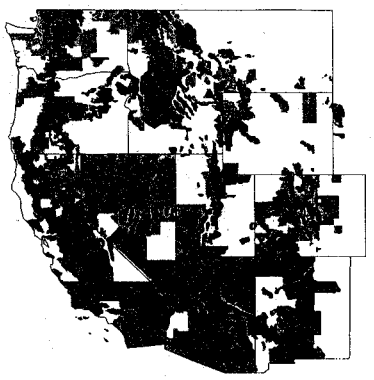
National Forest Lands at Medium and High Risk of Catastrophic Fire



Source: American Forests.

Appendix VIII

Population Growth in Relation to National Forests (1980-96)

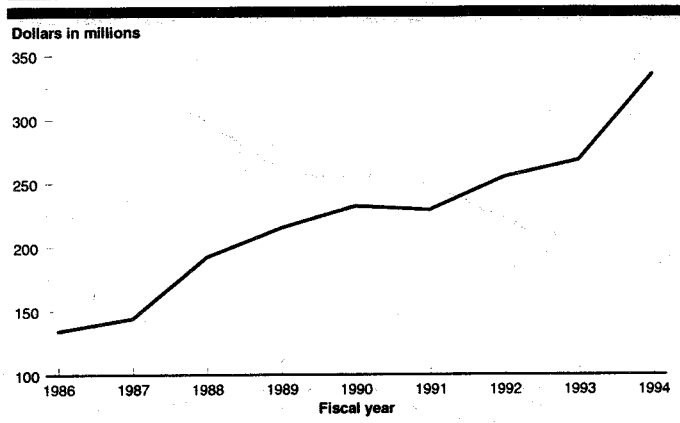


National forests
Counties in interior west with above average population growth (>25%)

Source: GAO's presentation of data from the Forest Service and the Bureau of the Census.

Appendix IX

Forest Service's Expenditures for Fire Fighting, Fiscal Years 1986-94



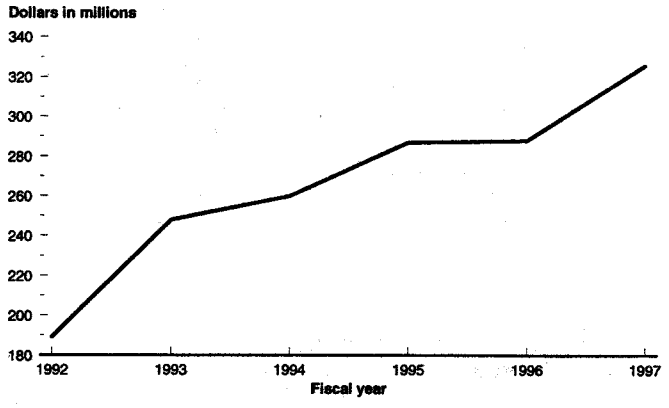
Notes: 1. The expenditures for each year represent the 10-year rolling average expressed in 1994 dollars.

2. Since 1990, 95 percent of these expenditures have been in the interior West

Source: GAO's presentation of latest data available from the Forest Service

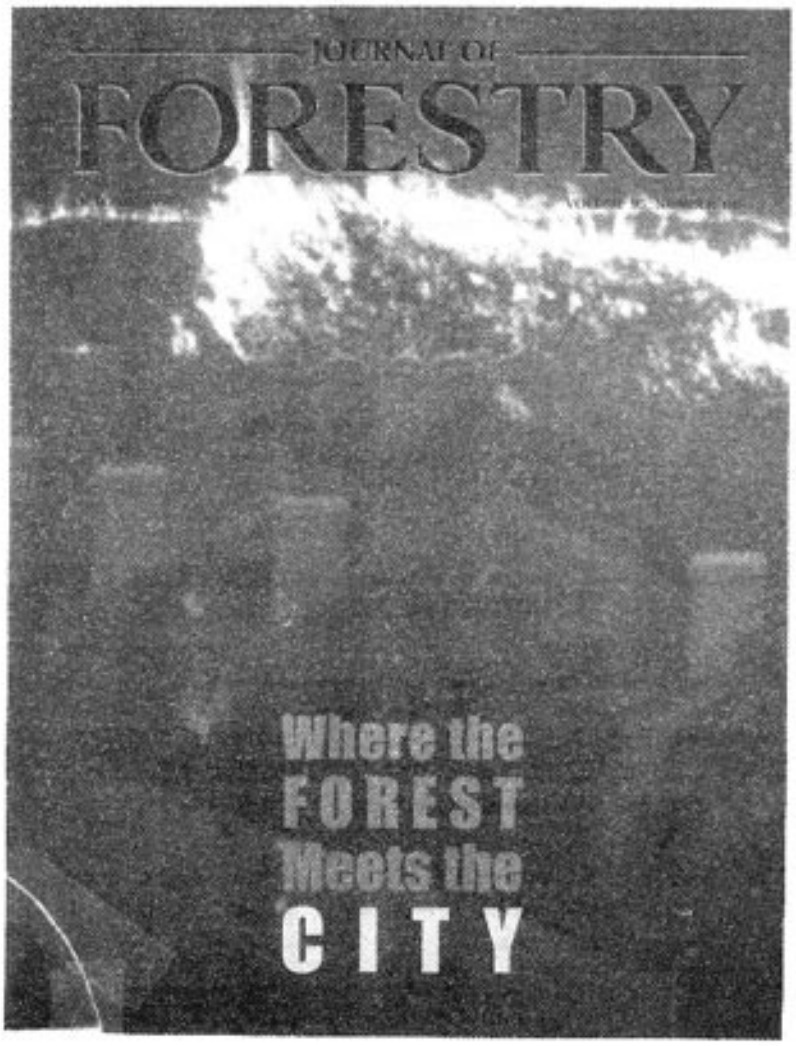
Appendix X

Forest Service's Expenditures for Wildfire Preparedness, Fiscal Years 1992-97



Note: For 1994, the last year figures by region were available, over 90 percent of these expenditures were in the interior West.

Source: GAO.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COVER

Despite a light ground fuel load, the August 1996 Eighth Street fire in Boise, Idaho, became a major conflagration that burned through residential neighborhoods. Such fires are becoming increasingly costly as suburban development spreads into wildlands. © 1996 Ravi Miro Fry, Boise National Forest.

Letters

Cost-Benefit Bonanza

Told in reasonably clear legalese, "The Criminal Aspects of Environmental Law" (*JOURNAL OF FORESTRY*, July 1997) advises landowners, foresters, and loggers to protect themselves from huge and ill-formed laws that fill thousands of pages. Where, at a probable cost of at least a quarter per page, does one obtain those laws? Then, of course, a lawyer must be engaged to interpret them. To see that landowners, foresters, and loggers do as advised, EPA has increased its criminal investigation teams 20-fold, other agencies are getting into the act, and the legal profession probably is snuggling down into yet another environmental law bonanza.

Our taxes, of course, cover the expenses of all concerned—except for landowners, foresters, and loggers. This expensive and needless harassment is little more than well-intentioned biocentrism gone mad. The outrageous costs of these laws and regulations vastly exceed their minuscule benefits.

James H. Patric
Greeneville, Tennessee

The Definition of a Forester

In his PERSPECTIVE in the July *JOURNAL OF FORESTRY*, Harry Wiant raised a critical issue—whether the definition of *forester* has become so inclusive that it has lost its meaning.

One feature that characterizes a profession is a unique body of knowledge that requires advanced training. Once it was relatively easy to define forestry and the knowledge it required. Forestry was simply the science and the art of managing forestlands, and five subject areas—silviculture, forest management, forest economics, forest protection, and utilization—formed the curriculum of an SAF-accredited forestry school.

Over time there was considerable pressure for greater flexibility in electives. The five- to six-course sequence in tree physiology, dendrology, ecology, silvics, and the theory and practice of silviculture was condensed into

(Continued on page 40)

Commentary

Karl F. Wenger

The Public's Interest Is Our Opportunity

In the September 1992 issue of the *Journal of Forestry*, our executive vice-president, Bill Banzhaf, pointed out, apropos of our present situation, that forestry had seen hard times before. He recounted how disappointed his father, a consulting forester, was during the 1930s because forestry was not held in high regard by other professionals. In the June 1997 *Journal*, Frank Wilbur Whitmore recollected foresters' complaints in the 1950s that we were not "considered in the same league as physicians, lawyers, or even engineers." My experience in the 1940s and 1950s justifies the same comments. Nobody except foresters seemed to care about forests and their proper management.

Now the situation is quite different. Many people are interested in what foresters do and have formed organizations to watch how forestlands in the United States are managed, especially publicly owned lands. But individually and as a profession we have not informed them about the excellent condition of US forests and the need for their active management. Because

of our failure to reach the public with this information, the management of US forests is being severely criticized. Although some of the criticism may be prompted by an ideological agenda, we need to recognize that most of the people supporting the critics are truly concerned about the treatment of our forestlands. We should look upon this interest as an opportunity rather than a misfortune. The opportunity is staring at us—the public is ready, if not eager, to be told the truth about modern forestry practices and the condition of US forests. What we need to do is find the way to reach them.

That is undoubtedly a difficult task. The leaders of the environmental organizations have a vested interest in prolonging the controversy about forest practices—it helps justify their existence. The news media also are more interested in controversy—war makes better news than peace. So our job is to find or create events that will interest the news media and support forest management. That job will require imagination and creativity, courage and action, and it is time we got started.

Inside the Journal

Rebecca N. Staebler

Expanding Roles

As Americans spill out of cities and suburbs and push into the exurbs, development is fracturing the edges of our wildlands and creating a new kind of forest ecosystem—as well as a new role for foresters. In "On the Urban Edge," John Ball describes urban forestry's long struggle to distinguish itself from arboriculture. Because the conflicts of the urban-wildland interface can be resolved only through a better understanding of this dynamic ecosystem, he predicts rich opportunities for urban foresters.

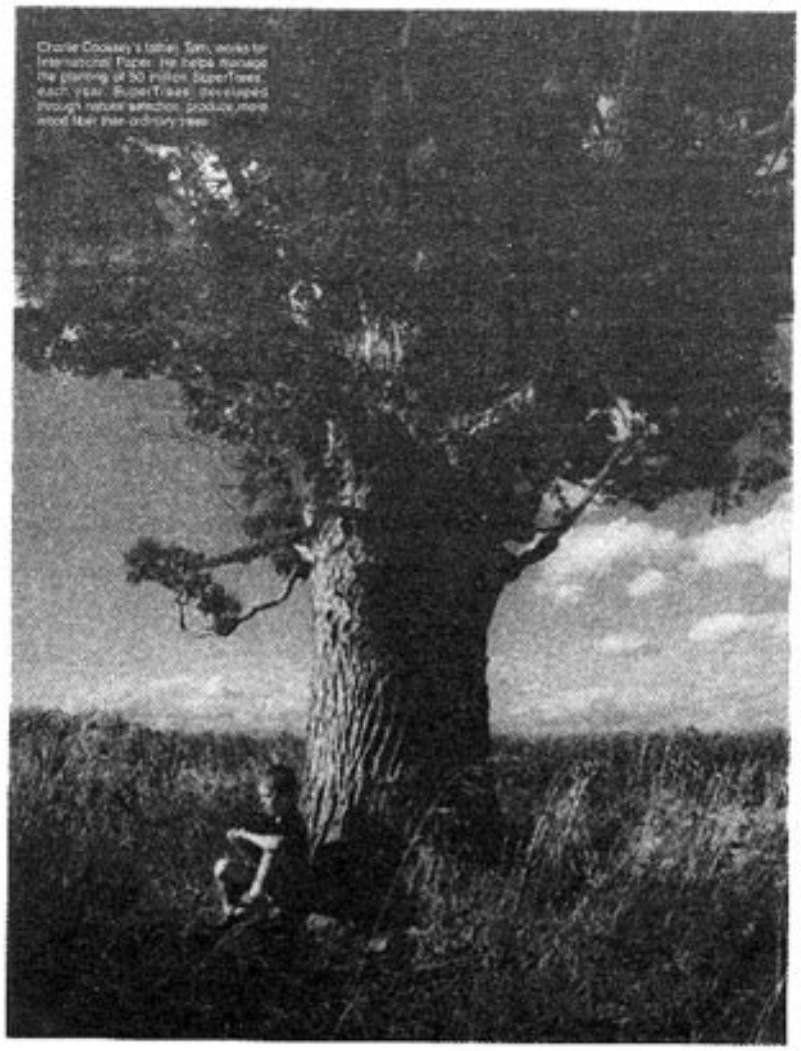
The fragmented forest at the wildland-urban interface is also increasing the losses of human lives and property to wildfire. Local government has the primary responsibility to prevent or reduce fire damage, yet few local policymakers take action. Steve R. Plevel identifies eight reasons, starting with a failure to acknowledge or understand the problem.

To show how foresters can help policymakers make good choices for land management and land use in the interface, Joshua D. Greenberg and Gordon A. Bradley explore two methods of quantifying the landscape gradient from the urban center to the surrounding wildlands. The resulting measures of urbanization can be compared with GIS images to provide information on vegetative cover, heterogeneity, and edges.

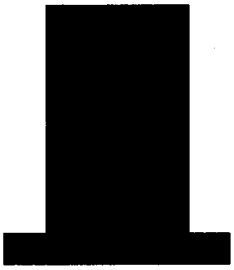
Useful analyses, of course, require accurate data. Asking whether remote sensing will live up to its promise for forest management, Randolph H. Wynne and Duane B. Carter look at the capabilities of the new satellites that transmit images with resolution of just a meter—for a price.

New technology also figures in the forest management information system that was developed to enhance education, research, and management at Oregon State University's McDonald-Dunn Research Forest. Described by David D. Marshall et al., its components include an in-place inventory system, a geographic information system, and a stand development model.

From state-of-the-art sophistication we turn to two countries where reforestation is a more abiding concern than pixels and computer models. As Katar Singh and Kulbhushan Balooni report, consumption of firewood and timber in India far exceeds domestic harvests, even though vast areas of degraded lands could be reforested. To exploit this potential, the National Tree Growers' Cooperative Society organizes co-ops to help villagers grow trees on marginal lands. In South Korea, too, denuded lands are available for meeting both the timber and nontimber needs of the nation, Byoung Il Yoo writes.


Charlie Cooney's father, Tom, works for International Paper. He helps manage the planting of 50 million SuperTrees each year. SuperTrees, developed through nature selection, produce more wood fiber than ordinary trees.

"My dad's a soil scientist. He teaches trees to defend themselves from diseases."



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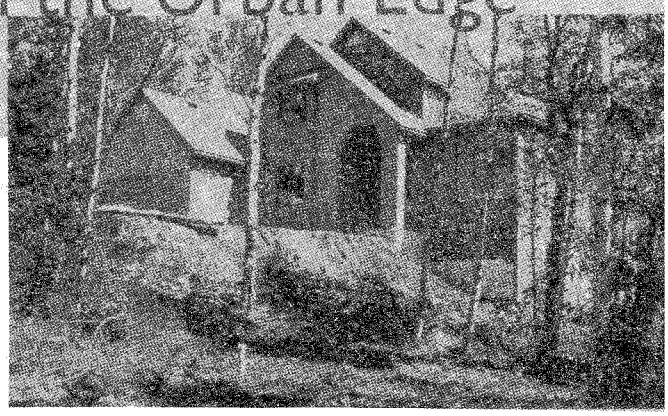


In the post–World War II era, America's rapidly expanding population, fueled by increased industrial and agricultural efficiency and capacity, generated a major demographic reversal: a nation that was primarily rural became urban. In 1790 less than 5 percent of the population lived in urban areas. It took nearly 150 years for the population to be equally divided between urban and rural (US Bureau of the Census 1931). By 1989 more than 75 percent of Americans lived in urban areas, and more than 80 percent are projected to do so by 2025 (Haub and Kent 1989).

But those figures don't tell where the migration has landed—the backyards of the urban regions. Since 1950, the spread of low-density suburbia beyond the urban core has tripled the land surface devoted to urban development (US Bureau of the Census 1989). Over the past 50 years, that increased urbanization along the fringe of metropolitan regions has had a tremendous impact on the forests.

Divide and Conquer

The impact is most visible at the urban-forest interface, where people have settled yet where significant forest acreage remains (Clawson 1984). The word interface is a misnomer because the urban-forest interface is not a boundary between two systems but instead a continuum where urban and forested areas intermingle to various degrees.

The urban core of most communities is dominated by people, structures, and the supporting infrastructure. It has few trees and rarely forests or even remnant stands. Beyond this core, lower-density suburban development is interspersed with green space and an occasional remnant forest island. In the exurbs, even farther from the core, forests and agricultural lands dominate, with developments being the islands in the landscape.

The interface is also fluid, rippling out from the core as new transportation corridors are created. This continually expanding urban-forest interface and the gradual fragmentation and urbanization of land absorbs many land uses and cover types.

Agricultural land is often protected from development by zoning and tax structures. Wetlands pose considerable problems for construction and may be legally off-limits. Forestlands, on the other hand, particularly upland forests, are viewed as prime development land and are highly desired sites for building.

In the last half of this century, as Americans have migrated to the exurbs, the line dividing residential development and forested areas has become increasingly blurred, creating opportunities for the study of forest fragmentation and its ecological consequences.

Even when agricultural land is subdivided for suburban developments, forestland is indirectly affected. Cropland lost to urban sprawl is replaced from forestland, though not necessarily in close proximity. At the national level, for every acre of agricultural land converted to development, a quarter of an acre of forestland is converted to agriculture (Healy 1984).

Suburban expansion has gradually fragmented fringe forests into islands.

A New and Enhanced Role for Foresters

By John Ball

As development spreads, the forest islands become smaller parcels, thus greatly increasing the proportion of forest edge and exposure to urban stresses (Medley et al. 1995). The process of fragmentation is highly visible and often alarming to the residents of the urban-forest interface. They can easily observe the gradual dissolution of a nearby forest as it becomes smaller and fragmented by housing developments, office complexes, and the usual array of gas stations and fast-food restaurants.

This fragmentation also has a major, though less visible, influence on the remnant forest's composition and structure. Smaller islands have a greater proportion of edge to interior, and in this more open environment exotic species flourish (Dunn and Loehle 1988): English sparrows replace warblers, for example, and Norway maple and buckthorn replace American beech. The ecological consequences of urban expansion into the forest are still poorly understood.

In addition, the fragmentation is not limited to forests. Landownership also becomes more complex in the transition from rural to urban. Multiple owners and overlapping regulations create difficulties in understanding the functions and relationships in the urban forest ecosystem.

Arborists and Foresters

This intermingling of forests and urban development presents both challenges and opportunities for the forestry profession, particularly the urban forester. Urban forestry is loosely defined as the management of tree populations in urban settings (Harris 1992), though it has been suggested that all forests are urban because we are an urban society (Carlozzi 1979).

Urban forestry is also referred to as urban and community forestry, or simply community forestry, since many residents of villages, towns, and small cities do not consider themselves urban. Regardless, managing trees and other vegetation in all these environments involves engineers, urban planners, and landscape architects, as well as arborists and foresters. Their roles and responsibilities are related and often overlap, particularly between arborists and urban foresters.

Whether one is doing arboriculture or urban forestry is often decided by the number of trees being managed. Arboriculture focuses on the care of individual trees; urban forestry is the management of tree populations (Miller 1996). The line between the two professions, however, is blurred.

The attention paid by arborists to individual trees was once believed to render the profession inferior to that of foresters, who were charged with management of tree populations. But although the responsibilities and educational backgrounds of the two professions overlap in places, urban forestry is moving beyond arboricultural practices to a comprehension of the workings of the urban forest ecosystem.

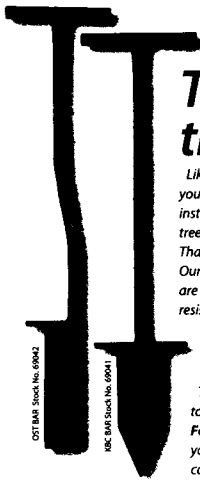
The arborists, through plant health care, are beginning to view trees as part of a greater landscape system. Foresters find that their management may shift from street tree populations to the individual mature trees in the park. Tyndall (1949) summed it best when, referring to his forestry work in Chicago, he said that "we do as little individual tree preservation work as possible, and yet as much as necessary."

In the past, the overlapping responsibilities of arborists and foresters have created conflict and some identity issues for urban foresters. The urban-forest interface is probably the zone where the overlap is the most apparent and conflicting (Miller 1996), yet it is also a place where urban foresters can use their unique knowledge and skills and thus redefine this field of forestry.

The Evolution of Urban Forestry

Urban forestry is a relatively recent development in the forestry profession in this country. A reasonable gauge of the profession's interest in urban forestry comes from the *JOURNAL OF FOR-*

Photos by John Ball



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ESTRY. Of the 76 articles, reviews, and announcements concerning urban forestry, arboriculture, or related fields published from 1940 to 1996, more than two thirds appeared in the 1980s and 1990s.

The evolution of urban forestry as a distinct branch of forestry can also be read in the content of the articles. The earliest references to urban forestry were Arbor Day notices in the 1920s, but in the next decade announcements and articles related specifically to the field began to appear. Most of the references before 1940 dealt with tree surgery, which for many foresters was not real forestry. You were considered to be "prostituting the profession" by linking the two (Silva 1932).

Nor was the profession of tree care given much respect. Fenska (1935) wrote that foresters looked upon tree surgery as "within the realm of quackery." However, less than 10 years later, Spring (1942) would write that forestry schools were excellent training for arborists and that many arborists were graduates of forestry colleges.

By the end of World War II many consulting foresters were identifying arboriculture as one of their areas of specialization (Pond 1948), and the line between foresters and arborists was being questioned (Fenska 1947). There were still those, however, who thought foresters belonged in the woods. Baldwin (1949) commented that "foresters should be working and domiciled in the forests. Any other environment is unnatural."

But the great number of postwar forestry college students prompted some to suggest landscaping and arboriculture as natural career avenues. In his article on future employment opportunities for foresters, Vitas (1947) wrote, "The public insists on picturing the forester in a tree surgeon's garb. All right, let's satisfy the public."

The acceptance of arboriculture as a potential career for foresters continued to gain support, even raising concerns that foresters were taking over arborists' jobs (Payne and Gallaher 1979). In 1984 the *JOURNAL* featured the experience of a forestry school graduate who had started his own tree service, in part because of the lack of opportunities in the more traditional areas of forestry (Juttner 1984).

That trend of foresters' taking jobs in arboriculture continues. A recent survey of forestry graduates found that more were employed as arborists than as urban foresters (Hildebrandt et al. 1993). Although arboriculture has provided foresters with career opportunities, it has also made some urban foresters feel isolated. They are concerned that forestry means *rural* forestry (Ries 1991) and that the needs of urban foresters are better served by the International Society of Arboriculture and the National Arborist Association than by the Society of American Foresters (Grey 1989). But urban forestry is distinguished from arboriculture in more profound terms than just the number of trees being managed, and the urban-forest interface is where the differences become most apparent.

The Forest or the Trees?

In the urban central core, isolated trees grow from holes carved in sidewalks. Planting sites are engineered, young trees are trained, and mature trees are pruned and occasionally cabled or fertilized. Arboriculture is very visible. Farther out from the core, in the exurbs and beyond, where woodlots and forests predominate, the management scale expands to at least the stand level. Forestry prevails over arboriculture. In the zone in between—the low-density urban and suburban areas—remnant forests and ornamental plantings intermingle. An oak-hickory forest with its associated vegetation becomes scattered groves of oaks interspersed with manicured lawns and homes. The arborist is charged with the care of these individual oaks as the trees suffer the stress of urban development, but who is charged with managing at a greater scale?

For many people, *urban* and *ecosystem* are exclusive terms. Stephen Jay Gould (1977) wrote, "Ecology [has become] a label for anything good that happens far from cities." But the urban environment is an ecosystem, with numerous components, functional processes, and disturbances. And although humans dominate the urban ecosystem, it is less understood than many natural systems. The parts are better understood than the whole. The focus is often on the tree, not the forest. Although much is known about the influence of urban development on the individual tree, relatively little is known about the effects on forest stands. Here is a role uniquely suited to the urban forester.

The Unknown Urban Ecosystem

Urban forestry has struggled for its identity, and acceptance has come slowly (Burnes and Moeller 1979). The specialty has been referred to as a part of recreational forestry (Tyndall 1949) and called environmental forestry or open-space forestry (Goddard 1969), among many other titles (Miller 1996).

Its purpose has been unclear, too. Does urban forestry serve the needs of rural forestry? Vaux (1980) enumerated the benefits of having foresters working in urban areas serve as a communication bridge between where the people live and where most foresters work. Is it a field in its own right? Or does its value revolve around aesthetics and watershed protection (Goddard 1969)?

The beautification programs common in the 1960s, while giving a boost to urban forestry, had the negative effect of trivializing the importance of trees. Urban trees became ornaments, a means of beautifying a city rather than a necessity like utilities, roads, and other components of the infrastructure. The distinct roles played by urban forestry and arboriculture were still undefined. Ornamental trees were considered an important area of study for foresters. Research in urban forestry focused on arboricultural practices, such as establishment and maintenance (Doolittle 1969), and with some justi-

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fication, arborists could say that foresters were trying to assume a role outside their professional training—the management of individual urban trees.

Indeed, although arborists and foresters share a general knowledge of tree physiology, dendrology, entomology, and pathology, among other disciplines, foresters often lack specific training in arboricultural practices, such as pruning and cabling. Though these have been described as easily acquired skills (Vitas 1947), they are not, and along with landscape architecture and city planning, they are best left to the specialists.

Nevertheless, there is a role for foresters in the urban environment. As Davis (1970) pointed out in a paper presented almost 30 years ago, "Foresters, as a professional group, have a place, and should have a working partnership, in urban forested-land matters. I would emphasize participation and partnership." Foresters do bring a unique set of knowledge and skills to the urban arena, and their partnership is essential to the sustainability of the urban forest ecosystem.

Urban forestry is now changing in a direction better suited to the training that foresters receive in the applied ecology field of silviculture. The importance of this training to urban foresters is sometimes forgotten, even though the urban forester has to be a stellar silviculturist (Smith 1983). The silviculturist manipulates the forest for human ends and understands both ecological principles and the owner's objectives (Smith 1986). In the urban environment, however, there are many owners with varied and often conflicting objectives, and the forester's difficulty is compounded by our lack of understanding of urban forest ecosystem structure and processes. A recent national assessment identified researching the ecological functions of the urban forest as the highest priority (Reiss 1992).

This new emphasis on the ecosystem will take urban forestry forward and define its role. The focus shifts from arboricultural practices, such as establishment and maintenance, to understanding how the urban forest ecosystem operates. This is a role best suited to urban foresters —those with the ecological and biological knowledge to work effectively at the urban-forest interface.

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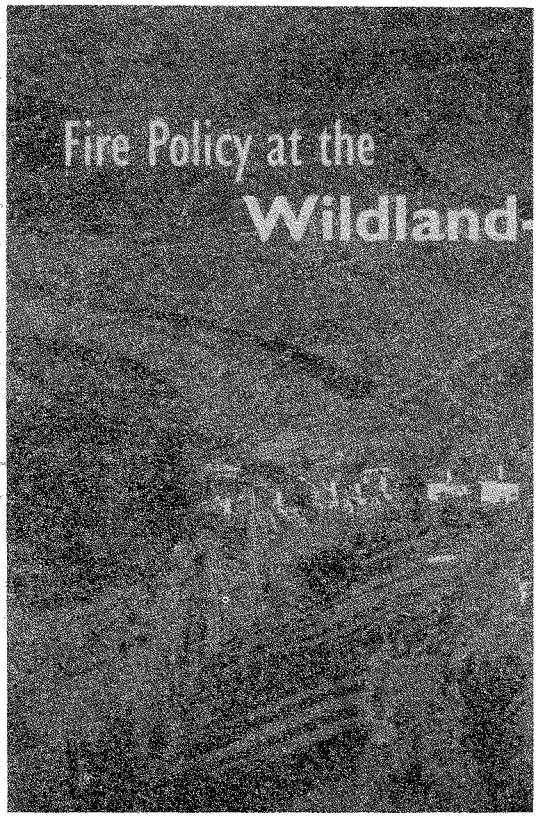


When a wildfire burned the hillside above, this golf course acted as a fireline, protecting a number of homes at the urban-wildland interface. But the homeowners' good fortune may be short-lived if the smooth expanse of the greens and fairways becomes a delivery system for mudslides and floods in the fire's aftermath.

Fire Policy at the Wildland-Urban Interface

A Local Responsibility

By Steve R. Plevel

Wildland fires are destroying more homes and threatening more urban areas in the United States every year. Much of this destruction happens because more people are moving into the wildland-urban interface. A problem once thought unique to Southern California is now recognized as a problem wherever "natural" vegetation is found next to the places people live and work. Only the frequency or extent of the problem varies with location; the problem exists throughout the country.

Local government is ultimately responsible for protecting life and property—for adopting policies to either prevent the occurrence or reduce the community's vulnerability to the effects of a disaster. However, few policies specific to wildland-urban interface fire have been adopted by local governments. Why? What accounts for the adoption of wildland-urban interface fire policy by local governments—or its rejection?

The Problem

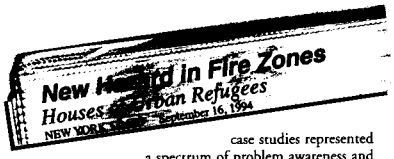
Throughout the United States residential and commercial development is extending into areas at high risk of

Photo by Ravi Miro Fry, Boise National Forest

fire in the wildland-urban interface. This intermingling of open space and development has occurred gradually and usually with little knowledge of or concern for potential interactions and impacts. It is revealing that the 1973 report from the National Commission on Fire Prevention and Control dealt exclusively with structural fire, but a 1987 followup workshop included wildland-urban interface fire as a major topic (FEMA 1987).

Continuing encroachment into high-hazard areas results in more fires that threaten, damage, or destroy homes and businesses. The probability of ignition increases, and protection is shifted from wildland resources to structures (National Commission n.d.). Although most fires within the wildland-urban interface are quickly suppressed with little or no loss of property or life, it does not take a huge fire to cause catastrophic losses (Davis and Marker 1987). The October 1991 Oakland–Berkeley Hills fire, for example, burned slightly more than 1,500 acres but killed 25 people and damaged or destroyed almost 3,000 structures; total cost was estimated at more than $1.5 billion (Oakland n.d.). Other states have also experienced disastrous wildland-urban interface fires: Florida, Colorado, Michigan, Oregon (Ewert et al. 1993), and most recently Texas (reported in the *Arizona Daily Star*, February 23, 1996).

Southern California has long been the place where wildfires regularly destroy homes. Numerous catastrophic fires—among them the 1959 Laurel Canyon fire, the 1961 Bel Aire fire, the 1990 Paint fire, and the 1993 Orange County fires—have resulted in the loss of large amounts of property and sometimes lives. California has recognized wildland-urban interface fire as a public policy problem and taken some steps to address it. After the 1991 Oakland–Berkeley Hills fire, California adopted the Bates Bill (California Government Code 51175), which requires identifying "very high fire hazard severity zones" in every county and developing a model ordinance for use by local government.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Nationally, wildland-urban interface fire has been recognized as a natural hazard and public policy problem, and the federal government includes fire in its definition of *major disaster* (Disaster Relief Act of 1974, PL 93-288). Local governments, however, seem unaware of the problem except where, as in California, there have been recent disastrous fires. Many parts of the United States have not yet identified that they now have, or might have in the future, an interface fire problem. In these places development began in low-flammability vegetation but is now expanding into vegetation with a higher risk.

An example is eastern Pima County, Arizona, which includes metropolitan Tucson. Settlement started in the saguaro–palo verde vegetation type, which very seldom has fires and generally does not carry fire because the groundcover is sparse. Urban development, however, has expanded into the chaparral and oak woodland types, which are fire-dependent systems that periodically have stand replacement or fuel-reducing fires. To date, however, there has never been a disastrous wildland-urban interface fire nor has a structure or life been lost in Pima County (Plevel 1996).

Apathy or Action?

To understand the lack of local action, examples of policymaking were examined and compared with the literature. The literature review revealed that little had been written about wildland-urban interface policymaking, but some studies specifically addressed natural hazard policymaking. Three case studies represented a spectrum of problem awareness and experience: the 1991 Oakland fire, the 1993 Orange County fires, and Eastern Pima County (Plevel 1996). Information about the case studies came from unstructured interviews, meeting minutes, and reports. From this work a list of eight factors that affect wildland-urban interface policy consideration and adoption was developed.

1. Acknowledging and understanding the problem. For a problem to get on the local policy agenda, there must be recognition that the problem exists—and that it is a public policy problem (Petak and Atkisson 1982). When disaster strikes, people expect the government to quickly help return their lives to "normal" and offer assistance to rebuild and recover. They also believe that government should prevent future occurrences (Petak and Atkisson 1982). Wildland-urban interface fire is just one of the hazards that local government is expected to address.

People who have not experienced a disaster, however, tend to deny that they may be threatened, and even where disaster has struck, residents tend to deny that it can recur. The case studies clearly show lack of acknowledgment before a disastrous fire, plus lack of action even when there is a history of destructive fires (Plevel 1996). Denial that a fire problem exists, or denial of the seriousness of an acknowledged problem, was cited as a roadblock to policymaking by people from all three case studies. Auf der Heide (1989) describes denial as the apathy factor.

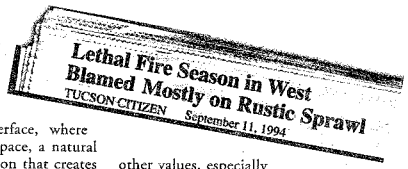
Even if acknowledgment and at least some understanding exist, Rossi et al. (1982) found that elected officials, like the general public, do not rank environmental hazards as a seri-

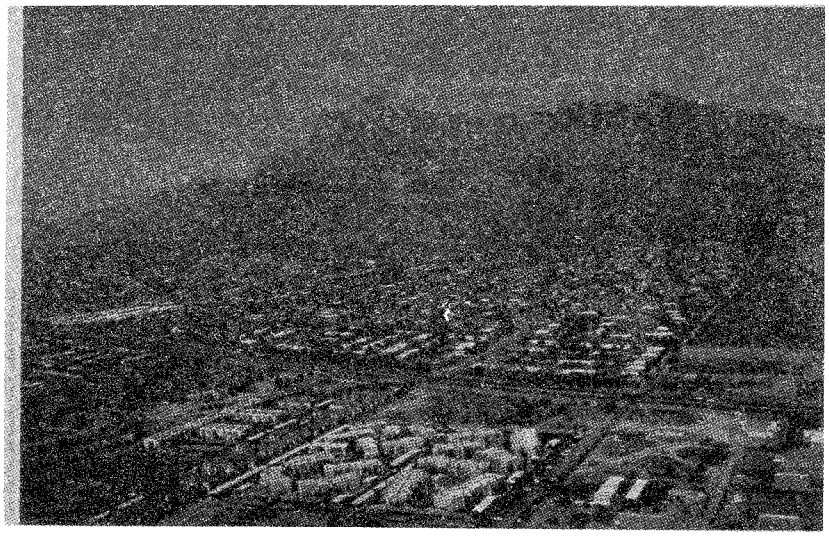
ous problem. Most communities believe the risk is too low to warrant special action (Petak and Atkisson 1982). Even residents of Southern California do not consider natural hazards serious; in the survey by Rossi et al. (1982), environmental hazards were ranked lower than almost all other problems listed.

2. Conflicting or competing values and interests. In their opening chapter, Rossi et al. (1982) state, "Unfortunately, many political solutions to the problems of environmental hazards conflict with other legitimate human values." At the wildland-urban interface, where people value open space, a natural setting, and vegetation that creates attractive environs, there may be conflicts with making the environment safe (Montague and Montague 1994). Environmental sensitivity, endangered species, aesthetics (wood shake roofs, for example), and historic preservation were specifically identified during the interviews as conflicting with adoption of hazard-reduction policies (Plevel 1996). In both Oakland and Orange County, people chose locations at least partially because of the existing vegetation; they may not have known there was a fire hazard. People are willing to trade some degree of safety for other values, especially where they see a low probability of an event (Rossi et al. 1982).

3. Authority to act. The authority to act in the case of disasters basically comes from the "police power" of government. This power allows valid government actions to protect the health, safety, morals, and general welfare of the community (Buck 1991).

Although the primary responsibility for emergency management is with the state, implementation is usually delegated to the local authority (Petak and Atkisson 1982). Everyone interviewed by Plevel (1996) said local government has all the authority to act that is


Lethal Fire Season in West Blamed Mostly on Rustic Sprawl
TUCSON CITIZEN September 11, 1994



Development in Pima County, Arizona, has expanded from lands that support creosote bushes and saguaro, which rarely burn, into surrounding mountainous areas of fire-dependent chapparal and oak. Though a major wildfire has yet to threaten Tucson's suburban sprawl, experience elsewhere at the urban-wildland interface indicates the severity of the threat.

needed. Several people, however, asked, "Will they?" The preference of local officials is that they set policy, plan, and implement while the state and federal governments pay the bills (Petak and Atkisson 1982). In fact, although local officials have some authority, they do not have complete authority. Shannon (1991) describes the situation that faces most local governments: "...policy problems at the urban-forest interface cross boundaries of land ownership, overlap agency jurisdictions, implicate a nongeographically located polity, and thus challenge conventional institutions that regulate individual behavior and provide benefits to categories of individuals." The paradox is that local government, which is least likely to see disaster management as a priority, is most likely to have the primary responsibility for that job (Auf der Heide 1989).

4. Participation in policymaking. Anderson (1984) identifies legislatures, the executive, administrative agencies, and the courts as the official policymakers, and interest groups, political parties, and individual citizens as participants. Davis and Marker (1987) are more specific about who is involved in wildland-urban interface fire policy, listing homeowners, fire protection agencies, local and regional planners, media and communication experts, insurance carriers, builders, contractors, architects, and training and motivational experts.

Anderson (1984) points out that a vocal advocate who "touches a nerve" can prompt action, as Rachael Carson did with *Silent Spring* and Ralph Nader did with *Unsafe at Any Speed.* This point is reinforced in the case studies (Plevel 1996). People interviewed said that advocates were needed if the wildland-urban interface fire problem were to be placed on the public policy agenda and kept there. As one official put it, "There must be a citizen outcry." Another person said, "There must be vocal citizens who keep the issue in front of the council." Two planning officials were looking for someone with "strong credentials"—an expert—to advocate action. Another person thought the expert should be nongovernment. A nongovernment advocacy group was needed, according to still another.

Mittler (1989) states that there is a small but growing body of literature indicating that only a few enthusiastic supporters can secure adoption and implementation of public policy. He highlights two of Wyler and Mann's (1983) factors as particularly relevant for keeping policies on the local agenda: first, that a small cadre of officials must lead the fight and, second, that the staff must be able and interested. He calls these people "issue champions." Rossi et al. (1982) found that people whose positions require it, such as planning and public works departments and elected officials, pay more attention to hazard mitigation.

5. Timing: the window of opportunity. Immediately after a severe disas-

ter there is a high level of public support for action to prevent future occurrence. This is aptly illustrated by the call by the citizens of Orange County for prevention of future events and an increased ability to respond (Plevel 1996). Most federal disaster policy changes have occurred in the aftermath of a catastrophe (May and Williams 1986). Here is an example of how fast the window of opportunity can close: only 15 to 20 percent of the recommendations of the Oakland after Action Report (Oakland n.d.) have been implemented (Plevel 1996). However, in the rush to do something during the emotional period right after a disaster, many imprudently drafted proposals may be advanced and even enacted into law. Between disasters public interest in hazard-related legislation drops, and thus legislative activity flags (Petak and Atkisson 1982).

6. *Who pays and how much.* The costs of disasters may be obvious or hidden. Obvious costs include implementing and maintaining emergency management activities, such as preparedness, structural mitigation measures, response to the disaster, and recovery. Hidden costs might include the increased price of housing attributed to higher construction standards (Petak and Atkisson 1982).

Who pays appears to be the more important factor. Several authors have stated that policymakers much prefer distributive policies, such as structural mitigation and postdisaster recovery (Petak and Atkisson 1982; Rossi et al. 1982). These preferences shift the burden from the individual and the local community to the state or national level. When funds can be obtained from other sources, local policymakers are somewhat more open to action. Such actions as disaster relief, low-cost loans, and subsidized insurance, however, encourage private risk taking. As Montague and Montague (1994) note, there is little incentive for fire protection planning and mitigation. Clary (1985) says that policymakers often gamble that a disaster will not happen rather than incur long-term preparedness costs, even if that means higher costs if disaster does strike.

Somewhat in contrast to these statements, Clary (1985) reports that natural hazard policies at all levels of government are characterized by an increasing emphasis on regulation and other approaches to control or prevent hazard events. The natural hazard policy action he finds most frequently used by state and local government is regulation.

7. *Political influences.* Politicians don't want to make decisions that will affect them while in office or harm their chance for reelection. Anderson (1984) says that "policy-making is 'political,' it involves 'politics,' and there is no reason either to resist or to denigrate this conclusion..." Rossi et al. (1982) also find that at the local

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level, "...elected decision makers react first and foremost to the political factors extant in their community, and generally not to what they perceive to be the policy needs of the community." The political impact on officials was cited by several people, including one elected official, as important (Plevel 1996). One person described it as the "will to act." It appears that constituents' desires and the elected official's personal values are the primary influences.

Anderson (1984) might have best summarized the political influences in his statement, "...the decision-maker's values are probably the most direct and pervasive criteria for deciding what to do."

8. Threat of liability and litigation. There was no evidence in the literature of governments' being sued over natural hazard disasters or mitigation actions. In support of the literature, most people interviewed thought that local government was not liable for the fire itself (Plevel 1996). Regardless, there seems to be a heightened concern by elected officials about liability and a fear of litigation—a concern that requires government to appear to be doing everything possible to aid recovery and, prevent further damage, and to do everything reasonable to prevent or mitigate future occurrences.

Conclusions and Outlook

People are becoming more aware of the wildland-urban interface fire problem, but they continue to deny its seriousness unless they have very recently been affected by a disastrous fire. Even recent victims, however, quickly shift their focus to other, more immediate issues—and given the infrequent and unpredictable nature of these disasters, other issues are bound to take priority.

Over the past 10 to 15 years, some incremental improvement in addressing the interface fire problem seems to have occurred. For example, the Federal Emergency Management Agency has taken new action at the national level, and some states, such as California, have adopted more specific standards and requirements. In a time when people clamor for less government intervention, however, local elected officials may have little inclination to do something. Besides, why act to prevent something you do not believe will happen again?

If wildland-urban interface fire problems are to be addressed, "issue champions" at the local level—vocal and respected individuals both inside and outside government—will have to keep the wildland-urban interface problem in the forefront. To increase their effectiveness, they may want to become an organized group and distribute educational materials. They need to be ready to take advantage of opportunities, such as near misses or nearby disasters, to increase awareness and understanding among citizens, agency officials, and elected officials.

As the National Commission on Wildfire Disasters concluded, people must pay now, for preparedness and mitigation, or pay later, for response and recovery, if they want to live in the wildland-urban interface.

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Analyzing the Urban-Wildland Interface with GIS

Two Case Studies

By Joshua D. Greenberg and Gordon A. Bradley

The concern over forest health, already well established in forestry, currently manifests itself in debates over the most appropriate way to manage forests in the Pacific Northwest. How management objectives affect forest structure and function is of primary importance (Thomas 1994). Where human settlement has occurred, concern focuses on the character and condition of the residual forest stand (Bradley 1984). At the landscape scale the arrangement of forests and other vegetation can be used to infer ecological processes (Turner 1989). How can geographic information systems (GIS) and remote sensing technology help identify patterns along an urban-wildland gradient, and what are the implications of the patterns they reveal?

Patterns of Human Settlement

Every human settlement, large or small, was carved from a wildland environment. Whether grasslands, forestlands, or wetlands, these landscapes were "domesticated" to produce commodities and amenities. The extent to which the vegetation has changed varies according to the intensity and scale of resource production activities (Morrill 1984). Even managed forestlands and farmlands, however, are still "green" landscapes.

A hundred years ago Americans, initially dispersed over the agrarian landscape, began migrating to the industrialized cites. Now the trend has reversed, and people are spilling out of the cities into suburban and rural landscapes. In fact, for the first time in the 20th century, the majority of people in the United States now reside outside urban centers. The driving forces of human migration and the resulting settlement patterns are largely a combination of regulation and the economics of land use: the cost of land, transportation, infrastructure (sewer, water, power), and other services, including schools and police and fire protection. People tend to settle in affordable areas that offer the maximum combination of services and amenities. Sometimes they find this in the city, but for the most part, as reflected in current settlement patterns, they prefer areas bordering existing cities.

When humans leave the cities, they generally colonize lands that have long been used for forestry and farming. Although some of this migration constitutes a resettlement of land abandoned a century ago, it is perceived that we are encroaching on these "wildlands" for the first time. Regardless, the result is a landscape in transition, and the current forest or pasture will eventually be replaced by urban structures.

That period of transition is significant for two reasons. First, people have many concerns about conflicting land uses, potential loss of amenities, and inefficient delivery of services. Second, they question whether the remnants of forests and pastures can be maintained through economic incentives, acquisition, and regulation. These landscapes are clearly turbulent environments that invite debate and legal challenges.

At the center of land-use debates are property rights, the optimal use of land, and the future condition of the natural environment. In the case of forests, the structure and function of the residual forest stand are the issue. Although both property rights and economic efficiency are not unrelated to the disposition of the residual forest stand, our focus here is the extent to which the residual stand can serve future land uses safely and effectively. This of course requires that the forest be healthy.

Forest Health

For the purpose of this discussion, *forest health* means that the residual stand or vegetation structure can produce a flow of benefits—productivity, safety, and viability—for local residents and society in general over an established length of time (Flores 1996).

Productivity. Both commodities and amenities are often desired from residual forest stands. Commodities may include commercial timber and firewood, though possibly not at the level of intensity under prior management, and such special forest resources as ferns, salal, berries, and mushrooms. The production of amenities is also critical. Scenery, wildlife, and special landscape features contribute significantly to the value of a region.

Safety. Managing a residual forest stand for safety includes facing problems of fire hazards and unstable stands containing trees susceptible to blow-

down. These hazards are legendary for causing damage to both individual houses and large subdivisions.

Viability. The structure and extensiveness of the residual forest determine whether it can provide habitat for a variety of plant and animal species. Central to viability are questions of patch size, shape, and composition, as well as other aspects of patch dynamics (Greenberg 1996). Consequently, the urban-wildland interface—that area where human settlement encroaches on forest, farm, and grasslands—presents many challenges and opportunities for foresters, planners, and policymakers.

One of the more important challenges is the process of detecting change in the landscape, identifying the nature of the change, and determining its significance. We present two approaches to analyzing vegetation in the urban-rural interface. The transect method uses distance from an urban center as the dependent variable. A second way is to select variables that represent the degree of "urbanness" of a location. Both methods are variations of gradient analysis technique, which helps reveal patterns in the landscape and answers questions about the urban-rural gradient. For example, is there a slow transition in vegetative cover, or is there a sharp edge? If there is a distinct region of landscape change, is it part of the urban-rural interface?

Gradient Analysis

Gradient theory holds that along a single environmental gradient in a landscape, plant communities will change together, creating an ecosystemic gradient, or ecocline (Whittaker 1967). Ecologists have found gradient analysis useful in understanding vegetation changes along a continuum of environmental variables. Studies in the Northwest have shown the relation of vegetation to changes in moisture and temperature (Beals 1969; Moral 1978; Agee and Kertis 1987). Although traditional discussions have focused on so-called natural patterns, these same transitions can be found in urban landscapes as well as between urban and wildland regions (Bradley 1984). The application of gradient analysis to urban studies has been proposed as a method of revealing the human impacts on landscapes (McDonnell and Pickett 1990). Recently, gradient analysis has been used to study urban-rural patterns in soil chemistry (Pouyat and McDonnell 1991), forest structure (Medley et al. 1995), microclimate (McPherson et al. 1994), and bird populations (Blair 1996). In these studies the experimental design was based on the correlations between environmental variables and human development, where distance from the city center was the variable to approximate the degree of human impact.

We have been applying the gradient techniques to urban regions by incorporating satellite data to help measure the effects of human development. Remote sensing imagery has the advantage of covering large areas at relatively frequent temporal intervals—and more cheaply than on-the-ground field collection. Another advantage to using satellite data is that standard methods can be adopted to apply the studies to multiple urban-rural sites to compare patterns and trends at even larger scales.

Study 1: Seattle

Our first study ranged from the urban downtown area of Seattle east to the Cascade Mountains. Instead of distance from the urban center as a measure of human impact, we selected population density and road density as the gradient variables, for which data were readily available from the US census Tiger files. To calculate the amount of vegetation, we used Landsat thematic mapper data and a normalized different vegetation index (Quattrochi and Pelletier 1990). Because chlorophyll absorbs red light and reflects infrared light (Lillesand and Kiefer 1994), the index's ratio of infrared to red reflectance (Tucker 1979) can approximate the amount of vegetative cover.

To compare changes in the selected variables, we chose six sites with different land uses: a downtown business district, a primarily Asian business and residential community, an in-city residential area, a newer business and residential area, a planned subdivision, and a state-managed forest *(fig. 1)*. Analysis of a gradient does not require that the data be spatially continuous (Austin 1985). Since Seattle, bounded

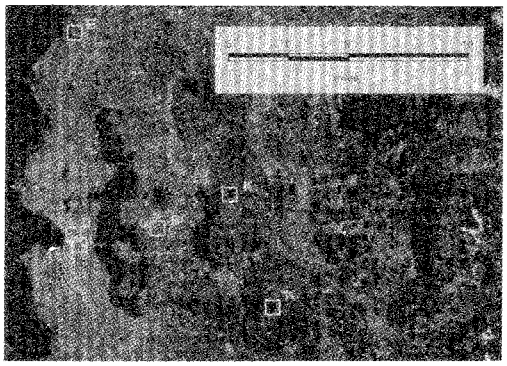


Figure 1. **1991 Landsat thematic mapper image of Seattle displaying bands 4, 3, and 2. Vegetation shows as red. Study sites are boxes.**
D = downtown
I = Asian business and residential
E = in-city residential
B = new business and residential
K = planned subdivision
T = state-managed forest

by Puget Sound and Lake Washington, has a nonradiant pattern of development, the sites were selected to provide a range of values for the dependent variables. In each site we selected random points and recorded values for both the human development level (population density, road density) and the response variable (normalized different vegetation index).

Our measures of human development covaried at all but one of the sites *(fig. 2)*. Even though it is a built environment and has a high density of roads, the Asian business district was the exception, apparently because it has few residents. The vegetation measure showed increasing amounts of cover as both population density decreased and road density increased. As expected, vegetative cover increased with a decrease in human disturbance. This relationship is not necessarily causal, however, since vegetation also increased with increased elevation, which is not a measure of human disturbance. That finding confirms the complexity of the relationships between human development, landscape patterns, and the physical environment: no single factor explains the relationships of the measured variables. In terms of the urban-wildland interface, however, this method determines where a particular neighborhood or region lies along the gradient.

Study 2: Eugene

For Eugene, Oregon, we chose the traditional transect method of gradient analysis and relied on a distance measure, rather than population density and road density, for human impacts. To interpret the satellite data, we used a simultaneous equation approach that determined what elements constituted the spectral reflectance pattern of each pixel (Adams et al. 1989; Sabol Jr. et al. 1992). What is appealing about this "mixing model" is that the data do not have to be classified into land cover types or use indices with confusing metrics. Instead, the results indicate the amount of elements found in each pixel. In theory these values are comparable across regions, biomes, and even continents.

The elements we chose to look at were vegetation, soils, and shade. Along the urban-to-rural gradient we expected increased vegetative cover and decreased soil cover. This pattern could be due to human disturbances and modifications of the landscape that remove vegetation, such as roads and buildings. Since a homogeneous landscape will show little variation in the pixels surrounding an observed point, whereas a heterogeneous landscape will have surrounding pixels with high variance, a moving-window analysis was made to calculate the diversity of the pixels in a 15-by-15-meter pixel region around the central pixel.

A second spatial measure calculated was the slope or degree of change in pixel values in a 3-by-3-meter moving window. A high degree of difference between neighboring cells yields high slope values. This is a simple method to detect edges in a landscape (Haining 1990; Fortin 1994). Both measures—diversity for vegetative cover heterogeneity, and slope values for edges—assess some of the spatial patterns that change along the gradient and imply changes in the structure and function of the forest systems.

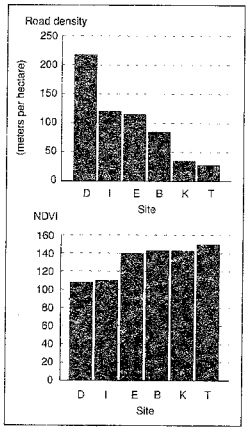


Figure 2. **Average values of road density and vegetative cover (NDVI = normalized different vegetation index) from the Seattle study sites.**
D = downtown
I = Asian business and residential
E = in-city residential
B = new business and residential
K = planned subdivision
T = state-managed forest

As in the Seattle study, we used a Landsat thematic mapper image with a 30-meter cell that was "unmixed" with software generated by the remote sensing laboratory in the University of Washington geology department (Adams et al. 1995). Values were recorded along a linear path from the agricultural area north of Eugene to the city center, and then east toward the Cascades, covering agricultural, urban, and wildland regions. These values were then charted as distances along the transect *(fig. 3)*.

Levels of vegetation and soil change at the edge between the agricultural and urban zones of Eugene: vegetation increases and soils decrease. The transition from urban to rural is less noticeable in vegetation measurements, but there is a slight decrease in average soil levels. The slope, or edge, measure has lower values in the agricultural zone and higher ones in the urban and rural zone. This indicates fewer spectral edges in the agricultural areas than in either the urban or the rural zones.

The vegetative diversity is lower in the agricultural zone, increases in the urban zone, and then decreases slightly in the rural zone. Although this type of spatial analysis is sensitive to changes in scale (Turner et al. 1989), at this particular scale we see a homogeneous agricultural zone, a heterogeneous urban zone, and a rural zone that lies somewhere in between. The transition between these zones is distinct and could be described as a discrete interface between land uses.

Our analysis was based on only one transect at one spatial and temporal scale. More intense analysis can be made by changing the location of the transect, the size of the cells, and the

intervals at which satellite images are taken. We offer those results only as an example of our methods and the possible output that can be expected.

Discussion

Both methods to assess the urban-rural interface provide information about the patterns of vegetation—vegetative cover, heterogeneity, and edges—in an urban region and the surrounding wildland areas. Studies have shown that the vegetative cover measurements can also be correlated to a leaf area index and to levels of productivity, although the exact model may vary from site to site.

The studies identify trends on the landscape as one moves from a built environment to wildland areas. The trends can be both temporal, such as fragmentation and change, and spatial, with measures of edge and heterogeneity. Because we used images from only one time period, the number of temporal patterns we could detect was limited.

Spatial patterns showed up in three scales. The first is that of the satellite image, or pixel. We measured the trends of the individual pixels in relation to a gradient variable, either distance from the urban core or population density. At any one location the average amount of vegetation for a 30-meter location is known.

The second spatial scale we assessed was the surrounding cells, in 3-by-3- or 15-by-15-meter grids, to study variations in vegetation around a central cell. We can extrapolate from this information to determine the level of heterogeneity and amount of vegetation edge for an area.

The third spatial scale encompassed the entire region. At this scale we look for general trends and any sharp changes in the overall patterns. In the Seattle study the Asian business district stood out from the other regions sampled. In the Eugene analysis we found a sharp line between the agricultural and urban regions. In a simplified view we expect to see one of two patterns: a gradual change or a stair-step pattern. In reality, a combination of the two might occur.

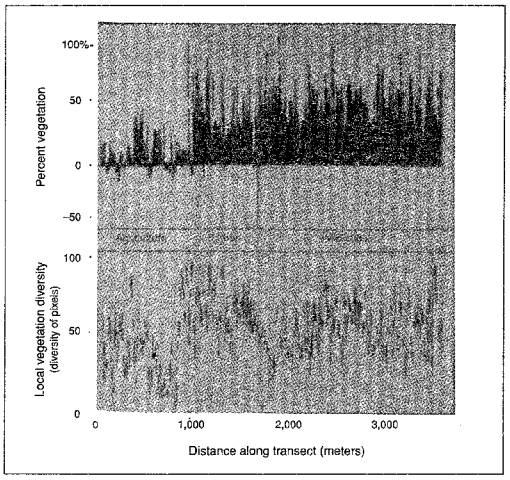


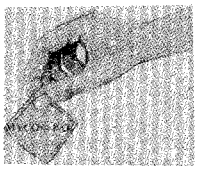
Figure 3. **Values along an urban-to-rural transect in Eugene, Oregon. Vegetative values below 0 percent are areas that the model did not predict accurately.**

Practical Applications

The results of the normalized different vegetation index and mixing model analysis are useful to planners and policymakers. If examined over several time periods, vegetation characteristics—edge, vegetative cover, diversity, and leaf area production—show the relation between human settlement and vegetation presence or absence; they also reveal trends in the increase, decrease, or stability of vegetation. Trends of interest may include the proximity of vegetation to development, the size and location of remnant vegetation patches, the connectivity of the patches, and the relationship between vegetation and sensitive areas, such as riparian zones, steep slopes, and wetlands.

That descriptive information has numerous important uses for developing programs to achieve desired results in a landscape:

- to control wildfire and its spread to structures;
- to address surface-water management problems;
- to maintain viable habitat for plant and animal species;



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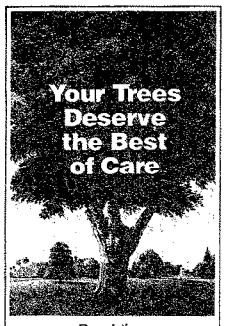

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• to plan open spaces, urban separators, and buffers along sensitive areas;

• to preserve the scenic character of rural landscapes;

• to make land-acquisition programs and scenic or conservation easements more effective; and

• to guide mitigation and restoration efforts.

GIS technology and the application of information generated by its use are indeed becoming essential in forest management, land-use planning, and policymaking, especially in the urban-wildland interface, where landscapes are undergoing rapid change. Such change requires an understanding of how best to maintain the health and viability of the forest while ensuring safety and quality of life for residents. JOF

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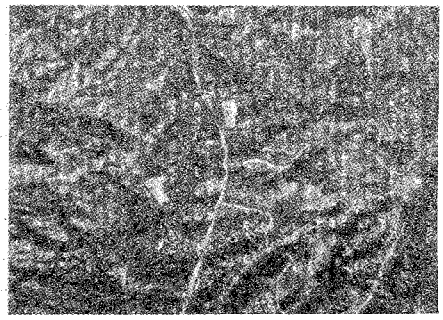
Will REMOTE SENSING Live Up to Its Promise for Forest Management?

By Randolph H. Wynne and Duane B. Carter

Despite much hype and promise, satellite remote sensing is rarely used in day-to-day forest resource management, largely because of the coarse resolution of the last generation of spaceborne sensors. The multispectral scanner (MSS) onboard the first earth resources technology satellite (ERTS-1, later dubbed Landsat-1) had a resolution (pixel size) of 79 by 79 meters and could sense only in the blue, green, red, and near-infrared bands. That was in 1972. Ten years later, the thematic mapper (TM) on Landsat-4 brought resolution down to 30 meters and added a thermal band and two midinfrared bands. The panchromatic mode of the French SPOT (Système Pour l'Observation de la Terre) satellite launched in 1986 gave us 10-meter data. The launch of the Indian Remote Sensing (IRS) satellite in 1995 brought resolution down to 5.8 meters.

That trend toward improved resolution continues with the planned launch of many high-resolution commercial smallsats—so called because of their high payload-to-mass ratio *(table 1, p. 24)*. By the end of this year, images with 1-meter resolution will be available to the public for the first time.

By late 1998, US companies alone will have launched seven high-resolution satellites: EarlyBird and QuickBird (EarthWatch), OrbView (OrbImage), Resource21, Lewis Hyperspectral Imager (TRW–NASA), Clark (CTA Space Systems–NASA), and Carterra-1 (Space Imaging EOSAT). Most of these smallsats will deliver a resolution of 1 to 3 meters, and their combination of panchromatic data and multispectral data—called pan sharpening—will significantly enhance the clarity of the image. In addition, all the sensors except one have stereo capability.



Courtesy of Space Imaging EOSAT

The high resolution of the new smallsat images will permit tracking of emergencies. A 1-meter (aerial) false color composite image of Buffalo Creek, Colorado, after a 1996 fire shows burned areas as blue; the red areas were not damaged.

The Big Deal

"So what?" some people say. "Air photos with submeter resolution have been around for years." For the foreseeable future we will continue to use air photos when extremely high resolution is required. Although spaceborne sensors capable of matching a color infrared photograph at the scale of 1 inch = 10 chains (660 feet) may exist, we are not likely to have access to them for some time to come. Even if we could, the required computer storage space would be huge.

Despite current limitations, however, there is a long list of reasons to prefer satellite images over air photos:

- Satellite images are digital. We live increasingly in a digital world, and in many cases a geographic information system (GIS) is the final data repository. Rather than peer through a stereoscope and draw maps, we analyze image data to provide one or more information layers in a GIS.
- Digital images are easy to send over computer networks. Most, if not all, of the commercial vendors of satel-

lite images plan to offer on-line access to their products within hours of acquisition.

• Given a specified resolution, satellite images typically provide greater ground coverage than air photos.

• Satellite images often have better geometric fidelity because of the altitude and stability of the orbit.

• Most spaceborne digital sensors are calibrated more precisely than film-based sensors.

• Some spaceborne sensors include wavelength bands, such as the mid-infrared and thermal infrared, that cannot be detected by film.

• Repeat coverage is easier to obtain.

Potential Applications

Volume by species. Stand density has been estimated from air photos for many years, and we can probably estimate stand density using high-resolution satellite imagery, too. But to find what Mike Wulder of the University of Waterloo calls the grail of foresters—volume by species—we also need to know species composition and stand height.

Wolter et al. (1995) showed that multitemporal TM and MSS data could be classified to the level of SAF forest cover types (Eyre 1980) with more than 80 percent accuracy. Although innovative, their methods are not practical for annual or biannual implementation, in part because their images were acquired over a 12-year period. Together with numerous air photo studies, however, the study by Wolter et al. shows that obtaining species-level cover types from high-resolution satellite imagery is feasible, especially when used with digital elevation models and other spatial data. To handle new issues created by high-resolution images, we must change our classification algorithms. This will be an active area of research as soon as the high-resolution, commercial smallsats are launched.

Stand height is the last clue to determining stand volume remotely. The vast majority of the high-resolution sensors have stereo capability, and as every undergraduate forestry student learns, stereo coverage both enhances image interpretation and allows height estimation. Although SPOT has had across-track stereo for some years, the high-resolution spaceborne sensors will offer along-track stereo—an improvement because the images will be acquired virtually simultaneously, like air photos, and will line up more precisely. By creating a digital elevation model, we can obtain the elevation of each picture element in a scene. When ground elevation is known (through a topographic map, global positioning system (GPS) point, or analysis of stereo images), stand height can be estimated: simply subtract the ground elevation from the height of the canopy.

The accuracy of such stand height measurements, however, presumes extremely precise measurements of both canopy height and ground elevation. We should further temper our expectations for these reasons:

• Even satellite imagery with 1-meter resolution will still only approximate small-scale photos, such as those from the National Aerial Photography Program.

• Current-generation digital photogrammetric workstations are cost prohibitive for many users.

• The precision of the pointing varies from sensor to sensor.

• Sensor models have not yet been developed for the soon-to-be-launched systems.

• Given the potential value-added market for digital elevation models, it is possible that some commercial vendors do not intend to sell stereo imagery directly to the end user.

Two other sources of high-resolution digital elevation models will be the forthcoming Lockheed-Martin Digital Terrain Elevation Mapping System and the ongoing US Geological Survey digital orthophoto program.

Stand conditions and forest health. Various forms of remote sensing (e.g., airborne videography, air photos, satellite imagery) can help assess forest health, particularly drought stress and disease infestation. Currently, satellite remote sensing for forest health assessment is hampered by inadequate resolution. The arrival of the high-resolution spaceborne sensors should help resolve this problem.

Perhaps most important, with the Lewis Hyperspectral Imager *(table 1)*, satellite remote sensing is evolving from sensors with a few wide spectral bands to earth-orbiting spectrometers collecting data in many narrow, contiguous bands.

The Landsat TM, for example, has seven bands; the Lewis satellite will offer 384. Much of digital image processing has revolved around the "spectral signatures" of earth surface features. These signatures have of necessity been very coarse and imprecise because of sensor limitations. The ability to better define and discriminate spectral signatures will enhance both classi-

Table 1. Spaceborne digital sensors with panchromatic resolution of 5 meters or less. Resolution of multispectral scanners (MSS) is expressed to the nearest meter. (Radar sensors are excluded.)

Country	Project	Launch	Resolution: Panchromatic	Resolution: MSS
			meters	
USA	EarthWatch QuickBird	1998	1	3
USA	Space Imaging EOSAT Carterra	1998	1	4
USA	Orbital Sciences Orbview	1997	1 or 2	4
Israel-USA	IAI/Core Technologies EROS	1997	1.5	—
France	SPOT 5 HRG	1999	2.5	10
Japan	ALOS AVNIR-2	2002	2.5	10
USA	EarthWatch EarlyBird	1997	3	15
USA	NASA CTA Clark	1998	3	15
USA	NASA TRW Lewis Hyperspectral Imager	1997	5	30

Sources: ASPRS 1995; Carlson and Patel 1997; Wulder 1997.

fication (e.g., Jia and Richards 1994) and identification of forest characteristics, particularly in the area of canopy chemistry (e.g., Wessman et al. 1988). Synoptic assessment of canopy chemistry will improve assessment of the potential effects of climate variability and land-use changes on our forest resources, and it will also allow targeted fertilization in intensively managed forests.

Site characterization. Forest spatial heterogeneity reflects differences in climatic and geomorphic processes that alter landforms and soils (e.g., Swanson et al. 1988). The effects of land use and climatic change on ecosystem composition, structure, and function are a critical environmental concern. Site index and species composition often vary with landforms because of such factors as water, light, and nutrient availability. The ability to characterize the landscape with high-resolution digital elevation models derived from commercial smallsats or other sources will greatly enhance our ability to understand and manage our forest ecosystems.

Fire monitoring. Satellite data have the potential to help assess damage from fire and other natural hazards. With a large number of satellites in orbit, new images will be available two or three times per day. With this increased frequency, satellite images can be used in many kinds of emergencies.

The Down Side

High-resolution satellite images come with several disadvantages, including an enormous volume of data, capital outlays for new equipment to process the images, and the cost of acquiring the images in the first place. Compare, for example, the size of current 100 km^2 images with those of the new, high-resolution images:

Sensor	Megabytes
Landsat multispectral scanner	0.02
Landsat thematic mapper	0.11
SPOT panchromatic	0.95
IRS-1C panchromatic	2.8
Carterra-1 panchromatic	95
QuickBird panchromatic	95

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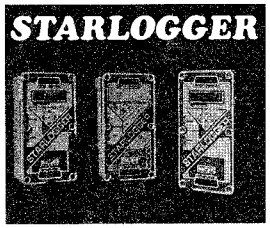

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The high volume of data can be accommodated with increased hard disk space, but it will still be a hurdle for all image users. In addition to more storage space, users will need fast, state-of-the-art microprocessors.

Capital outlay for a system to display and analyze satellite images is high. Although almost all image-processing software and hardware are becoming less expensive, the production-quality software necessary to analyze stereo images is not. The software alone in such packages as SOCET SET (Helava–GDE Systems), SoftPlotter (Autometric–Visions International), and ImageStation (Intergraph) can cost $90,000 or more.

How can an institution or company justify the initial costs of such systems? This is simple cost-benefit analysis. Anyone interested in using high-resolution satellite images for management should analyze the current management costs and techniques, and the benefits to be gained by using high-resolution data. If management objectives are met by using aerial photography, gearing up for digital images may not be wise, particularly for the near term. However, as GIS becomes ever more integrated into resource management at all levels, high-resolution digital images will be increasingly important.

None of the vendors contacted for this review had set their list prices. Images will usually be licensed, rather than sold, to the end user. Since prices are likely to be competitive, customers should compare ease of distribution, sensor characteristics, and service. In fact, given the wealth of competition and the "commodity" nature of images, most vendors already realize the importance of top-to-bottom integration and value-added, targeted products.

Besides the costs of images and equipment, another disadvantage is the potential unavailability of data for certain places at certain times. As with GPS, the high-resolution satellites will have "selective availability." Selective availability, or shutter control, means that during times of international con-

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flict or political tension, satellite images of affected areas will be degraded or unavailable. Although this factor may not affect users analyzing US data, those working with images of other countries may suffer interruptions. For example, the US government has already restricted US commercial satellites from imaging Israel and has held Israel's new high-resolution satellite program to similar standards for other areas in the Middle East (Ferster 1996). Organizations managing resources in areas likely to be affected by shutter control should consult both the image vendors and US Department of Commerce for details on the latest policies.

Conclusions

The commercial smallsats will be the first to combine the benefits of digital multispectral images, such as spectral pattern recognition, with the high resolution and stereo capability once found only in aerial photography. This combination should remarkably accelerate use of remote sensing in day-to-day forest management. In particular, stand delineation and classification for forest inventory will become more automated, with a corresponding reduction in the time and expense required for field inventory. However, field inventory (in conjunction with GPS and large-scale air photos) will still be required for accuracy assessment and training as well as for those situations requiring a precision unavailable from satellite images alone. PE&RS

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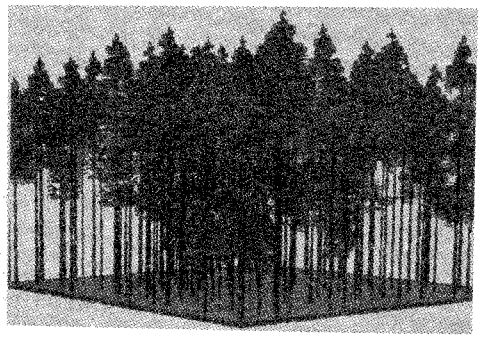
A Forest Management Information System for Education, Research, and Operations



By David D. Marshall, Debora L. Johnson, and David W. Hann

Just minutes from the campus of Oregon State University, the McDonald-Dunn Research Forest is important for education and research at the College of Forestry and other academic units. Proximity to Corvallis also makes this 11,648-acre forest an important recreational asset to the community. To enhance the property's educational and research functions and facilitate day-to-day operations, a forest management information system (FMIS) has been developed. Although some applications of this FMIS are specific to managing vegetation in a research and teaching forest, many are appropriate for all types of public and private forest ownerships and can also help manage recreation, cultural resources, wildlife, and riparian and water resources.

Components of the FMIS

The FMIS at the McDonald-Dunn Research Forest comprises an inventory system, a geographic information system (GIS), and a stand development model.

Inventory system. Work on the inventory started in 1980, when four design considerations were formulated: (1) there would be an in-place inventory of all stands on the property, (2) a grid of sample points would be installed across every stand, (3) a utilitarian sample plot design would be developed, and (4) the sample grid and plots would be permanently installed.

An in-place inventory of all stands was chosen for several reasons. Watershed and landscape-level issues can best be addressed when each stand has been identified, its attributes of interest measured, and its location described. Not only do these data provide a complete description, but they also provide better information on the true variability in the landscape. A good, complete inventory of all stands also permits managers to determine what treatment for each stand will best meet the objectives for the property. Finally, an in-place inventory of all stands provides flexibility for identifying research opportunities and choosing stands, watersheds, or landscapes for teaching.

A grid of sample plots in each stand was used to estimate stand attributes and characterize within-stand variation in horizontal spatial arrangement and vertical structure *(fig. 1, p. 28)*. The justification and implementation of many of today's complex and expensive treatment schemes require more detailed information about stand structure than in the past.

To meet the first two design criteria, a grid of 6,106 sample points was installed across the 660 stands on the property. Stands were defined not as operational units but as units of homogeneous overstory characteristics based on aerial photographs. Sampling intensities ranged from one or two sample points per acre in regeneration, and one sample point per 2 acres in immature and mature stands, to one sample point per 4 acres in old-growth stands. These variable sampling intensities can be implemented as a stand develops by dropping intermediate points on the sampling grid.

A single sample plot design—one that samples the full range of tree sizes across all stand ages—was chosen to simplify the fieldwork and minimize the statistical problems that can arise when the sample plot design changes with stand condition (Hann and Zumrawi 1991). The sample plot design for this inventory consists of three nested subplots installed at each point: (1) a 1/229-acre fixed area plot for trees ranging from 6 inches tall to 4 inches

Oregon State University's research and teaching forest benefits from a stand development model that incorporates crown and wood-quality attributes. New programs that translate numerical representations of stands into realistic images help students evaluate alternative treatments.

dbh, (2) a 1/57-acre fixed area plot for trees ranging from 4.1 to 8 inches dbh, and (3) a 20-BAF variable radius plot for trees larger than 8 inches dbh. It is similar to the cost-effective designs commonly used in stand examinations and inventory clusters in the Pacific Northwest. Each sample tree is measured for diameter, total height, and height to live crown.

The permanent installation of the inventory plots allows an extensive monitoring system to evaluate traditional and nontraditional silvicultural treatments as well as changes in ecosystem structure and function. Permanent installations also provide data sets for validating and, if necessary, recalibrating the stand development model, plus a long-term historical record that is useful in adapting management, designing new research activities, and training new managers and students.

Installation of the inventory system started in 1981 and was completed in 1983. Remeasurement began in 1986 under a 10-year schedule. To maintain a stable budget from year to year, stands were placed into groups that approximated a tenth of total remeasurement labor. Inventory crews have consisted of students, and quality control is maintained through an intensive training program, the use of field data recorders programmed to check and edit entries, and field checks of crew measurements by the inventory staff.

The data recorders produce database files that are downloaded and merged with the complete data set. These files can be manipulated with most common database and spreadsheet programs. A separate database of summarized variables is maintained from which data retrievals are crafted.

Geographic information system. Although summarized variables from database retrievals are very useful in tabular form, these same queries often provide new insights to researchers and resource managers when they are displayed graphically. To satisfy the growing need for spatial analysis and display, a GIS for the research forest was developed beginning in 1990. Base layers—including roads, streams, topography, and inventory plots—were initially scanned from 1:4,800 Mylar maps and built into a set of overlays for a personal computer–based GIS. In 1993 forest managers switched to a workstation GIS, where the development of an extensive set of GIS overlays has continued *(fig. 2)*.

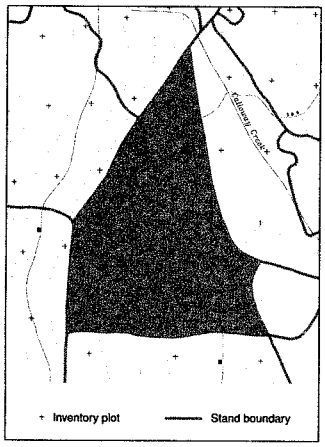


Figure 1. **Locations of inventory plots in stand 42401, the McDonald-Dunn Research Forest.**

The FMIS staff seeks to make the GIS layers and associated inventory data easy to access and use through the World Wide Web and through personal computers and workstations linked to the college network. Managers, professors, and students can then get quick answers to questions about the property.

Expanding monitoring work has required new GIS layers, including information on the locations of snags, roads, and streams; changes because of harvest; and trail and skid road construction. These updates are now being made with global positioning system receivers that provide a rapid and accurate way to digitize features directly from the ground.

Stand development model. During the initial installation of the inventory system in the early 1980s, past growth rates were reconstructed for 136 stands to provide the data needed to calibrate the ORGANON stand development model to Douglas-fir and grand fir forest types on the forest (Hann et al. 1995). Stands not treated within the past five years and with significant basal area in the two target species were selected in a manner to cover as wide a range in site index, age, and density as possible.

ORGANON, designed for personal computers, is a single-tree, distance-independent model (Munro 1974) that incorporates crown attributes in many of its functions. It was chosen because it can predict future development—and resulting wood-quality attributes—of even-aged and uneven-aged stands with pure or mixed-species composition. Treatments possible with this architecture include fertilization, pruning, and innumerable cutting alternatives. During simulation new trees can be added to the stand through an ingrowth routine.

Applied to an existing stand, ORGANON takes the initial sample of trees from the inventory, a stand age (if even aged), and site index (King 1966) and predicts how each sample tree's diameter, total height, height to crown base, and expansion factor (number of trees per acre the tree represents) will change given a species-specific diameter growth rate (Ritchie and Hann 1985; Zumrawi and Hann 1993), height growth rate (Ritchie and Hann 1986), height to crown base (Zumrawi and Hann 1989), and mortality rate equations, respectively. Individual tree records are aggregated to provide stand-level information. The resulting model has been validated with 30 years of independent remeasurement data from four local growth-and-yield installations *(table 1)*.

All of ORGANON's many output options present numerical values in tables or graphs. Graphs and tables can convey the state of the forest stand very

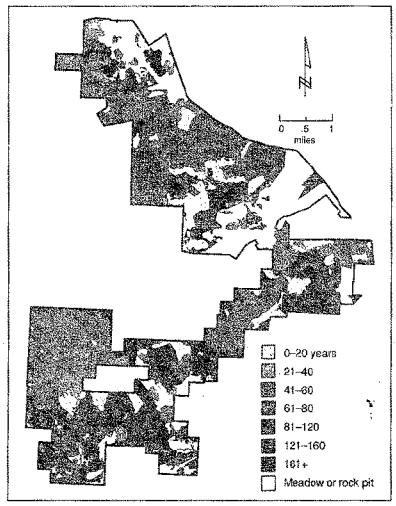


Figure 2. **Age classes in the McDonald-Dunn Research Forest.**

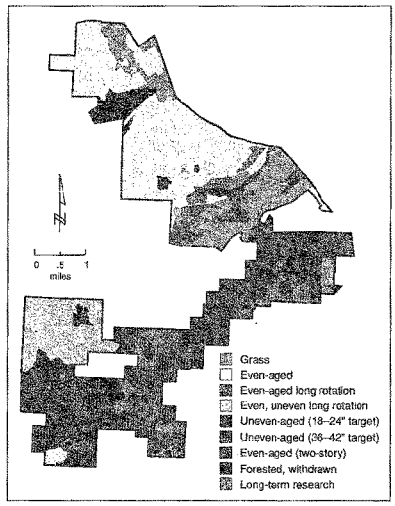


Figure 3. **Land allocation in the McDonald-Dunn Research Forest.**

precisely but require education and experience to interpret and understand. A forest scene, on the other hand, can relate information to the viewer in a way that isn't possible with tables and graphs. Program VIZ4ST (Hanus 1995) displays "three-dimensional" forest stand structure in color on a personal computer. It uses the output from ORGANON to display the relationship between the trees in forest stands in a familiar manner.

With its five-year growth cycle, the ORGANON stand development model was designed primarily for making silvicultural treatment decisions on selected stands. Unfortunately, updating the inventory of the entire property to a common year is difficult. To solve this problem, a separate program incorporating just the growth and mortality routines in ORGANON efficiently updates all stands that have not been treated since the last inventory measurement.

Uses of the System

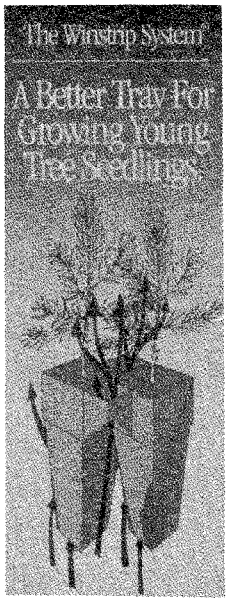
As the components of the FMIS have been completed, they have been incorporated into the educational and research programs of the College of Forestry and the day-to-day operations of managing the property.

Education. Elements of the FMIS are used in teaching undergraduate and graduate courses in the use of forest models, the practice of silviculture, and the interactions of wildlife with forest management practices. The forest models course, for example, uses GIS maps, stand summaries and tree lists from the inventory, and the ORGANON model to evaluate alternative thinning and fertilization strategies and planting densities for even-aged stands, the effect of pruning on tree and stand development, and the tradeoffs of even- versus uneven-aged management.

Research. The FMIS provides data both directly useful for researchers' analyses and indirectly useful for finding stands or forest types that match the description of their project's targeted population. A recent project to develop a system of equations for characterizing the crown profile of Douglas-fir tapped FMIS in two ways. First, data on the largest crown width of stand-grown trees were quickly and inexpensively gathered over two years by adding

Table 1. ORGANON validation results using data on total stem cubic-foot volume per acre from the control plots on four installations near the McDonald-Dunn Research Forest.

	Number of control plots	Size of control plots	Initial breast height age	King's site index	Difference at end of 30-year projection
Black Rock A	1	1.0 acres	39	116 feet	−4.2 %
Black Rock B	1	1.0	40	113	−1.6
Burnt Woods	2	0.1	18	136	+3.7
Haskins	3	0.2	13	136	−2.0
Weighted average					*−0.8*



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crown width measurements to the usual inventory tree measurements. Second, summaries from the inventory data were used to select a small set of stands where individual trees were felled for detailed width measurements.

Forest operations. The FMIS was crucial for the McDonald-Dunn forest plan (Sessions et al. 1993). Maps developed with the GIS were used to help the planning team make land allocation decisions *(fig. 3)*. ORGANON was then used to make 100-year yield predictions for every stand on the forest and for every treatment type that might be applied to it, including even-aged, two-storied, and uneven-aged regimes. Every stand and its particular set of prescriptions were then represented in a FORPLAN (Johnson et al. 1986) harvest-scheduling analysis. The results of this analysis were linked back to the GIS to display a map with suitable harvest units for each planning period.

The FMIS also provides basic monitoring data to help users understand the status and trends of many forest processes that are directly related to the size, species composition, and growth of trees. In addition, the permanent plot design provides a framework from which other ecological data, such as understory vegetation, woody debris, lichens, and crown sizes, may be collected.

Adaptation and Evolution

As the utility of the FMIS becomes more widely known, greater demands are placed on it, and the requests for information from it increase almost daily. Among the new issues that have emerged are these:

- How to measure and characterize edges between stands.
- How to efficiently sample down woody debris and other vegetation components.
- How to monitor the effects of management decisions on a wider range of resources.
- How to make the FMIS more directly accessible to students and faculty on campus.
- How to best use the FMIS in developing, marketing, and conducting continuing education programs.

The College of Forestry's substantial investment in the FMIS over the past 15 years is now beginning to pay dividends through expanded educational and research opportunities and improved operational decisions. The FMIS is a tool to manage the forest for a wide range of activities and values, and as a result, the College of Forestry is well positioned to deal with the information needs of the 21st century.

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Tree Growers' Cooperatives
FARM FORESTRY

There are now more than 100 million hectares of degraded lands in India that are suitable for farm forestry. The federal government, faced with a pronounced deficit in internal production of firewood and timber, has begun to organize tree growers' cooperatives as a means of permitting the rural poor to reclaim this land. Here, women prepare a plot of village-owned wasteland in the state of Gujarat for use as a tree plantation.

Tree growers' cooperative societies hold high promise as an instrument for promoting farm forestry in India on a sustainable basis. They can disseminate technical information to potential tree growers; supply quality saplings, fertilizers, and pesticides; provide or help secure institutional credit; and arrange for efficient marketing of farm forestry products at remunerative prices.

Although the practice of planting trees by Indian farmers on farmland—their own or community or government land—is as old as the cultivation of other crops, the need for government intervention to promote farm forestry was first articulated by the National Commission on Agriculture in 1976, when conventional farm forestry had failed to meet the increasing demand for tree products. The National Forest Policy of 1988 also emphasized the role of farm forestry as a source of raw materials for forest-based industries and advocated that degraded lands be planted to trees (GOI 1988).

Tapping the Potential

There exists substantial potential in India on both the supply and the demand sides for increasing the area devoted to tree plantations. An estimated 30 million hectares of private lands in India is degraded and fit only for farm forestry, as is another 80 million hectares of degraded land owned by the state governments and village *panchayats*—a statutory institution comprising all resident villagers aged 18 years and more and managed by an executive committee of elected representatives. Under a variety of social welfare programs, many state governments are now granting government wastelands to the rural poor or the co-ops on long-term leases for tree growing. Thus some 130 million hectares of land is available for farm forestry in India.

On the demand side of the equation, Indians need various farm forestry products, especially firewood, fodder, and timber. In 1987 the consumption of firewood and timber in India was 235 million m^3 and 40 million m^3, respectively, compared with harvests of 40 million m^3 and 15 million m^3 (Oka 1992). According to

IN INDIA

By Katar Singh and Kulbhushan Balooni

Kaushal and Chimamani (1992), if the government's national target of producing 200 million m^3 of wood is to be achieved by the year 2000, some 500 million seedlings will have to be planted every year in India. This indeed is a Herculean task.

To exploit the potential of farm forestry in India, the following four preconditions must be met.

1. Tree plantations must be financially viable. Whatever the rationale for farm forestry advanced by government policymakers, academics, environmentalists, and national and multinational companies, the plain truth is that rational people will grow trees only if it is financially worthwhile. The experience with farm forestry projects in India to date indicates that farmers grow trees on their land if tree growing is more profitable than growing any other crops and when benefits from trees exceed the costs of growing them (Chambers et al. 1989; Saxena 1991).

2. Technical information and materials must be provided. Most of the tree growers in India are poor, small-scale operators. Unorganized and illiterate, they do not have access to the latest technical information about farm forestry, nor can they afford fertilizers and pesticides. Information from various organizations needs to be collated and disseminated to potential tree growers through appropriate media so that they can be trained in the latest methods. Fertilizers and pesticides need to be provided at subsidized prices so that poor farmers can use them to enhance tree production.

Currently, saplings and in a few cases fertilizers are provided to tree growers by state forest departments and nongovernmental organizations under various farm forestry programs. Most often, saplings are not supplied at the right time of year or in adequate numbers, and the quality of the saplings is poor.

3. Institutional credit on easy terms must be available. So far, commercial and cooperative banks in India have not played any significant role in providing credit on easy terms and conditions for tree plantations. The National Bank for Agriculture and Rural Development provides refinancing under several programs through commercial and cooperative banks, but tree growers remain unaware or unmotivated. The programs need to be more widely publicized, the farmers better educated, and the credit delivery system streamlined because of the importance of credit for a long-term investment like forestry.

4. Tree growers should be organized. Obtaining production inputs at reasonable cost and selling forest products at remunerative prices are difficult because the growers are small-scale operators scattered throughout a large country. Low prices have dampened the enthusiasm of tree growers for growing trees, particularly in the regions where farm forestry has made good progress (Saxena 1992).

Those problems can be addressed by various institutions and organizations—government forest departments, nongovernmental organizations, the co-ops, individual entrepreneurs, private companies, multinational corporations—and in India, all coexist and contribute to the cause of farm forestry. Each type of organization has its strengths and weaknesses. In most situations, however, the cooperatives seem most appropriate for promoting farm forestry: they have a sense of social responsibility, and their primary goal is to meet the needs of their members. When organized into forestry co-ops, tree growers can have easier access to technical advice, good-quality saplings, fertilizers, pesticides, credit, and assured markets, both national and international.

How the Co-ops Work

The co-ops are a relatively recent development in India. Fadaval Tree Growers' Cooperative Society, organized in the mid-1970s in Surat district of Gujarat state, was probably the first such society. In 1986 a pilot project attempted to organize more co-ops in selected states of India through a national organization, the National Tree Growers' Cooperative Federation (NTGCF), headquartered at Anand. NTGCF is registered under the Multistate Cooperative Societies Act; it is neither a government organization nor a private company. The pilot project was launched in Gujarat, Andhra Pradesh, Orissa, Karnataka, and Rajasthan. Later, one more state, Uttar Pradesh, was included.

In each state NTGCF deploys a multidisciplinary team of specialists in such areas as forestry, sociology, extension education, and rural development. The team organizes village meetings and makes door-to-door visits to edu-

cate and motivate farmers to grow trees, then identifies potential leaders and officebearers for the proposed co-ops and trains them in management. Thus the NTGCF plays an active role in establishing and nurturing the co-ops.

The main objective of the co-ops is to enable villagers to grow trees and grasses of suitable species on their own marginal agricultural lands and degraded government lands to meet local needs for firewood, fodder, and wood for making farm tools and implements. The ultimate goal is to improve the socioeconomic condition of the members and the quality of the local environment.

A typical co-op performs a variety of functions:

- planting trees on degraded common lands owned by the village or government;
- helping members grow appropriate species of trees and grasses on their private lands;
- providing technical information and training;
- distributing seeds, saplings, fertilizers, and pesticides;
- processing, storing, and marketing all the products of its members through NTGCF;
- operating firewood and fodder banks for its members and, in times of shortage, procuring fodder from other areas and selling it to members at cost; and
- managing degraded wastelands and marginal lands to increase their productivity, securing the lands on long-term lease or contract.

Each co-op is registered under the Cooperative Societies Act. A co-op can be formed with a minimum of 11 adults from different families. Any person who grows trees or grass and resides within a co-op's area of operation can join; he or she agrees in writing to sell produce to the co-op only. Each co-op in Gujarat state studied by Balooni (Balooni 1995) had more than 100 members. The largest co-op, with 560 members, had 311 landless people, 190 marginal-land farmers, and 59 small farmers.

A typical co-op consists of a general body, comprising all the members, vested with policymaking powers under the Cooperative Societies Act and its own bylaws. A management committee is responsible for implementing the policies determined by the general body and for overall administration and management. A paid secretary looks after day-to-day matters. Five members elected by co-ops from all the participating states serve on the board of directors of the NTGCF.

Money Matters

The co-ops obtain funding from various sources. Each member has to buy at least one share of 10 Indian rupees (INR) and pay an entry fee of INR 1; shares are not issued to nonmembers. NTGCF provides a one-time grant amounting up to INR 458,000 (approximately $15,000) to a co-op established under its auspices for meeting various expenses in the first five years for planting trees on 40 hectares of village wastelands. NTGCF, in turn, receives funds and grants from many national and international agencies, including the Canadian International Development Agency, which provides commodity aid in the form of wood pulp, and the Swedish International Development Authority, which provides palmolein.

The bylaws of a typical co-op stipulate that 25 percent of the profit from its sale of fodder, timber, and other tree products be transferred to its reserve fund. In accordance with the Cooperative Societies Act and Rules, money is also set aside for the cooperative education fund, and a sum not exceeding 12 percent of the paid-up share capital

Table 1. Cumulative expenditures incurred on various operations by three sample co-ops in Kheda district of Gujarat in the first five years (1987–92), in Indian rupees (INR).*

	Tree Growers' Co-op Society							
	Vatra		Sarnal		Navagambara		Total	
	INR	*%*	*INR*	*%*	*INR*	*%*	*INR*	*%*
Land development, soil/and water conservation	151,655	40.51	143,692	56.28	109,270	28.44	404,617	39.91
Plantation and after care	184,116	49.18	70,430	27.58	246,027	64.02	500,573	49.37
Equipment	5,466	1.47	4,406	1.73	6,127	1.59	16,021	1.58
Staff salaries	29,575	7.90	32,090	12.57	21,625	5.63	83,290	8.21
Stationery and supplies	2,163	0.58	1,950	0.76	1,238	0.32	5,351	0.53
Office rent	1,350	0.36	2,750	1.08	—	0.00	4,100	0.40
Total	374,347	100.00	255,318	100.00	384,287	100.00	1,013,952	100.00
Area under plantation (in hectares)	40 ha		35 ha		60 ha		135 ha	
Plantation cost per hectare	INR 9,359		INR 7,295		INR 6,405		INR 7,511	
Compounded plantation cost per hectare at 10% interest (at 1995–96 prices)	INR 16,949		INR 13,799		INR 11,079		INR 13,523	
(in US$, rounded)	$565		$460		$370		$450	

*INR 30 = US$1
Source: NTGCF 1995

is earmarked for paying dividends to the shareholders.

Of the balance left after those statutory deductions, 65 percent is distributed to members in accordance with the value of trees or grass and any other produce they sell; 5 percent is set aside for community development work; 10 percent is paid as a bonus to the society's staff; 15 percent goes for soil, water, and energy conservation and wasteland development; and 5 percent is paid into the cooperative propaganda fund.

Progress Report

By the end of June 1996, NTGCF had organized 401 co-ops in six states—Andhra Pradesh, Gujarat, Karnataka, Orissa, Rajasthan, and Uttar Pradesh. Altogether, the co-ops counted 34,855 members and had planted more than 8 million saplings on wasteland leased to the co-ops by the state governments and more than 2.4 million saplings on private marginal land (NTGCF 1996). Of the total number of members of the co-ops, 19 percent were women.

It is too early to assess the co-ops' performance and sustainability: the first co-ops were set up in 1987, and final harvesting is not yet done. But on the basis of data on actual costs and intermediate benefits and estimates of final harvest, we found that a typical co-op can be financially viable for 15 years or so. Mishra (1993) found the internal rate of return with subsidy to be 16.27 percent; the cost-benefit ratio at 15 percent discount rate was 1:1.13 for tree plantations on wastelands in the state of Madhya Pradesh under a tree growers' cooperative scheme over 26 years. We estimated the average cost of tree plantation for a sample of three co-ops in Kheda district of Gujarat to be INR 13,523 ($450) per hectare at the 1995–96 prices over five years *(table 1)*. The costs included tree planting and growing, land development, soil and water conservation, and overhead. The costs incurred in earlier years (before 1992–93) were compounded at the rate of 10 percent to express them at 1995–96 prices. At the 10 percent discount rate, a co-op in Gujarat had an internal rate of return of 51.6 percent and the cost-benefit ratio was 1:5.64 over 16 years, on the basis of projected benefits.

Many co-op members are now well trained and motivated to manage their societies without any external assistance. But in many other cases, members are not yet able to take over the management. It is hoped that over time, the co-ops will become autonomous, financially viable institutions.

Little has been published about the performance of the co-ops and their establishment, nurturing, and management. A few case studies conducted by scholars and practitioners throw some light on these aspects, however. Drawing on those studies and our own discussions with a sample of officials and nonofficials involved, we identified the following issues:

- legal and administrative hassles in securing for the co-ops wastelands on lease from the government;
- restrictions on harvesting and transport of trees grown by co-op members on their private lands;
- lack of procedures for resolving conflicts that arise in managing the co-ops;
- lack of a mechanism for distributing benefits equitably; and
- problems in integrating procurement, storage, processing, and marketing activities.

The NTGCF is now identifying practical alternatives for resolving those problems. The role of the government should be to facilitate the establishment and smooth functioning of the co-ops by providing them needed technical, financial, and legal support and removing procedural and legal hurdles in leasing wastelands to them and in harvesting and transporting farm forestry products.

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SOUTH KOREA

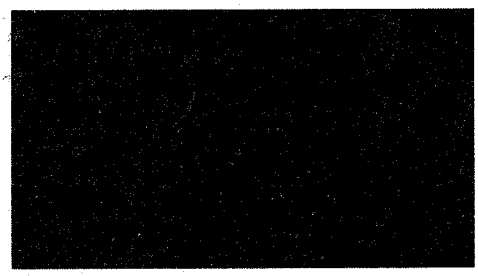
Reforestation for Timber and Conservation

By Byoung Il Yoo

What was one of the world's poorest places has become a modern, developed nation, and what had been a devastated landscape is now successfully reforested.

The forestland of South Korea, comparatively rich old-growth in some regions, was largely destroyed by overharvesting and illegal cutting throughout the colonial period (1910–45) and the Korean War (1950–53), leaving devasted mountains and bare hillsides. The forest has always been important for Koreans, however. They have a 5,000-year history with mountains and forests, and just as the culture of some nations is based on stone and desert, the culture of Korea is based on wood and forest.

Since the early 1960s, considerable investment in forestry has been made as part of a national development plan. In 1961 the Forestry Administration was established to manage forest resources efficiently. Two 10-year forest development plans have now been completed. The target of the first plan was to replant 1 million hectares of denuded forestland; the objective of the second was to create 1 million hectares of commercial forest. Today these forests are still immature, mostly less than 30 years old, and have limited economic value. As a result, imported wood meets 85 percent of South Korea's domestic timber needs.



Forestry, however, is for the future. The third 10-year plan is now under way, with the goal of harmonizing economic values and public benefits, including conservation and outdoor recreation, on the nation's forests.

The tree planting and forest protection practices of the New Villages Movement (Saemaul Undong) also helped rehabilitate Korea's forests. The nongovernmental organizations known as forest cooperatives have led the development of private forestry in Korea. Private forests account for 71 percent of total forestland; 96 percent of the 2 million forest owners—individuals, families, and cooperatives—manage less than 10 hectares. Such small-scale ownership is generally not efficient, but the cooperatives have encouraged rational management by allowing owners to combine labor and

capital and thus improve the profitability of their forests. Currently, some 458,000 Koreans are members of forestry cooperatives.

Supply and Demand

Timber was a main export for South Korea, especially plywood and sawtimber, from the late 1960s to the early 1980s. The industry slumped, however, when the log export ban was imposed by tropical countries and the cost of domestic labor increased. Beset by management difficulties, some plywood companies in Korea went out of business, and plywood imports rose. The recent operation rate of domestic sawmills has been around 50 percent of capacity, and there are fewer sawmills in remote areas.

As of 1994, total stock volume was estimated at 296 million cubic meters. The national average per hectare was 45 cubic meters—much higher than the 1960s figure, 10 cubic meters per hectare. The growth rate of Korea's stock volume is estimated at 4.9 percent per year.

Domestic demand for timber will increase with the population and Korea's economic development, and dependence on imports will continue. The share of Korean timber in this growing market will reach 17 percent in the year 2000.

Forest Policy

In a word, South Korea's forest policy is reforestation. As farmland was being lost to drought, floods, and erosion, the need for reforestation of Korea's devastated mountainsides was urgent. The goal was environmental preservation, not just timber production.

The Forestry Administration is now focusing on improving land management on its 24 national forests to accommodate citizens' demands for recreational uses in addition to timber. The agency is promoting forests for recreation and building campgrounds and arboreta.

To deal with timber shortages, new commercial forests are being established, and the amount of such plantations will grow to 47 percent of total forest area in 2030. Existing forest resources must be protected, of course, and the agency seeks to control fire, pests, and disease. Greater productivity in forestry is another goal, to be achieved through improved roads and mechanized production. New storage yards and forest product processing factories are being built.

Finally, forest researchers are applying advanced technology to improve local species and develop new uses for forest products, and new forestry techniques are being made available through extension programs to small-scale forest managers and owners.

Challenges

South Korea faces several problems in implementing its forest policy in the face of shrinking worldwide forests. The country's own forest resources are woefully insufficient for Koreans today, let alone future generations. The high proportion of privately owned forests, moreover, may lead to inefficient use of forestland, since forestry is a low-profit, long-term investment. Achieving sustainable forests will take time, money, and the concerted effort of many people.

Sustainable forest management may be a barometer for modernization in countries today. Now that South Korea is basically a modern, developed country, Koreans can complete the moderization process by improving the quality of their lives through clean water and air and sustainable forests: that is their task.

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Letters

(Continued from page 2)

one or two courses. Subjects like forest soils, forest fire control and use, forest entomology, forest pathology, wood technology, and utilization were combined or dropped.

But major changes began in the 1970s with the environmental movement. The number of schools offering environmental studies proliferated, and the list has grown to more than 1,000 undergraduate and 3,000 graduate programs. I believe forestry schools got swept up in the flow, perhaps because of the popularity of the movement, or competition for students, or a belief that environmental studies included topics of real concern to society. To make room for new courses, forestry subjects were eliminated or consolidated.

Over time and with good intent, both the schools and SAF have attempted to accommodate, as foresters, people involved in the management of our forests. In 1958 the SAF definition of forestry was 13 words; in 1997 an SAF definition ran five times that. But a wildlife biologist is not a forester; neither is a landscape architect, a systems ecologist, or a recreation planner, even though these specialists play significant roles in forest management.

We risk losing the unique body of knowledge that sets forestry apart. This body of knowledge need not be one directional. For example, a silviculturist should be qualified to prescribe treatments for improving wildlife habitat, and even wilderness preservation, in addition to sustainable wood production.

Concluding, I agree with Wiant that we need to redefine what makes forestry a profession and define more explicitly the title of forester.

J. W. Barrett
Knoxville, Tennessee

CORRECTION

In "Northern Spotted Owl Management: Mixing Landscape and Site-Based Approaches" by King et al. (August), the colors on Figure 1 on page 23 were reversed; black should indicate reserves.

In Review

■ UNCERTAIN DECISIONS

Against the Gods: The Remarkable Story of Risk. Peter L. Bernstein. 1996. 383 p. $27.95 cloth. John Wiley & Sons, 605 Third Ave., New York 10158.

Peter Bernstein postulates that what separates modern times from the thousands of years of history is humankind's "mastery of risk: the notion that the future is more than a whim of the gods and that men and women are not passive before nature." Those with an interest in how human beings make choices and respond to risk will find this book a readable and insightful tour of the vast literature on the subject, beginning with the Hindu-Arabic numbering system and ending with modern chaos theory. Contributions by philosophers, mathematicians, and other great thinkers are presented in biographical sketches, in the style of Heilbroner's *The Worldly Philosophers.* For those wishing to pursue the technical details, an exhaustive bibliography is included, along with notes and name and subject indexes.

The story of risk begins in 1654, when a French nobleman challenged Blaise Pascal to solve a puzzle concocted by an Italian monk 200 years earlier. The puzzle can be paraphrased as "how to divide the stakes of an unfinished game of chance between two players when one of them is ahead." Pascal collaborated with Fermat, solved the puzzle, and in the process discovered the theory of probability, the language of risk.

Gottfried von Leibniz commented to Jacob Bernoulli in 1703 that "[N]ature has established patterns originating in the return of events, *but only for the most part.*" Citing this key phrase, Bernstein contends that Leibniz provided the reason why events are unpredictable and why there is such a thing as risk.

In a paper published in 1738, Daniel Bernoulli introduced the concept of utility (value based on ability to satisfy wants) and laid the foundation for human rationality ("utility is inversely proportionate to the quantity of goods possessed").

With the 20th century came the distinction between risk (measurable) and uncertainty (unmeasurable) as postulated by both Frank Knight and J.M. Keynes. In a 1952 paper titled "Portfolio Selection," Harry Markowitz used volatility as a proxy for investment risk. This work was the foundation for most of the investment theory that followed.

Two psychologists, Daniel Kahneman and Amos Tversky, developed Prospect Theory to explain how people manage risk and uncertainty, and discovered behavior patterns that had not been recognized by proponents of rational decisionmaking, particularly the asymmetry between decisions entailing gains and those entailing losses. In a chapter titled "The Fantastic System of Side Bets," Bernstein presents a wonderfully clear explanation of derivative instruments and their long history.

Although most of the examples in the book are financial, it would be difficult to pick up an issue of the *JOURNAL OF FORESTRY* and not find several applications of the ideas and techniques presented by Bernstein. Forestry *is* decisionmaking under uncertainty. It relies on sampling of larger populations and on predictions of growth, prices, wildlife responses, and other factors far into the cloudy future. It deals with investments in forest stands by individuals and corporations as well as investments in portfolios of timberland by institutions. Our economic models assume the rationality of human behavior.

It is difficult for me to imagine any forester (or other literate human being) who would not enjoy this volume.

—Paul E. Sendak
Durham, New Hampshire

■ NEW RELEASES

Aquic Conditions and Hydric Soils: The Problem Soils. M.J. Vepraskas and S.W. Sprecher, eds. 1997. 156 p. $36 paper. Soil Science Society of America, SSSA Special Publication Number 50, 677 South Segoe Rd., Madison, WI 53711-1086.

A Dictionary of Plant-Lore. Roy Vickery, ed. 1997. 413 p. $17.95 paper. Oxford University Press, 198 Madison Ave., New York 10016.

Domestication and Commercialization of Non-Timber Forest Products in Agroforestry Systems. Roger R.B. Leakey, August B. Temu, Mary Melnyk, and P. Vantomme, eds. 1997. 287 p. $31 paper. Food and Agriculture Organization of the United Nations, Bernan Associates, 4611-F Assembly Drive, Lanham, MD 20706.

State of the World's Forests: 1997. Food and Agriculture Organization of the United Nations. 1997. 200 p. $25 paper. Bernan Associates, 4611-F Assembly Drive, Lanham, MD 20706.

Tree Huggers: Victory, Defeat & Renewal in the Northwest Ancient Forest Campaign. Kathie Durbin. 1997. 295 p. $24.95 cloth. The Mountaineers, 1001 SW Klickitat Way, Seattle 98134.

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Forestry Reports

■ GENERAL

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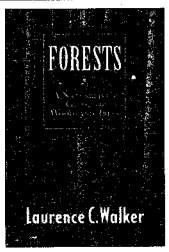

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■ ECONOMICS

Using IMPLAN to Identify Rural Development Opportunities. D.W. Holland, H.T. Geier, and E.G. Schuster. 1997. 19 p. USDA For. Serv., INT Res. Stn., 324 25th St., Ogden, UT 84401. Gen. Tech. Rep. INT-GTR-350.

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Classifieds and Employment

■ POSITIONS AVAILABLE

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Applications are invited for a full-time faculty position as assistant professor of forestry, beginning July 1998. Applicants should have expertise and an interest in teaching courses in more than one of the following areas: natural resources issues and policy, introductory GIS and remote sensing, forestry in the developing world, wildlife management, forest pathology, and/or forest entomology. The new faculty member will also be expected to teach at least one section of our Introduction to Forestry course each year. We seek above all a broadly educated forester with excellent field skills and a strong commitment to interdisciplinary teaching in a high-quality liberal arts program. We specifically seek a person who will complement existing department strengths in silviculture, forest soils, forest ecology, urban forestry, biometrics, hydrology, and many areas of geology. At least one graduate degree in forestry or a closely related field is required. Applicants should have a PhD or be nearing its completion.

The University of the South has a distinguished liberal arts program in which excellence in teaching is emphasized and research with students is encouraged. The attractive campus lies on the Cumberland Plateau within the 10,000-acre forested and managed University Domain, which is used for teaching, research, and recreation. The six-person Department of Forestry and Geology offers degrees in forestry, geology, and natural resources. There are 1,250 undergraduates in the college and approximately 60–70 junior and senior majors in the department. This position is a three-year appointment, convertible with expected college growth and favorable job performance to tenure-track at the end of the third year. Three-year positions have been a fundamental part of the university's expansion program since 1992 with the college moving toward 1,300 students by the year 2000. The Department of Forestry and Geology has been consistently growing for the past 10 years, with new faculty positions added previously in 1987 and 1992.

Review of applications will begin January 8, 1998. Applicants should send a curriculum vitae, undergraduate and graduate transcripts, three letters of recommendation, a statement of teaching interests and experience, and a statement of research interests to **Dr. Karen Kuers, Forestry Search Committee, Department of Forestry and Geology, The University of the South, Sewanee, TN, 37383-1000; e-mail: kkuers@seraph1.sewanee.edu.**

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Three Faculty Positions, Department of Forestry, University of Kentucky

The University of Kentucky Department of Forestry announces three new faculty positions. These positions are funded by the Robinson Forest Initiative, which has the broad responsibility of providing forestry and natural resource programs that will contribute to the betterment of the lives of the people of Kentucky.

Terrestrial Restoration Ecology. This position is 80% research and 20% instruction. Responsibilities of this position are to initiate a research program examining ecosystem dynamics in degraded natural forests using an integrated approach to ecosystem restoration. The successful applicant must have research experience focusing on restoration of forests to productive, healthy ecosystems. A geographical focus of research will be the mixed-mesophytic forests and other unique natural communities of eastern Kentucky, which have been anthropogenically

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Applications consisting of a curriculum vitae, transcripts, brief statements of research and instruction interests, teaching philosophy, and career goals, and three letters of recommendation should be submitted by December 31, 1997, to Dr. Mary A. Arthur, Chair, Terrestrial Restoration Ecology Search Committee, Department of Forestry, University of Kentucky, Lexington, KY 40546-0073.

Forest Resource Management. This position is funded by the Robinson Forest Initiative, which has the broad responsibility of providing forestry and natural resource programs that will contribute to the betterment of the people of eastern Kentucky. The position is 100% extension, tenure-track, and at the assistant professor level. Emphasis of this position is on management sciences and resource economics including systems analysis and operations research. Responsibilities of this position are to develop an effective extension program providing for sustained economic and ecological benefits from Kentucky's forests, to provide landowners with the information needed to make appropriate decisions at the individual ownership and landscape level, to assist in regional planning of forest resources, and to contribute to the development and dissemination of the studies of resource use and sustainable development. This position will be located at the Robinson Substation, situated 90 miles east of Lexington in Quicksand, Kentucky.

Applications consisting of a curriculum vitae, transcripts, brief statements of extension interests and career goals, and three letters of recommendation should be submitted by December 31, 1997, or until a suitable candidate is found to Dr. Matthew H. Pelkki, Forest Resource Management Search Committee, Department of Forestry, University of Kentucky, Lexington, KY 40546-0073.

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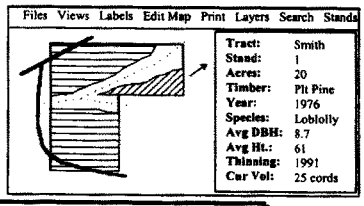

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EOE

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The successful applicant must be able to communicate effectively with individuals, agencies, and audiences responsible for forest management, water resources, and related areas of concern throughout eastern Kentucky. Competency in use of mass media and teaching technologies will be an asset. Cooperative work with an interdisciplinary team will be an important aspect of this position. Teaching contributions to the forestry and natural resources curriculum are expected.

Applications including a curriculum vitae, transcripts, a brief statement of extension and teaching interests, and three letters of recommendation should be addressed by December 31, 1997, to **Dr. Allan J. Worms, Chair, Search Committee, Department of Forestry, University of Kentucky, Lexington, KY 40546-0073.** The position has a starting date by July 1, 1998.

The University of Kentucky is an AA/EO employer and is committed to increasing the diversity of its faculty, staff, and student body. Individuals from underrepresented groups are encouraged to apply.

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The Clinch Powell Sustainable Development Initiative (CPSDI), a regional nonprofit organization, is seeking a full-time sustainable forestry and wood products manager. The position will be based in Abingdon, Virginia, and will involve regular travel to a satellite office and other sites throughout a 10-county region of Appalachian Virginia and Tennessee. The manager will coordinate CPSDI's wood products program, develop markets for sustainable wood products, oversee the development of a value-adding infrastructure, and work closely with entrepreneurs, community leaders, and other groups. A bachelor's degree in marketing, business, or forestry is required, along with a minimum three years' experience in the wood products industry. Familiarity with environmentally sensitive logging, wood certification, and forest stewardship preferred. Salary range $28,000 to $35,000. Send résumé and letter to **CPSDI, PO Box 791, Abingdon, VA 24212** by October 31.

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Assistant/Associate Professor and State Extension Forestry Specialist

The application closing date for the assistant/associate professor and state extension forestry specialist position, Department of Forestry, Oklahoma State University, has been extended to November 1, 1997. The complete position announcement was published in the August 1997 *Journal of Forestry* and the July-August 1997 *Forestry Source*. For information, contact **Dr. Ed Miller at (405) 744-5438; e-mail: forelm@okway.okstate.edu.**

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Bullard Fellowships in Forest Research, Harvard University

Each year, Harvard University awards a limited number of Bullard Fellowships to individuals in biological, social, physical, and political sciences to promote advanced study, research, or integration of subjects pertaining to forested ecosystems. The fellowships, which include stipends up to $30,000, are intended to provide individuals in midcareer with an opportunity to utilize the resources and to interact with personnel in any department within Harvard University in order to develop their own scientific and professional growth. In recent years, Bullard Fellows have been associated with the Harvard Forest, Department of Organismic and Evolutionary Biology, and the J.F. Kennedy School of Government and have worked in areas of ecology, forest management, policy, and conservation. Fellowships are available for periods ranging from four months to one year and can begin at any time in the year. Fellowships are not intended for graduate students or recent postdoctoral candidates. Further information may be obtained from **Committee on the Charles Bullard Fund for Forest Research, Harvard University, Harvard Forest, PO Box 68, Petersham, MA 01366.** Annual deadline for applications is February 1.

Applications from international scientists, women, and minorities are encouraged.

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Perspective

Today's Forests Lack Color

For years I had been puzzled by how few people of color use the national forests. I initially believed this was due to the low number of people of color employed by the USDA Forest Service. However, after more than 20 years' work with schools, universities, churches, and civic organizations in communities of color, I have some strong contrary opinions. I have concluded that people in communities of color, particularly the African-American community, know little about national forest system lands, and virtually none of them realize that these are public lands—*their* public lands.

Each year for the past five years, I have begun my presentations for urban youth groups by asking, "Who owns the national forests?" Each year I receive the same answers: "the government," "Smokey Bear," etc. These answers are deeply disappointing. Generally, to this audience, the forest is just that, "the forest." They know little about the differences between federal, state, private, and industry ownerships.

I am convinced, first of all, that lack of knowledge is the primary factor contributing to the lack of national forest use by communities of color. Furthermore, I believe that such lack of knowledge is, in part, due to the failure of the Forest Service and other forestry and environmental entities to engage communities of color, the majority of whom reside in urban settings.

My second opinion: the prevailing myth, which maintains that lack of transportation, equipment, leisure time, and money are the primary factors for the lack of national forest use by communities of color, is just that—a myth, one grounded in ignorance and racial bias.

The July issue of the NAACP's *Crisis* magazine reported that dozens of African-American organizations spend, in total, nearly $210 million in the cities hosting their national conventions. The article also estimated that the African-American community spends more than $4 billion annually on travel and lodging. Nike, Adidas, and other industrial giants compete for dollars in communities of color by advertising in the minority media and supporting minority organizations.

This leads to my third opinion: we at the Forest Service should increase the marketing of our products, services, and economic resources in communities of color. Our leaders and employees regularly meet and form economic partnerships with leaders of the timber industry, environmental groups, and professional organizations, such as the Society of American Foresters. We even reward such activities as examples of leadership and good stewardship. Yes, these meetings and partnerships are important. But as we carry out the service part of our mission, we *must* share our time and economic resources with communities of color.

In 1992 two Wind River Ranger District employees, Tom Linde and Carmen Saunders, approached me with a plan aimed at marketing national forests to urban minority youth. They wanted to involve minority young people in National Fishing Week activities.

Urban service organizations were searching for opportunities to introduce urban youth to outdoor experiences. Linde and Saunders believed public lands should be a focal point for these activities and that Forest Service employees should assume a leadership role in introducing communities of color to the use of their national forests.

Thus began Urban Youth Camp-Outs in Washington State. We have since found them to be instrumental in achieving our agency mission of "Caring for the Land *and Serving People.*"

Programs such as Urban Youth Camp-Outs present tremendous opportunities for creating environmentally conscientious forest users and for building working relationships with communities of color. This year alone, our Camp-Out program will serve more than 200 young people.

Which leads to my final opinion: as a result of the camp-outs, several cooperating organizations have become involved in Forest Service Urban and Community Forestry (U&CF) grants. One local cooperator, the Bagley Teen Center, received a $10,000 U&CF grant to develop a Teen Tree Steward Program. Gifford Pinchot National Forest employees will teach classes in soils and silviculture for the tree stewards. However, the forest is not funded to provide this support. I am told that since U&CF funding is pass-through money ($612,000 this year in Washington and Oregon) to the state, there is nothing left for funding national forest participation in the local community. Even though many programs are staffed entirely by volunteers, most such community requests go unanswered because we lack funding.

Funding these efforts in local communities should be part of the Forest Service's State and Private Forestry (S&PF) Urban and Community Forestry program. This year the S&PF Urban Forestry program was funded at $26 million nationally. So it's obvious—to me, anyway—that there *are* sufficient funds for state and national forest efforts in urban forestry.

Our philosophies and even our regulations on the use of urban forestry funding cry out for change! Communities of color contribute their tax dollars, allowing the Forest Service to carry out its mission. All such communities ask is to be included in the people we serve.

Earl Ford is ecosystem staff officer, USDA Forest Service, Gifford Pinchot National Forest, 10600 NE 51st Circle, Vancouver, WA 98682.

Code of Ethics

for Members of the Society of American Foresters

Preamble

Stewardship of the land is the cornerstone of the forestry profession. The purpose of these canons is to govern the professional conduct of members of the Society of American Foresters in their relations with the land, the public, their employers, including clients, and each other as provided in Article VIII of the Society's Constitution. Compliance with these canons demonstrates our respect for the land and our commitment to the wise management of ecosystems, and ensures just and honorable professional and human relationships, mutual confidence and respect, and competent service to society.

These canons have been adopted by the membership of the Society and can only be amended by the membership. Procedures for processing charges of violation of these canons are contained in Bylaws established by the Council. The canons and procedures apply to all membership categories in all forestry-related disciplines, except Honorary Members.

All members upon joining the Society agree to abide by this Code as a condition of membership.

Canons

1. A member will advocate and practice land management consistent with ecologically sound principles.
2. A member's knowledge and skills will be utilized for the benefit of society. A member will strive for accurate, current, and increasing knowledge of forestry, will communicate such knowledge when not confidential, and will challenge and correct untrue statements about forestry.
3. A member will advertise only in a dignified and truthful manner, stating the services the member is qualified and prepared to perform. Such advertisements may include references to fees charged.
4. A member will base public comment on forestry matters on accurate knowledge and will not distort or withhold pertinent information to substantiate a point of view. Prior to making public statements on forest policies and practices, a member will indicate on whose behalf the statements are made.
5. A member will perform services consistent with the highest standards of quality and with loyalty to the employer.
6. A member will perform only those services for which the member is qualified by education or experience.
7. A member who is asked to participate in forestry operations which deviate from accepted professional standards must advise the employer in advance of the consequences of such deviation.
8. A member will not voluntarily disclose information concerning the affairs of the member's employer without the employer's express permission.
9. A member must avoid conflicts of interest or even the appearance of such conflicts. If, despite such precaution, a conflict of interest is discovered, it must be promptly and fully disclosed to the member's employer and the member must be prepared to act immediately to resolve the conflict.
10. A member will not accept compensation or expenses from more than one employer for the same service, unless the parties involved are informed and consent.
11. A member will engage, or advise the member's employer to engage, other experts and specialists in forestry or related fields whenever the employer's interest would be best served by such action, and a member will work cooperatively with other professionals.
12. A member will not by false statement or dishonest action injure the reputation or professional associations of another member.
13. A member will give credit for the methods, ideas, or assistance obtained from others.
14. A member in competition for supplying forestry services will encourage the prospective employer to base selection on comparison of qualifications and negotiation of fee or salary.
15. Information submitted by a member about a candidate for a prospective position, award, or elected office will be accurate, factual, and objective.
16. A member having evidence of violation of these canons by another member will present the information and charges to the Council in accordance with the Bylaws.

Adopted by the Society of American Foresters by Member Referendum, June 23, 1976, replacing the code adopted November 12, 1948, as amended December 4, 1971. The 1976 code was amended November 4, 1986, and November 2, 1992.

106TH CONGRESS
1ST SESSION

H. R. _____

IN THE HOUSE OF REPRESENTATIVES

Mrs. CHENOWETH introduced the following bill; which was referred to the Committee on _____

A BILL

To safeguard communities, lives, and property from catastrophic wildfire by authorizing contracts to reduce hazardous fuels buildups on forested Federal lands in wildland/urban interface areas while also using such contracts to undertake forest management projects to protect noncommodity resources.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

4 (a) SHORT TITLE.—This Act may be cited as the
5 "Community Protection and Hazardous Fuels Reduction
6 Act of 1999".

1 (b) TABLE OF CONTENTS.—The table of contents of
2 this Act is as follows:

Sec. 1. Short title; table of contents.
Sec. 2. Findings and purpose.
Sec. 3. Definitions.
Sec. 4. Identification of wildland/urban interface areas.
Sec. 5. Contracting to reduce hazardous fuels buildups and undertake forest management projects in wildland/urban interface areas.
Sec. 6. Monitoring requirements.
Sec. 7. Reporting requirements.
Sec. 8. Special funds.
Sec. 9. Termination of authority.
Sec. 11. Regulations.
Sec. 12. Authorization of appropriations.

3 **SEC. 2. FINDINGS AND PURPOSE.**

4 (a) FINDINGS.—The Congress finds the following:

5 (1) Management of Federal lands has been
6 characterized by large cyclical variations in fire sup-
7 pression policies, timber harvesting levels, and the
8 attention paid to commodity and noncommodity val-
9 ues.

10 (2) Forests on Federal lands are experiencing
11 significant disease epidemics and insect infestations.

12 (3) The combination of inconsistent manage-
13 ment and natural effects has resulted in a hazardous
14 fuels buildup on Federal lands that threatens cata-
15 strophic wildfire.

16 (4) While the long-term effect of catastrophic
17 wildfire on forests and forest systems is a matter of
18 debate, there should be no question that catastrophic
19 wildfire must be prevented in areas of the Federal

1 lands where wildlands abut, or are located in close
2 proximity to, communities, residences, and other pri-
3 vate and public facilities on non-Federal lands.
4 (5) Wildfire resulting from hazardous fuels
5 buildup in such wildland/urban interface areas
6 threatens the destruction of communities, puts
7 human life and property at risk, threatens commu-
8 nity water supplies with erosion that follows wildfire,
9 destroys wildlife habitat, and damages ambient air
10 quality.
11 (6) The Secretary of the Interior and the Sec-
12 retary of Agriculture must assign a high priority and
13 undertake aggressive management to reduce the risk
14 of wildfire in wildland/urban interface areas on Fed-
15 eral lands through the elimination of hazardous fuels
16 buildups in such areas. The protection of human life
17 and property and the protection of water supplies
18 and ambient air quality in wildland/urban interface
19 areas must be given the highest priority.
20 (7) The noncommodity resources of wildland/
21 urban interface areas on Federal lands, including
22 such resources as riparian zones and wildlife habi-
23 tats, which must be protected to provide recreational
24 opportunities, clean water, and other amenities to
25 neighboring communities and the public suffer from

1 a backlog of unfunded forest management projects
2 designed to provide such protection.
3 (8) In a period of fiscal austerity characterized
4 by shrinking budgets and personnel levels, Congress
5 must provide the Secretary of the Interior and the
6 Secretary of Agriculture with innovative tools to ac-
7 complish the required reduction in hazardous fuels
8 buildup and to undertake other forest management
9 projects in the wildland/urban interface areas on the
10 Federal lands at the least cost.
11 (b) PURPOSE.—The purpose of this Act is to provide
12 new authority and innovative tools to the Secretary of the
13 Interior and the Secretary of Agriculture—
14 (1) to safeguard communities, lives, and prop-
15 erty by reducing or eliminating the threat of cata-
16 strophic wildfire in wildland/urban interface areas on
17 Federal lands; and
18 (2) to undertake needed forest management
19 projects in such areas.
20 **SEC. 3. DEFINITIONS.**
21 As used in this Act:
22 (1) CONGRESSIONAL COMMITTEES.—The term
23 "congressional committees" means the Committee
24 on Resources and the Committee on Agriculture of
25 the House of Representatives and the Committee on

1 Energy and Natural Resources and the Committee
2 on Agriculture, Nutrition, and Forestry of the Sen-
3 ate.
4 (2) ELIGIBLE FOREST PRODUCTS SALE.—The
5 term "eligible forest products sale" means a sale of
6 forest products in a wildland/urban interface area
7 identified under section 4 conducted for the primary
8 purpose of reducing hazardous fuels buildups in the
9 area.
10 (3) FEDERAL LANDS.—The term "Federal
11 lands" means—
12 (A) federally managed lands administered
13 by the Bureau of Land Management under the
14 Secretary of the Interior; and
15 (B) federally managed forest lands created
16 from the public domain and administered by
17 the Secretary of Agriculture.
18 (4) FOREST MANAGEMENT PROJECT.—The
19 term "forest management project" means a project
20 designed to protect one or more noncommodity re-
21 sources on or in close proximity to Federal lands.
22 Such projects may include riparian zone enhance-
23 ment, habitat improvement, noncommercial hazard-
24 ous fuels reduction, and soil stabilization or other
25 water quality improvement project.

1 (5) FOREST PRODUCT.—The term "forest prod-
2 ucts" means any tree or tree part that can be used
3 for a commercial purpose.
4 (6) FUELS.—The term "fuels" includes forage,
5 woody debris, duff, needle cast, brush, understory,
6 ladder fuels, and dead or dying overstory.
7 (7) HAZARDOUS FUELS BUILDUP.—The term
8 "hazardous fuels buildup" means that level of fuels
9 accumulation, within a fire regime, in which an igni-
10 tion with the right combination of weather and topo-
11 graphic conditions can result in—
12 (A) a dangerous exposure of risk to fire-
13 fighters and the public;
14 (B) a high potential to cause risk of loss
15 to key components that define ecological re-
16 sources, capital investments, and private prop-
17 erty; or
18 (C) both subparagraphs (A) and (B).
19 (8) LAND MANAGEMENT PLAN.—The term
20 "land management plan" means the following:
21 (A) With respect to Federal lands de-
22 scribed in paragraph (3)(A), a land use plan
23 prepared by the Bureau of Land Management
24 pursuant to section 202 of the Federal Land
25 Policy and Management Act of 1976 (43 U.S.C.

1712), or other multiple-use plan currently in effect.

(B) With respect to Federal lands described in paragraph (3)(B), a land and resource management plan (or if no final plan is in effect, a draft land and resource management plan) prepared by the Forest Service pursuant to section 6 of the Forest and Rangeland Renewable Resources Planning Act of 1974 (16 U.S.C. 1604).

(9) SECRETARY CONCERNED.—The term "Secretary concerned" means—

(A) with respect to the Federal lands described in paragraph (3)(A), the Secretary of the Interior; and

(B) with respect to the Federal lands described in paragraph (3)(B), the Secretary of Agriculture.

(10) WILDLAND/URBAN INTERFACE AREA.—The term "wildland/urban interface area" means the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuel.

1 **SEC. 4. IDENTIFICATION OF WILDLAND/URBAN INTERFACE**
2 **AREAS.**

3 On or before September 30 of each year, each Dis-
4 trict Manager of the Bureau of Land Management and
5 each Forest Supervisor of the Forest Service shall identify
6 those areas on Federal lands within the jurisdiction of the
7 District Manager or Forest Supervisor that the District
8 Manager or Forest Supervisor determines—

9 (1) meet the definition of wildland/urban inter-
10 face areas; and

11 (2) have hazardous fuels buildups and other
12 forest management needs that warrant the use of
13 forest management projects as provided in section 5.

14 **SEC. 5. CONTRACTING TO REDUCE HAZARDOUS FUELS**
15 **BUILDUPS AND UNDERTAKE FOREST MAN-**
16 **AGEMENT PROJECTS IN WILDLAND/URBAN**
17 **INTERFACE AREAS.**

18 (a) CONTRACTING AUTHORITY.—

19 (1) REDUCTION OF HAZARDOUS FUELS.—The
20 Secretary concerned is authorized to enter into con-
21 tracts under this section for the sale of forest prod-
22 ucts in a wildland/urban interface area identified
23 under section 4 for the primary purpose of reducing
24 hazardous fuels buildups in the area.

25 (2) INCLUSION OF FOREST MANAGEMENT
26 PROJECTS.—As a condition of an eligible forest

1 products sale, the Secretary concerned may require
2 the purchaser of such products to undertake one or
3 more forest management projects in the wildland/
4 urban interface area. The Secretary concerned may
5 include a forest management project as a condition
6 in an eligible forest products sale only if the Sec-
7 retary determines that—
8 (A) the forest management project is con-
9 sistent with the applicable land management
10 plan; and
11 (B) the objectives of the forest manage-
12 ment project can be accomplished most cost ef-
13 ficiently and effectively when the project is per-
14 formed as part of the sale contract.
15 (b) FINANCING OF FOREST MANAGEMENT
16 PROJECTS.—
17 (1) FINANCING THROUGH SALES.—To finance a
18 forest management project required as a condition of
19 a contract for an eligible forest products sale, the
20 Secretary concerned shall include in the contract a
21 provision that reduces the amount otherwise re-
22 quired to be paid to the United States by the pur-
23 chaser for forest products sold under the contract by
24 the amount determined under paragraph (2) to off-

1 set costs incurred by the purchaser in carrying out
2 the required forest management project.
3 (2) AMOUNT OF REDUCTION OF PAYMENT.—
4 The amount of the price reduction in paragraph (1)
5 shall be equal to—
6 (A) the costs incurred by the purchaser in car-
7 rying out the required forest management project;
8 minus
9 (B) any assistance paid to the purchaser under
10 subsection (c) to cover those costs.
11 (c) SUPPLEMENTAL FUNDING USING APPROPRIATED
12 FUNDS.—The Secretary concerned may use appropriated
13 funds to assist the purchaser of forest products in a con-
14 tract for an eligible forest products sale to undertake a
15 forest management project required as a condition of the
16 contract, if the funds are provided from the resource func-
17 tion or functions that directly benefit from the perform-
18 ance of the project and are available from the annual ap-
19 propriation for such function or functions during the fiscal
20 year in which the sale is offered. The amount of assistance
21 to be provided for each forest management project shall
22 be included in the prospectus, and published in the adver-
23 tisement, for the eligible forest products sale.
24 (d) DETERMINATION OF FOREST MANAGEMENT
25 OFFSETS.—Prior to the advertisement of an eligible forest

1 products sale, the Secretary concerned shall determine the
2 maximum price reduction to be allowed under subsection
3 (b) for each forest management project to be required as
4 a condition of the sale contract. A description of the forest
5 management project, and the cost of the project that may
6 be offset against the purchaser's payment for forest prod-
7 ucts in the sale, shall be included in the prospectus, and
8 published in the advertisement, for the sale.

9 (e) EFFECT ON MONEYS RECEIVED.—Only the
10 amounts actually paid by a purchaser under a contract
11 for an eligible forest products sale shall be considered to
12 be money received for purposes of title II of the Act of
13 August 28, 1937 (50 Stat. 875; 43 U.S.C. 1181f), the
14 first section of the Act of May 24, 1939 (53 Stat. 753;
15 43 U.S.C. 1181f–1), the sixth paragraph under the head-
16 ing "FOREST SERVICE" in the Act of May 23, 1908
17 (35 Stat. 260; 16 U.S.C. 500), section 13 of the Act of
18 March 1, 1911 (36 Stat. 963; commonly known as the
19 Weeks Act; 16 U.S.C. 500), or other applicable law con-
20 cerning the distribution of receipts from the sale of forest
21 products on Federal lands.

22 (f) LIMITATION ON AMOUNT OF OFFSETS.—The
23 total amount by which purchase payments under contracts
24 for eligible forest products sales may be reduced under
25 subsection (b) each fiscal year—

1 (1) under contracts awarded by the Secretary of
2 the Interior, may not exceed $10,000,000; and
3 (2) under contracts awarded by the Secretary of
4 Agriculture, may not exceed $10,000,000.

5 **SEC. 6. MONITORING REQUIREMENTS.**

6 The Secretary concerned shall monitor the prepara-
7 tion and offering of contracts for eligible forest products
8 sales under section 5, and the performance of forest man-
9 agement projects under the contracts to determine the ef-
10 fectiveness of the contracts and forest management
11 projects in achieving the purpose of this Act.

12 **SEC. 7. REPORTING REQUIREMENTS.**

13 (a) ANNUAL REPORT.—Not later than 90 days after
14 the end of each full fiscal year in which contracts are en-
15 tered into under section 5, the Secretary concerned shall
16 submit to the congressional committees a report, which
17 shall provide for the Federal lands within the jurisdiction
18 of the Secretary concerned the following:
19 (1) A list of the wildland/urban interface areas
20 identified on or before September 30 of the previous
21 fiscal year pursuant to section 4.
22 (2) A summary of all contracts entered into,
23 and all forest management projects performed, pur-
24 suant to section 5 during the preceding fiscal year.

1 (3) A discussion of any delays in excess of three
2 months encountered during the preceding fiscal year,
3 and likely to occur in the fiscal year in which the re-
4 port is submitted, in preparing and offering the
5 sales, and in performing the forest management
6 projects, pursuant to section 5.
7 (4) The results of the monitoring required by
8 section 6 of the contracts authorized, and the forest
9 management projects performed, pursuant to section
10 5.
11 (5) Any anticipated problems in the implemen-
12 tation of this Act.
13 (b) FOUR YEAR REPORT.—The fourth report pre-
14 pared by the Secretary concerned under subsection (a)
15 shall contain, in addition to the matters required by sub-
16 section (a), an assessment by the Secretary concerned re-
17 garding whether the contracting authority provided in sec-
18 tion 5 should be reauthorized beyond the period specified
19 in section 9(a). If the Secretary concerned feels that reau-
20 thorization is warranted, the Secretary shall also include
21 such recommendations as the Secretary considers appro-
22 priate regarding changes in the authority to better achieve
23 the purpose of this Act.
24 **SEC. 8. SPECIAL FUNDS.**
25 (a) ESTABLISHMENT AND INITIAL FUNDING.—

1 (1) ESTABLISHMENT.—Notwithstanding any
2 other provision of law, not later than 30 days after
3 the date of enactment of this Act, the Secretary con-
4 cerned shall establish and maintain a special fund,
5 which shall be available without further appropria-
6 tion for the purposes of planning, offering, and man-
7 aging eligible forest products sales under section 5.
8 (2) INITIAL FUNDING SOURCES.—
9 (A) INTERIOR.—From amounts available
10 to the Secretary of the Interior for reduction of
11 hazardous fuels for the fiscal year in which this
12 Act is enacted, the Secretary of Interior shall
13 transfer $10,000,000 to the fund established by
14 the Secretary of the Interior pursuant to para-
15 graph (1).
16 (B) AGRICULTURE.—From amounts avail-
17 able to the Secretary of Agriculture for reduc-
18 tion of wildland fire hazardous fuels for the fis-
19 cal year in which this Act is enacted and each
20 of the three following fiscal years, the Secretary
21 of Agriculture shall transfer $10,000,000 each
22 of such fiscal years to the fund established by
23 the Secretary of Agriculture pursuant to para-
24 graph (1).

1 (b) REPLENISHMENT OF FUNDS.—The Secretary
2 concerned shall deposit in the fund established by the Sec-
3 retary under subsection (a) all receipts from each contract
4 for an eligible forest products sale conducted by that Sec-
5 retary under section 5, minus the amount required to be
6 distributed under a provision of law referred to section
7 5(e).
8 (c) TERMINATION.—
9 (1) IN GENERAL.—The Secretary concerned
10 shall terminate the fund established by that Sec-
11 retary under subsection (a) at the expiration of the
12 last day of the fifth full fiscal year occurring after
13 the date of the enactment of this Act.
14 (2) TREATMENT OF BALANCE AND FUTURE RE-
15 CEIPTS.—Any moneys remaining in a fund estab-
16 lished under subsection (a) on the termination date
17 of the fund, and any receipts received after that day
18 from eligible forest products sales under section 5—
19 (A) shall be available to the Secretary of
20 the Interior for the reduction of hazardous
21 fuels, in the case of moneys remaining in the
22 fund established by the Secretary of the Inte-
23 rior and receipts for forest products from Fed-
24 eral lands within the jurisdiction of that Sec-
25 retary; and

1 (B) shall be available to the Secretary of
2 Agriculture for reduction of wildland fire haz-
3 ardous fuels, in the case of moneys remaining
4 in the fund established by the Secretary of Ag-
5 riculture and receipts for forest products from
6 Federal lands within the jurisdiction of that
7 Secretary.

8 **SEC. 9. TERMINATION OF AUTHORITY.**

9 (a) TERMINATION DATE.—The authority of the Sec-
10 retary concerned to offer eligible forest products sales
11 under section 5, and to require the purchasers of such
12 products to undertake forest management projects as a
13 condition of such sales, shall terminate at the end of the
14 five-fiscal year period beginning on the first October 1st
15 occurring after the date of the enactment of this Act.

16 (b) EFFECT ON EXISTING SALES.—Any contract for
17 an eligible forest products sale under section 5 entered
18 into before the end of the period specified in subsection
19 (a), and still in effect at the end of such period, shall re-
20 main in effect after the end of such period pursuant to
21 the terms of the contract.

22 **SEC. 11. REGULATIONS.**

23 Not later than 180 days after the date of the enact-
24 ment of this Act, the Secretary concerned shall prescribe

1 such regulations as are necessary and appropriate to im-
2 plement this Act.

3 **SEC. 12. AUTHORIZATION OF APPROPRIATIONS.**

4 There are authorized to be appropriated for each of
5 the first five fiscal years beginning after the date of the
6 enactment of this Act such sums as may be necessary to
7 carry out this Act.

BRIEFING PAPER

CHAIRMAN'S DRAFT
H.R. ____, "The Community Protection and Hazardous Fuels Reduction Act of 1999"
February 9, 1999

SUMMARY

In the 105th Congress, Chairman Helen Chenoweth introduced H.R. 2458, the "Community Protection and Hazardous Fuels Reduction Act of 1997," on September 11, 1997. The Subcommittee on Forests and Forest Health held a hearing on Tuesday, September 23, 1997.

In the 106th Congress, the Chairman plans to reintroduce the bill that would provide authority to the Secretary of Agriculture and the Secretary of the Interior to safeguard communities, lives, and property from catastrophic wildfire. It authorizes the Secretaries to eliminate hazardous fuels buildup and undertake other forest management projects to protect noncommodity resources on Federal lands that are located in close proximity to rural communities and urban areas.

BACKGROUND

According to the Forest Service, large areas of national forests in the Interior West are in poor health. Symptoms include tree stands that are too dense with crowded small trees, undergrowth and accumulated dead materials on the ground. Also, the composition of trees has changed, with an increasing amount of fire-intolerant trees replacing the more fire resistant species. The incidence of epidemic disease and insect infestations has also increased. These conditions have developed from a lack of forest management activities and effective suppression.

In these dense stands, where many small dead and dying trees often form fuel "ladders" to the crowns of larger trees, wildfires have become large, intense, and catastrophic. Catastrophic wildfires compromise the Forest Service's ability to implement Congressional directives to manage national forests for multiple uses and for sustained yield of renewable resources. These wildfires damage water supplies, adversely affect ambient air quality, and destroy fish and wildlife habitat. Also, the damage caused by catastrophic wildfires to the soil substantially reduces the ability of the land to support future stands of trees and greatly increases the potential for massive soil erosion.

In addition, catastrophic wildfires pose hazards to human health, safety, and property. At the beginning of the century, a clear delineation existed between the urban center and what was considered rural America. This no longer exists. Over time, cities have grown into suburbs, and suburbs have blended in to what was once considered rural. This complex landscape has come to be known as the wildland/urban interface. Forests and grasslands are intermixed with housing, businesses, farms and other developments, posing new challenges for fire management and suppression.

From fiscal year 1986 through fiscal year 1994, the 10-year rolling average of annual costs for fighting fires grew from $134 million to $335 million, or by 150%. It is now approaching $1 billion annually. In 1996, wildfires burned over 6 million acres and cost nearly one billion dollars to fight. While not the biggest fire season ever (in 1930 over 52 million acres were scorched), the 1996 fire season is regarded by many fire experts as the most severe. The largest contributing factor to this consensus was the fire intensity caused by the accumulated fuel buildup. According to a GAO report, congressional efforts to reduce these buildups are, "[a] race against time.... before damage from uncontrollable wildfires becomes widespread..."

ADMINISTRATION POSITION

On September 23, 1997, the Administration testified that it: agrees with the stated purpose of H.R. 2458; could not support the bill as introduced; and would be willing to work with the Committee to address its concerns. The legislation has been revised in the Chairman's draft to address these concerns.

KEY PROVISIONS OF THE LEGISLATION:

- Allow the U.S. Forest Service and the Bureau of Land Management (BLM) to issue timber sale contracts in the urban/wildland interface (areas surrounding communities and homes) to reduce hazardous wildfire fuel buildup in these priority areas.
- Allow the Forest Service and BLM to use revenue generated from these sales to reduce noncommercial fuels buildup and conduct other forest management projects in the sale area to improve forest health, wildlife and fish habitat, riparian areas, streams and water quality, and achieve other forest objectives.
- Require that the appropriate cabinet secretary submit an annual report to Congress detailing their application of the Act.
- Assure that all sales comply with all existing environmental laws.
- Authorize the program for a total of five years.

WHAT THE BILL ACCOMPLISHES:

- Protects forests, human life and property.
- Helps local communities reduce the accumulation of wildland fuels on adjacent public lands. The unnatural accumulation of dead and dying trees, prolonged drought in the West, and the proximity of homes to forests have created a very dangerous situation.
- Improves forest health and water quality by allowing the use of revenue generated from the authorized sales to be used for projects to achieve these objectives.

Staff Contact: Doug Crandall, Subcommittee on Forests and Forest Health at x5-0691.

"Community Protection and Hazardous Fuels Reduction Act of 1999"

Sponsor - Chairman Helen Chenoweth

Key Provisions of this legislation would:

* Allow the U.S. Forest Service and the Bureau of Land Management (BLM) to make timber sale contracts in the urban/wildland forest areas to reduce hazardous wildfire fuels buildup.

* Allow Forest Service and BLM to use revenue generated from these sales to reduce noncommercial fuels buildup and conduct other forest health projects in the sale area.

* Require that the appropriate cabinet secretary submit an annual report to Congress detailing their application of the Act.

* Assure that all sales comply with all existing environmental laws.

* Authorize the program for a total of five years.

Talking Points:

- Protects forests, human life and property.

- Legislation would help local communities to reduce the chances of catastrophic wildfire in national forests surrounding them.

- The unnatural accumulation of dead and dying trees, prolonged drought in the West, and the proximity of homes to forests have created a very dangerous situation.

- Fire in communities that are near national forests are the most costly to contain, the most damaging to property and life, require the most sophisticated fire fighting techniques and the highest coordination among local, state and federal agencies.

- Bill would improve forest health and water quality by allowing the use of revenue generated from these sales to be used for projects that improve watersheds and improve the health of the forest.

- The GAO recently reported that wildland/urban interface areas are the most costly and hazardous locations in which to fight fires and that any strategic fuels reduction program must have a primary focus in these areas.

- The GAO recently reported, congressional efforts to reduce unnatural buildups are a , "race against time.... before damage from uncontrollable wildfires becomes widespread..."

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